As filed with the Securities and Exchange Commission on June 28, 2018

Registration No. 333-

UNITED STATES
SECURITIES AND EXCHANGE COMMISSION
WASHINGTON, D.C. 20549

FORM S-1
REGISTRATION STATEMENT
UNDER
THE SECURITIES ACT OF 1933

Bionano Genomics, Inc.
(Exact Name of Registrant as Specified in its Charter)

Delaware	3826	26-1756290
(State or Other Jurisdiction of Incorporation or Organization)	(Primary Standard Industrial Classification Code Number)	(I.R.S. Employer Identification Number)

Bionano Genomics, Inc.
9640 Towne Centre Drive, Suite 100
San Diego, California 92121
(858) 888-7600
(Address, Including Zip Code, and Telephone Number, Including Area Code, of Registrant's Principal Executive Offices)

R. Erik Holmlin, Ph.D.
President and Chief Executive Officer
Bionano Genomics, Inc.
9640 Towne Centre Drive, Suite 100
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(858) 888-7600
(Name, address, including zip code, and telephone number, including area code, of agent for service)

Copies to:

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Approximate date of commencement of proposed sale to the public: As soon as practicable after the effective date of this registration statement.

If any of the securities being registered on this Form are to be offered on a delayed or continuous basis pursuant to Rule 415 under the Securities Act of 1933, check the following box: ☐

If this Form is filed to register additional securities for an offering pursuant to Rule 462(b) under the Securities Act, please check the following box and list the Securities Act registration statement number of the earlier effective registration statement for the same offering. ☐

If this Form is a post-effective amendment filed pursuant to Rule 462(c) under the Securities Act, check the following box and list the Securities Act registration statement number of the earlier effective registration statement for the same offering. ☐

If this Form is a post-effective amendment filed pursuant to Rule 462(d) under the Securities Act, check the following box and list the Securities Act registration statement number of the earlier effective registration statement for the same offering. ☐

Indicate by check mark whether the registrant is a large accelerated filer, an accelerated filer, a non-accelerated filer, a smaller reporting company or an emerging growth company. See the definitions of "large accelerated filer," "accelerated filer," "smaller reporting company" and "emerging growth company" in Rule 12b-2 of the Exchange Act.

Large accelerated filer	☐	Accelerated filer	☐
Non-accelerated filer	☐ (Do not check if a smaller reporting company)	Smaller reporting company	☒
		Emerging growth company	☒

If an emerging growth company, indicate by check mark if the registrant has elected not to use the extended transition period for complying with any new or revised financial accounting standards provided to Section 7(a)(2)(B) of the Securities Act. ☐

CALCULATION OF REGISTRATION FEE

Title of each Class of Securities to be Registered	Proposed Maximum Aggregate Offering Price(1)(2)	Amount of Registration Fee
Common stock, par value $0.0001 per share(3)	$34,500,000	$4,295.25

(1) Estimated solely for the purpose of calculating the registration fee in accordance with Rule 457(o) of the Securities Act of 1933, as amended.
(2) Includes the aggregate offering price of additional shares that the underwriters have the option to purchase, if any.
(3) In accordance with Rule 416(a), the Registrant is also registering hereunder an indeterminate number of additional shares of Common Stock that shall be issuable pursuant to Rule 416 to prevent dilution resulting from stock splits, stock dividends or similar transactions.

The Registrant hereby amends this Registration Statement on such date or dates as may be necessary to delay its effective date until the Registrant will file a further amendment which specifically states that this Registration Statement will thereafter become effective in accordance with Section 8(a) of the Securities Act of 1933, as amended, or until the Registration Statement will become effective on such date as the Securities and Exchange Commission, acting pursuant to said Section 8(a), may determine.

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The information in this preliminary prospectus is not complete and may be changed. We may not sell these securities until the registration statement related to these securities filed with the Securities and Exchange Commission is declared effective. This prospectus is not an offer to sell or a solicitation of an offer to buy these securities and we are not soliciting offers to buy these securities in any state where the offer or sale is not permitted.

PRELIMINARY PROSPECTUS SUBJECT TO COMPLETION, DATED June 28, 2018

Shares

Common Stock

We are offering shares of our common stock. This is our initial public offering and no public market currently exists for our common stock. The initial public offering price of our common stock is expected to be between $ and $ per share. We have applied to list our common stock on The Nasdaq Global Market under the symbol "BNGO."

We are an "emerging growth company" as defined by the Jumpstart Our Business Startups Act of 2012, and as such, have elected to comply with reduced public company reporting requirements and may elect to comply with reduced public company reporting requirements in future filings.

Investing in our common stock involves risks. See "Risk Factors" beginning on page 11 of this prospectus for a discussion of the risks that you should consider in connection with an investment in our securities.

	Per Share	Total
Initial public offering price	$	$
Underwriting discounts and commissions(1)	$	$
Proceeds to Bionano Genomics, Inc. (before expenses)	$	$

(1) See "Underwriting" beginning on page 119 for additional information regarding underwriting compensation.

We have granted the underwriters an option to buy up to an additional shares of common stock from us at the initial public offering price, less the underwriting discounts and commissions, to cover over-allotments, if any. The underwriters may exercise this option at any time during the 30-day period from the date of this prospectus.

The underwriters expect to deliver the shares against payment on or about , 2018.

Neither the Securities and Exchange Commission nor any other regulatory body has approved or disapproved of these securities or passed upon the accuracy or adequacy of this prospectus. Any representation to the contrary is a criminal offense.

Sole Book-Running Manager

Roth Capital Partners

Lead Manager

Maxim Group LLC

The date of this prospectus is , 2018.

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Neither we nor any of the underwriters have authorized anyone to provide you with any information or to make any representations other than as contained in this prospectus or in any free writing prospectuses we have prepared. Neither we nor the underwriters take responsibility for, and provide no assurance about the reliability of, any information that others may give you. This prospectus is an offer to sell only the shares offered hereby, but only under circumstances and in jurisdictions where it is lawful to do so. The information contained in this prospectus is accurate only as of the date of this prospectus, regardless of the time of delivery of this prospectus or any sale of the common stock. Our business, financial condition, results of operations and prospects may have changed since that date.

Unless otherwise indicated, all references in this prospectus to "Bionano," the "company," "we," "our," "us" or similar terms refer to Bionano Genomics, Inc. and its subsidiaries.

No action is being taken in any jurisdiction outside the U.S. to permit a public offering of our common stock or possession or distribution of this prospectus in any such jurisdiction. Persons who come into possession of this prospectus in jurisdictions outside the U.S. are required to inform themselves about and to observe any restrictions about this offering and the distribution of this prospectus applicable to those jurisdictions.

Through and including , 2018 (the 25th day after the date of this prospectus), all dealers effecting transactions in these securities, whether or not participating in this offering, may be required to deliver a prospectus. This is in addition to a dealer's obligation to deliver a prospectus when acting as an underwriter and with respect to an unsold allotment or subscription.

PROSPECTUS SUMMARY

This summary highlights information contained elsewhere in this prospectus. This summary does not contain all of the information you should consider before investing in our common stock. You should read this entire prospectus carefully, including "Risk Factors," "Management's Discussion and Analysis of Financial Condition and Results of Operations," and our financial statements and the related notes included elsewhere in this prospectus, before making an investment decision.

BIONANO GENOMICS, INC.

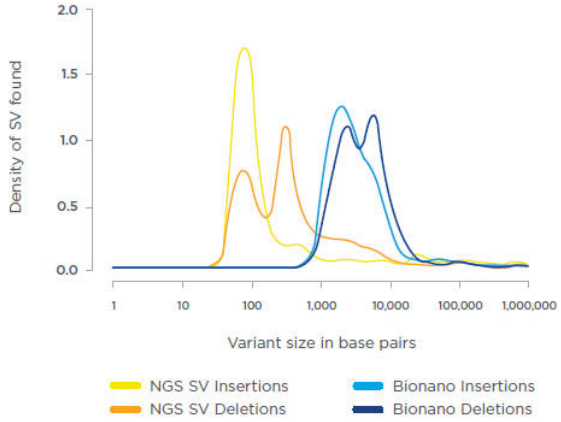
Overview

We are a life sciences instrumentation company in the genome analysis space. We develop and market the Saphyr system, a platform for ultra-sensitive and ultra-specific structural variation detection that enables researchers and clinicians to accelerate the search for new diagnostics and therapeutic targets and to streamline the study of changes in chromosomes, which is known as cytogenetics. Our Saphyr system comprises an instrument, chip consumables, reagents and a suite of data analysis tools.

Structural variation refers to large-scale structural differences in the genomic DNA of one individual compared to another. Each structural variation involves the rearrangement or repetition of as few as hundreds to as many as tens of millions of DNA base pairs. Structural variations may be inherited or arise spontaneously and many cause genetic disorders and diseases. Until our commercial launch of the Saphyr system in February 2017, and since, we believe no products existed or exist that could more comprehensively and cost and time-efficiently detect structural variation.

We have established relationships with key opinion leaders in genomics research and clinical applications, including rare diseases and oncology, and our installed base of over 90 systems made up of Saphyr and its predecessor includes some of the world's most prominent clinical, translational research, basic research, academic and government institutions as well as leading pharmaceutical and diagnostic companies. Examples include Children's National Health System, DuPont Pioneer, Garvan Institute of Medical Research, Genentech, Icahn School of Medicine at Mount Sinai, McDonnell Genome Institute at Washington University, National Cancer Institute, National Institutes of Health, Pennsylvania State University and Salk Institute for Biological Studies.

Approximately 6,000 research use only, or RUO, high throughput sequencers are currently installed worldwide. Sequencing is very good at detecting genome differences involving just a few base pairs or single-nucleotide variations, but sequencing, including next-generation sequencing, or NGS, cannot reliably detect the larger structural variations that our system can detect. Therefore, Saphyr is being adopted alongside this installed base of sequencers as a complement that gives users the ability to see a much wider scope of genome variation than ever before. As shown in the graphic below, the Garvan Institute of Medical Research generated data that we expect to be published which shows the density of structural variations found relative to the size of the structural variation found for our system (blue lines) against next-generation sequencing (Illumina; orange lines). Next-generation sequencing has a very significant deficiency in detecting structural variations. Given our system's ability to detect structural variations, it picks up essentially where next-generation sequencing drops off, as shown below.



The Saphyr system, which is for RUO, is also beginning to be adopted by cytogenetics labs that seek to use it in commercial clinical tests of its patients as a laboratory developed test, or LDT. These labs currently rely on existing methods such as karyotyping, fluorescence in situ hybridization, or FISH, and microarrays for clinical tests and research that look at chromosomal structure, location and function in cells. Major guidelines for oncology and genetic disease clinical diagnostics recommend first-line structural variation testing by these existing methods. The organizations issuing these guidelines include, among many others, World Health Organization (WHO), National Comprehensive Cancer Network (NCCN), American College of Medical Genetics (ACMG) and American College of Obstetricians & Gynecologists (ACOG).

We estimate that approximately 2,500 clinical cytogenetics labs exist worldwide. We believe Saphyr makes clinical testing for structural variations simpler, higher throughput, more cost effective and more scalable. In addition, we believe that Saphyr makes it easier for cytogenetics labs to accommodate new content when the research community validates newly discovered structural variation-based biomarkers for clinical diagnostics. Importantly, Saphyr can be used alone to provide comprehensive detection of structural variations and enable diagnostic calls without the need for any sequencing or cytogenetic technology.

Saphyr and its predecessor system, which we collectively refer to as our system in this prospectus, have been cited by researchers and clinicians in approximately 130 publications covering structural variations in areas of high unmet medical need and research interest, such as rare and undiagnosed pediatric diseases, muscular diseases, developmental delays and disorders, prostate cancer and leukemia.

Market Opportunity

According to Research and Markets, the worldwide market for genomics products and services is expected to reach approximately $23.9 billion by 2022, up from approximately $14.7 billion in 2017, representing a compound annual growth rate of 10.2%.

We believe that the discovery research and cytogenetics segments together comprise an addressable opportunity for us to sell up to approximately 8,500 Saphyr systems, representing a current total instrument market opportunity of approximately $2.1 billion. In addition to the instrument sales opportunity, Saphyr instruments generate recurring revenue from chip consumables that are used on a per-sample basis. We believe each Saphyr instrument has the potential to create recurring revenue in a range of approximately $75,000 to approximately $150,000 per year, suggesting a potential annual recurring revenue opportunity of approximately $0.6 billion to approximately $1.3 billion. Therefore, we believe that our currently addressable portion of the genome analysis market is estimated to be between $2.7 billion and $3.4 billion.

Existing Technologies and Their Limitations

Even though both single nucleotide variation and structural variation are each very common, a much larger number of variant nucleotides in the average human genome are found in structural variations as compared to single nucleotide variations. A recent study showed that 30 million base pairs, on average, in the human genome are part of structural variations while only 10 million are single nucleotide variations. Sequencing and cytogenetics simply do not elucidate comprehensive structural variations in a systematic and cost- and time-efficient manner. Most structural variations found to date that have been implicated in disease were discovered through laborious, expensive, unindustrialized and non-comprehensive methods over the course of many years.

The Limitations of Sequencing

Nearly all genome sequencing, including next-generation sequencing, uses a method called sequencing by synthesis. Sequencing by synthesis is an in-vitro process for synthesizing a copy of DNA, one base at a time in a way that makes it possible to measure the identity of each base as it is incorporated into the growing DNA copy. The read lengths typical for next-generation sequencing are often too short to determine the right location and orientation of a reading frame in the genome because many of the reads from one chromosome are identical to reads from either another chromosome or even another location on the same chromosome. These short lengths disconnect and destroy most of the structural information of the original genome and make next-generation sequencing unable to reliably detect genomic variations larger than a few hundred base pairs.

The recognition of the need for greater lengths of sequence reads to determine genome structure, birthed the so-called long-read sequencing submarket. Because of the need for long-read sequencing, Pacific Biosciences of California developed a system that uses another alternative form of sequencing by synthesis, while Oxford Nanopore Technologies developed a system that uses nanopore technology. These systems provide users with average read lengths in the tens of thousands of base pairs. However, these read lengths have proven not to be long enough to reliably and comprehensively detect structural variations. Pacific Biosciences' polymerases cannot regularly produce reads that are the necessary hundreds of thousands of base pairs in length. In addition, Oxford Nanopore's system has difficulty reliably feeding molecules that are, on average, hundreds of thousands of base pairs in length through each nanopore. The time and cost of providing a comprehensive whole genome analysis of a patient in a clinical setting is prohibitive when using these longer-read technologies.

The Limitations of Cytogenetics

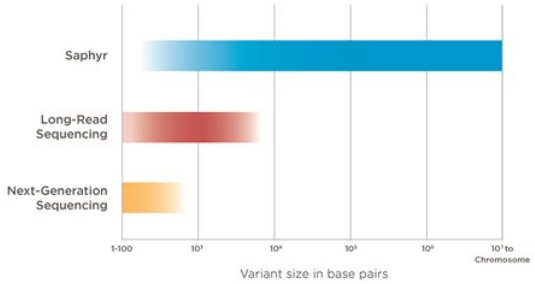
Cytogenetics is the study of chromosomal structure and how structural variations impact health. The field has historically relied on karyotyping, FISH and more recently, microarrays. These methods each can detect some structural variations, but they are all inadequate solutions for high volume and low cost genetic testing for structural variations, and none is an approach that can comprehensively detect structural variations with the ultra-high sensitivity and ultra-high specificity of the Saphyr system.

- Karyotyping is the gross optical examination of the chromosomes using a microscope. In this method, chromosomes are directly viewed on a slide by a pathologist with a microscope, resulting in resolution that is limited to structural events that are larger than five million base pairs. When karyotyping is used to diagnose unknown genetic disease, only about 5% of karyotyping tests result in a confirmed pathogenic finding. The test is costly, and its results are subject to each pathologist's interpretation which introduces variability in diagnostic calls and makes the methodology not amenable to automation.
- FISH is a molecular cytogenetic technique that is used to detect chromosomal aberrations. FISH is limited to known targets and cannot be used for discovery. Every FISH test performed needs to be chosen to look for a specific genetic marker that the clinician anticipates may be found based on the clinical symptoms of the patient. In addition, the test results can be ambiguous and inconclusive, and reproducibility and variability among users can be a significant issue. Like karyotyping, FISH's diagnostic yield is very low when used to diagnose unknown genetic disease with only an estimated 7% of FISH providing a confirmed pathogenic finding. In addition, FISH is expensive, especially for the limited amount of information that it provides.
- Chromosomal microarrays and SNP (single nucleotide polymorphism) arrays are tests consisting of slides that contain thousands of spots of DNA fragments that bind to the DNA of the sample. Microarrays have limited utility as a diagnostic tool as they are only useful when there are gains and losses of base pairs within the sample's genome that are specific to the probes that are populated on the array. Microarrays are also limited in their ability to provide specific locations of gains or losses on a chromosome, or even identify on which chromosome that the gains or losses occur. In addition, microarrays have low resolution as they cannot reliably detect structural variants smaller than 50,000 base pairs. Also, the diagnostic yield of microarrays is low. Only an estimated 20% of microarray tests provide a confirmed pathogenic finding when used to diagnose unknown genetic disease.

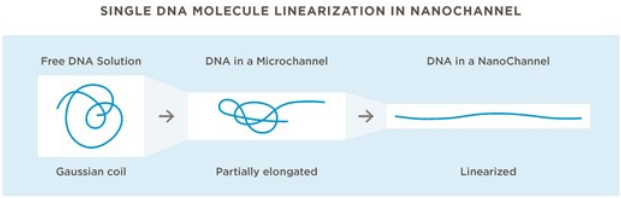
Our Solution

Our approach to measuring genome structure and structural variation is novel and highly differentiated. Our Saphyr system directly observes extremely long genomic DNA without any amplification to construct a physical map that accurately assigns the chromosomal location, order, orientation and quantity of all the genome's functional elements. Our solution is built upon four key elements:

- **Extremely long molecules for analysis.** The Saphyr system is capable of analyzing single molecules that are on average approximately 250,000 base pairs long. These lengths are over 1,000 times longer than the average read length with Illumina systems and approximately 10 times longer than the average read lengths with Pacific Biosciences and Oxford Nanopore systems. Building a picture of the genome with massive building blocks overcomes the inherent challenge of genome complexity and is the key to Saphyr's unprecedented sensitivity and specificity.



- **Proprietary nanotechnology for massively parallel linearization and analysis of long molecules with single molecule imaging.** Analyzing these extremely long chromosomal fragments required invention. Molecules of this size are more like balls of yarn in a test tube and must be unraveled for meaningful analysis. We invented, patented, developed and commercialized nanochannel arrays to capture them from solution and unwind and linearize them for structural variation analysis. Each molecule is imaged separately, making it possible to deconvolute complex mixtures including haplotypes and heterogeneous tumors, as shown in the graphic below.



- **DNA labeling chemistry specifically for physical mapping**. The detailed analysis of sequence we use is also highly unique and novel. Instead of identifying the sequence of every base pair in these long fragments, we label and detect specific sequence patterns or motifs that occur universally across every genome with an average frequency of approximately one site for every few thousand base pairs.
- **Bioinformatic tools for structural variation analysis.** Finally, our approach includes a novel bioinformatics platform that we developed from the ground-up to take advantage of the unique benefits of our solution. It comprises proprietary algorithms for the construction of a structurally accurate physical map of the genome without using a reference genome in assignment of structure. Physical maps of a test subject are then compared in cross-mapping analysis that allows our system to detect genome wide structural variation, including the most complex balanced events.

Our Focus Areas

Our Saphyr system serves many segments of the genomics market seeking to find and understand structural variation. We have identified focus areas where we concentrate our resources to ensure robust adoption of our system and frequent utilization of consumables. We have selected these segments because of their urgent need to detect structural variations and the significant economic opportunity they represent. Our current focus areas are human genetic diseases, including rare diseases and oncology.

- **Rare diseases.** In genetic disease, existing tools have reached a plateau where almost half of patients with genetic disease who are tested in clinical laboratories fail to receive a molecular diagnosis. In order to increase diagnostic yield, a massive increase in the understanding of the complete structure and variation of the genome is essential.
- **Cancer.** In cancer, each patient has a unique disease with a complex pattern of genome changes. Traditional and recently-developed treatments do not attack the individual changes in each patient's tumor. Recent personalized medicine programs aim to provide clinicians with individual treatments specifically targeting the mutations found in each patient's cancer. For personalized cancer medicine to be successful, all variants in the cancer genome need to be detected, which is not feasible with cytogenetic or whole genome sequencing approaches.

Our Saphyr system, which is for RUO, is being used for basic and translational research and also beginning to be adopted by cytogenetics labs that seek to use it in commercial clinical tests of its patients as an LDT.

Our Strengths

We have established ourselves as one of the leaders in the field of genome analysis, and we believe we are the industry's performance leader in structural variation detection. Below are our strengths that we believe will enable us to capture a significant portion of the genome analysis market and retain our leadership position in structural variation:

- ***Highly differentiated technology platform enables researchers and clinicians to obtain information that cannot be had systematically and cost efficiently from traditional technologies.*** Saphyr's unique ability to systematically and cost efficiently see structural variations across the genome from 500 base pairs to tens of millions of base pairs is unique in the industry. We believe this greater insight will facilitate a paradigm shift in healthcare from an emphasis on treatment with relatively untargeted therapies to a focus on earlier detection, more precise diagnosis and treatment with better targeted therapies.
- ***Validated solution recognized industry-wide.*** We have deep and expanding scientific validation as evidenced by the quickly expanding base of publications regarding our system. We believe our technology is becoming a vital tool in cutting-edge life sciences research.

- ***Strong installed base of premier customers.*** We have sold more than 90 of our systems to over 80 customers globally, including some of the world's most prominent clinical, translational research, basic research, academic and government institutions as well as leading pharmaceutical and diagnostic companies.
- ***Attractive business model with a growing, high-margin recurring revenue component.*** As we continue to grow our installed base of Saphyr systems, optimize workflows and expand our structural variation detection capabilities, we expect to rapidly increase our high-margin revenues derived from consumables.
- ***Industry-leading intellectual property portfolio.*** We have developed a global patent portfolio that includes 43 issued patents across 14 patent families and an exclusively licensed portfolio of patents and applications from Princeton University, which includes 22 patents across two families. This global patent portfolio has filing dates ranging from 2001 to 2017.
- ***Highly experienced senior management team.*** We are led by a dedicated and highly experienced senior management team with significant industry experience and proven ability to develop novel solutions. Each of the members of our senior management has more than 20 years of relevant experience.

Our Strategy

Our goal is to enable new research in genomics to allow greater insight into their role in human health in ways that have not been possible with any other current research and diagnostic technologies.

Our strategy to achieve this includes:

- drive adoption of Saphyr in discovery research and cytogenetics markets;
- support the publication of findings with Saphyr by our customers and partners;
- expand gross margins through economies of scale and growing sales of consumables;
- continue to innovate our products and technologies; and
- partner with industry-leading companies and laboratories to accelerate adoption in clinical markets.

Risk Factors Summary

Investing in our common stock involves substantial risk. The risks described under the heading "Risk Factors" immediately following this summary may cause us to not realize the full benefits of our strengths or may cause us to be unable to successfully execute all or part of our strategy. Some of the more significant challenges include the following:

- we have incurred losses since we were formed and expect to incur losses in the future. We cannot be certain that we will achieve or sustain profitability;
- our quarterly and annual operating results and cash flows have fluctuated in the past and might continue to fluctuate, which could cause the market price of our common stock to decline substantially;
- we are an early, commercial-stage company and have a limited operating history, which may make it difficult to evaluate our current business and predict our future performance;
- if we are unable to maintain adequate revenue growth or do not successfully manage such growth, our business and growth prospects will be harmed;
- our future capital needs are uncertain and we may need to raise additional funds in the future;
- if our products fail to achieve and sustain sufficient market acceptance, our revenue will be adversely affected;
- our future success is dependent upon our ability to further penetrate our existing customer base and attract new customers;

- we are currently limited to "research use only" with respect to many of the materials and components used in our consumable products including our assays;
- in the near term, our business will depend on levels of research and development spending by academic and governmental research institutions and biopharmaceutical companies, a reduction in which could limit demand for our products and adversely affect our business and operating results;
- if we do not successfully manage the development and launch of new products, our financial results could be adversely affected;
- if the U.S. Food and Drug Administration determines that our products are medical devices or if we seek to market our products for clinical diagnostic or health screening use, we will be required to obtain regulatory clearance(s) or approval(s), and may be required to cease or limit sales of our then marketed products, which could materially and adversely affect our business, financial condition and results of operations. Any such regulatory process would be expensive, time-consuming and uncertain both in timing and in outcome;
- if we are unable to protect our intellectual property, it may reduce our ability to maintain any technological or competitive advantage over our competitors and potential competitors, and our business may be harmed; and
- our principal stockholders and management own a significant percentage of our stock and will be able to exert significant control over matters subject to stockholder approval.

Corporate Information

We were formed in January 2003 as BioNanomatrix LLC, a Delaware limited liability company. In August 2007, we became BioNanomatrix Inc., a Delaware corporation. In October 2011, we changed our name to BioNano Genomics Inc. Upon the filing of our amended and restated certificate of incorporation immediately prior to the closing of this offering, our name will be Bionano Genomics, Inc.

Our principal executive offices are located at 9640 Towne Centre Drive, Suite 100, San Diego, California 92121, and our telephone number is (858) 888-7600. Our website address is www.bionanogenomics.com. Information contained in, or that can be accessed through, our website is not incorporated by reference into this prospectus, and you should not consider information on our website to be part of this prospectus. Our design logo, "Bionano," and our other registered and common law trade names, trademarks and service marks are the property of Bionano Genomics, Inc.

We are an "emerging growth company" as defined in the Jumpstart Our Business Startups Act of 2012, or the JOBS Act. We may take advantage of certain exemptions from various public company reporting requirements, including not being required to have our internal control over financial reporting audited by our independent registered public accounting firm under Section 404 of the Sarbanes-Oxley Act of 2002, reduced disclosure obligations regarding executive compensation in our periodic reports and proxy statements, and exemptions from the requirements of holding a nonbinding advisory vote on executive compensation and any golden parachute payments. We may take advantage of these exemptions for up to five years or until we are no longer an "emerging growth company," whichever is earlier. In particular, in this prospectus, we have provided only two years of audited financial statements and have not included all of the executive compensation related information that would be required if we were not an emerging growth company. Accordingly, the information contained herein may be different than the information you receive from other public companies in which you hold stock.

In addition, the JOBS Act provides that an emerging growth company can take advantage of an extended transition period for complying with new or revised accounting standards. This provision allows an emerging growth company to delay the adoption of new or revised accounting standards that have different transition dates for public and private companies until those standards would otherwise apply to private companies. We have elected to use this extended transition period. As a result of this election, our timeline to comply with these standards will in many cases be delayed as compared to other public companies that are not eligible to take advantage of this election or have not made this election. Therefore, our financial statements may not be comparable to those of companies that comply with the public company effective dates for these standards.

The Offering

Common stock offered by us	shares
Common stock to be outstanding after this offering	shares
Option to purchase additional shares of common stock offered by us	shares
Use of proceeds	We estimate that our net proceeds from this offering will be $ million (or approximately $ million if the underwriters' option to purchase additional shares of our common stock from us is exercised in full), after deducting estimated underwriting discounts and commissions and estimated offering expenses payable by us. We intend to use the net proceeds we receive from this offering to expand our commercial capabilities in selling and marketing related to our products, to fund our ongoing research and development activities, and for general corporate purposes, including working capital, operating expenses and capital expenditures. See "Use of Proceeds" for additional information.
Risk factors	You should carefully read and consider the information in the section titled "Risk Factors" and all other information set forth in this prospectus before deciding to purchase any shares of our common stock.
Proposed Nasdaq trading symbol	We have applied to list our common stock on The Nasdaq Global Market under the symbol "BNGO."

The number of shares of our common stock that will be outstanding after this offering is based on 3,318,349 shares of common stock outstanding as of March 31, 2018, and excludes:

- 18,649,605 shares of our common stock issuable upon the exercise of stock options outstanding as of March 31, 2018 under our Amended and Restated 2006 Equity Compensation Plan, as amended, or 2006 Plan, with a weighted-average exercise price of $0.12 per share;
- shares of our common stock reserved for future issuance under our 2018 Equity Incentive Plan, or 2018 Plan, which will become effective once the registration statement of which this prospectus forms a part is declared effective, as well as any future increases in the number of shares of common stock reserved for issuance under our 2018 Plan and any shares underlying outstanding stock awards granted under our 2006 Plan that expire or are repurchased, forfeited, cancelled or withheld, as more fully described in the section titled "Executive Compensation – Equity Incentive Plans";
- shares of our common stock reserved for issuance under our 2018 Employee Stock Purchase Plan, or ESPP, which will become effective once the registration statement of which this prospectus forms a part is declared effective, and any automatic increases in the number of shares of common stock reserved for future issuance under our ESPP;
- shares of our common stock issuable upon the exercise of an outstanding warrant which, prior to the completion of this offering, is exercisable for 42,872 shares of our Series B convertible preferred stock;
- shares of our common stock issuable upon the exercise of outstanding warrants which, prior to the completion of this offering, are exercisable for 75,027 shares of our Series B-1 convertible preferred stock;
- shares of our common stock issuable upon the exercise of an outstanding warrant which, prior to the completion of this offering, is exercisable for 510,417 shares of our Series D convertible preferred stock;
- shares of our common stock issuable upon the exercise of an outstanding warrant which, prior to the completion of this offering, is exercisable for 291,667 shares of our Series D-1 convertible preferred stock; and
- shares of common stock issuable upon exercise of warrants to be issued to the Underwriters in connection with this offering, which will have an exercise price equal to 150% of the initial public offering price per share in this offering.

In addition, unless we specifically state otherwise, the information in this prospectus assumes or gives effect to:

- the filing of our amended and restated certificate of incorporation, which will be in effect upon the completion of this offering;

- the conversion of all of our outstanding shares of convertible preferred stock into an aggregate of 121,992,497 shares of common stock upon the closing of this offering;
- the net exercise of outstanding warrants to purchase shares of our Series B-1 convertible preferred stock for an aggregate of shares of common stock (based on an assumed initial public offering price of $ per share (the midpoint of the price range set forth on the cover page of this prospectus));
- the net exercise of outstanding warrants to purchase shares of our Series D convertible preferred stock for an aggregate of shares of common stock (based on an assumed initial public offering price of $ per share);
- the conversion of outstanding convertible promissory notes issued in February 2018 into shares of common stock (based on an assumed initial public offering price of $ per share (the midpoint of the price range set forth on the cover page of this prospectus);
- that the initial public offering price of our shares of common stock is $ per share, which is the midpoint of the price range set forth on the cover page of this prospectus;
- no exercise of the outstanding options described above;
- no exercise of the underwriters' option to purchase up to an additional shares of common stock from us in this offering; and
- a 1-for- reverse stock split of our common stock to be effected prior to the closing of this offering.

Summary Financial Data

The summary statement of operations data for the years ended December 31, 2016 and 2017 and the balance sheet data as of December 31, 2017 are derived from our audited financial statements that are included elsewhere in this prospectus. The summary statement of operations data for the three months ended March 31, 2017 and 2018 and the balance sheet data as of March 31, 2018 are derived from our unaudited financial statements that are included elsewhere in this prospectus. Our historical results are not necessarily indicative of our results in any future period and results from our interim period may not necessarily be indicative of the results of the entire year.

You should read the following summary financial data together with "Management's Discussion and Analysis of Financial Condition and Results of Operations" and our financial statements and the related notes included elsewhere in this prospectus. The summary financial data in this section are not intended to replace our financial statements and the related notes and are qualified in their entirety by the financial statements and related notes included elsewhere in this prospectus.

	Year ended December 31,		Three Months Ended March 31,	
	2016	2017	2017	2018
Total revenue	$ 6,792,789	$ 9,505,043	$ 1,720,754	$ 1,768,485
Operating expenses				
Cost of revenue	3,578,692	6,030,512	1,205,264	841,449
Research and development	11,431,941	12,009,170	3,190,416	2,367,093
Selling, general and administrative	12,950,572	14,079,658	3,513,059	2,895,404
Impairment of property and equipment	—	604,511	—	—
Total operating expenses	27,961,205	32,723,851	7,908,739	6,103,946
Interest expense	(470,072)	(590,927)	(142,294)	(301,981)
Other income	2,802,797	462,923	658,107	793,856
Provision for income taxes	(12,924)	(18,552)	(13,358)	(3,776)
Net loss	$ (18,848,615)	$ (23,365,364)	$ (5,685,530)	$ (3,847,362)
Net loss per share(1):				
Basic and diluted	$ (7.30)	$ (7.66)	$ (1.89)	$ (1.16)
Pro forma net loss per share(1):				
Basic and diluted				

(1) See Note 2 to our financial statements included elsewhere in this prospectus for a description of how we compute basic and diluted net income per share attributable to common stockholders and preferred stockholders and pro forma basic and diluted net loss per share attributable to common stockholders.

	As of March 31, 2018		
	Actual	Pro Forma(1)	Pro Forma As Adjusted(1)(2)
		(unaudited)	
Balance Sheet Data:			
Cash and cash equivalents	$ 7,552,716	$	$
Working capital	(13,006,514)		
Total assets	16,462,320		
Long-term debt	6,681,082		
Convertible note	13,329,843		
Total liabilities	27,472,007		
Convertible preferred stock	43,010,137	—	
Accumulated deficit	(58,113,398)		
Total stockholders' deficit	$ (54,019,824)		

(1) The pro forma balance sheet data gives effect to (i) the automatic conversion of all of our outstanding shares of convertible preferred stock into an aggregate of 121,992,497 shares of common stock, (ii) the net exercise of certain outstanding warrants to purchase shares of our Series B-1 convertible preferred stock for an aggregate of shares of common stock (based on an assumed initial public offering price of $ per share (the midpoint of the price range set forth on the cover page of this prospectus)), (iii) the net exercise of certain outstanding warrants to purchase shares of our Series D convertible preferred stock for an aggregate of shares of common stock (based on an assumed initial public offering price of $ per share (the midpoint of the price range set forth on the cover page of this prospectus)), and (iv) the conversion of approximately $13.4 million aggregate principal amount of outstanding convertible promissory notes plus accrued interest thereon into shares of common stock (based on an assumed initial public offering price of $ per share (the midpoint of the price range set forth on the cover page of this prospectus) and a conversation date of , 2018).

(2) The pro forma as adjusted balance sheet data reflects (i) the items described in footnote (1) above and (ii) our receipt of estimated net proceeds from the sale of shares of common stock at the assumed initial public offering price of $ per share, after deducting the estimated underwriting discounts and commissions and estimated offering expenses payable by us.

(3) A $1.00 increase (decrease) in the assumed initial public offering price of $ per share would increase (decrease) cash and cash equivalents, working capital, total assets, total liabilities, additional paid-in capital and total stockholders' (deficit) equity by $ million, assuming that the number of shares offered by us, as set forth on the cover page of this prospectus, remains the same, after deducting the estimated underwriting discounts and commissions. Similarly, each increase (decrease) of 1.0 million shares in the number of shares of common stock offered by us would increase (decrease) each of cash and cash equivalents, working capital, total assets, additional paid-in capital and total stockholders' (deficit) equity by $ million, assuming the assumed initial public offering price of $ per share remains the same, and after deducting the estimated underwriting discounts and commissions.

(4) Working capital is calculated as current assets minus current liabilities.

RISK FACTORS

Investing in our common stock involves a high degree of risk. You should consider and read carefully all of the risks and uncertainties described below, as well as other information included in this prospectus, including our financial statements and related notes appearing at the end of this prospectus, before making an investment decision. The risks described below are not the only ones facing us. The occurrence of any of the following risks or additional risks and uncertainties not presently known to us or that we currently believe to be immaterial could materially and adversely affect our business, financial condition or results of operations. In such case, the trading price of our common stock could decline, and you may lose all or part of your original investment. This prospectus also contains forward-looking statements and estimates that involve risks and uncertainties. Our actual results could differ materially from those anticipated in the forward-looking statements as a result of specific factors, including the risks and uncertainties described below.

Risks related to our financial condition and need for additional capital

We have incurred losses since we were formed and expect to incur losses in the future. We cannot be certain that we will achieve or sustain profitability.

We incurred net losses of $18.8 million and $23.4 million for the years ended December 31, 2016 and 2017, respectively. We incurred net losses of $5.7 million and $3.8 million for the three months ended March 31, 2017 and 2018, respectively. As of March 31, 2018, we had an accumulated deficit of $58.1 million. We cannot predict if we will achieve sustained profitability in the near future or at all. We expect that our losses will continue for the foreseeable future as we plan to invest significant additional funds toward expansion of our commercial organization and the development of our technology. In addition, as a public company, we will incur significant legal, accounting, and other expenses that we did not incur as a private company. These increased expenses will make it harder for us to achieve and sustain future profitability. We may incur significant losses in the future for a number of reasons, many of which are beyond our control, including the other risks described in this prospectus, the market acceptance of our products, future product development and our market penetration and margins.

Our quarterly and annual operating results and cash flows have fluctuated in the past and might continue to fluctuate, which could cause the market price of our common stock to decline substantially.

Numerous factors, many of which are outside our control, may cause or contribute to significant fluctuations in our quarterly and annual operating results. These fluctuations may make financial planning and forecasting uncertain. In addition, these fluctuations may result in unanticipated decreases in our available cash, which could negatively affect our business and prospects. In addition, one or more of such factors may cause our revenue or operating expenses in one period to be disproportionately higher or lower relative to the others. As a result, comparing our operating results on a period-to-period basis might not be meaningful. You should not rely on our past results as indicative of our future performance. Moreover, our stock price might be based on expectations of future performance that are unrealistic or that we might not meet and, if our revenue or operating results fall below the expectations of investors or securities analysts, the price of our common stock could decline substantially.

Our operating results have varied in the past. In addition to other risk factors listed in this section, some of the important factors that may cause fluctuations in our quarterly and annual operating results include:

- adoption of our systems and related products;
- the timing of customer orders to purchase our systems;
- the rate of utilization of consumables by our customers;
- receipt and timing of revenue for services provided by out data solutions service;
- the timing of the introduction of new systems, products, system and product enhancements and services; and
- the receipt and timing of revenue from our distribution and marketing arrangements.

In addition, a significant portion of our operating expense is relatively fixed in nature, and planned expenditures are based in part on expectations regarding future revenue. Accordingly, unexpected revenue shortfalls could decrease our gross margins and cause significant changes in our operating results from quarter to quarter. If this occurs, the trading price of our common stock could fall substantially.

We are an early, commercial-stage company and have a limited operating history, which may make it difficult to evaluate our current business and predict our future performance.

We are an early, commercial-stage company and have a limited commercial history. Our limited commercial history may make it difficult to evaluate our current business and makes predictions about our future success or viability subject to significant uncertainty. We will continue to encounter risks and difficulties frequently experienced by early, commercial-stage companies, including scaling up our infrastructure and headcount. If we do not address these risks successfully, our business will suffer.

If we are unable to maintain adequate revenue growth or do not successfully manage such growth, our business and growth prospects will be harmed.

We have experienced significant revenue growth in a short period of time. We may not achieve similar growth rates in future periods. Investors should not rely on our operating results for any prior periods as an indication of our future operating performance. To effectively manage our anticipated future growth, we must continue to maintain and enhance our financial, accounting, manufacturing, customer support and sales administration systems, processes and controls. Failure to effectively manage our anticipated growth could lead us to over-invest or under-invest in development, operational and administrative infrastructure; result in weaknesses in our infrastructure, systems, or controls; give rise to operational mistakes, losses, loss of customers, productivity or business opportunities; and result in loss of employees and reduced productivity of remaining employees.

Our continued growth could require significant capital expenditures and might divert financial resources from other projects such as the development of new products and services. As additional products are commercialized, we may need to incorporate new equipment, implement new technology systems, or hire new personnel with different qualifications. Failure to manage this growth or transition could result in turnaround time delays, higher product costs, declining product quality, deteriorating customer service, and slower responses to competitive challenges. A failure in any one of these areas could make it difficult for us to meet market expectations for our products, and could damage our reputation and the prospects for our business.

If our management is unable to effectively manage our anticipated growth, our expenses may increase more than expected, our revenue could decline or grow more slowly than expected and we may be unable to implement our business strategy. The quality of our products and services may suffer, which could negatively affect our reputation and harm our ability to retain and attract customers.

Our future capital needs are uncertain and we may need to raise additional funds in the future.

We believe that the net proceeds from this offering, together with our cash generated from commercial sales and our existing cash and cash equivalents, including the proceeds from our recent financings, will enable us to fund our operating expenses and capital expenditure requirements for at least the next 18 months. However, we may need to raise substantial additional capital to:

- expand our sales and marketing efforts to further commercialize our products;
- expand our research and development efforts to improve our existing products and develop and launch new products, particularly if any of our products are deemed by the U.S. Food and Drug Administration, or FDA, to be medical devices or otherwise subject to additional regulation by the FDA;
- seek FDA approval to market our existing products or new products utilized for diagnostic purposes;

- lease a larger facility or build out our existing facility as we continue to grow our employee headcount;
- hire additional personnel;
- enter into collaboration arrangements, if any, or in-license other products and technologies;
- add operational, financial and management information systems; and
- incur increased costs as a result of operating as a public company.

Our future funding requirements will depend on many factors, including:

- market acceptance of our products;
- the cost and timing of establishing additional sales, marketing and distribution capabilities;
- the cost of our research and development activities;
- the success of our existing distribution and marketing arrangements and our ability to enter into additional arrangements in the future; and
- the effect of competing technological and market developments.

We cannot assure you that we will be able to obtain additional funds on acceptable terms, or at all. If we raise additional funds by issuing equity or equity-linked securities, our stockholders may experience dilution. Future debt financing, if available, may involve covenants restricting our operations or our ability to incur additional debt. Any debt or equity financing may contain terms that are not favorable to us or our stockholders. If we raise additional funds through collaboration and licensing arrangements with third parties, it may be necessary to relinquish some rights to our technologies or our products, or grant licenses on terms that are not favorable to us. If we do not have, or are not able to obtain, sufficient funds, we may have to delay development or commercialization of our products. We also may have to reduce marketing, customer support or other resources devoted to our products or cease operations. Any of these factors could have a material adverse effect on our financial condition, operating results and business.

The recently passed comprehensive tax reform bill could adversely affect our business and financial condition.

On December 22, 2017, President Trump signed into law new legislation that significantly revises the Internal Revenue Code of 1986, as amended. The newly enacted federal income tax law, among other things, contains significant changes to corporate taxation, including reduction of the corporate tax rate from a top marginal rate of 35% to a flat rate of 21%, limitation of the tax deduction for interest expense to 30% of adjusted earnings (except for certain small businesses), limitation of the deduction for net operating losses to 80% of current year taxable income and elimination of net operating loss carrybacks, one time taxation of offshore earnings at reduced rates regardless of whether they are repatriated, elimination of U.S. tax on foreign earnings (subject to certain important exceptions), immediate deductions for certain new investments instead of deductions for depreciation expense over time and modifying or repealing many business deductions and credits (including reducing the business tax credit for certain clinical testing expenses incurred in the testing of certain drugs for rare diseases or conditions). Notwithstanding the reduction in the corporate income tax rate, the overall impact of the new federal tax law is uncertain, and our business and financial condition could be adversely affected. In addition, it is unknown if and to what extent various states will conform to the newly enacted federal tax law. The impact of this tax reform on holders of our common stock is likewise uncertain and could be adverse. We urge our stockholders to consult with their legal and tax advisors with respect to this legislation and the potential tax consequences of investing in or holding our common stock.

Our ability to use net operating losses to offset future taxable income may be subject to limitations.

As of March 31, 2018, we had aggregate U.S. net operating loss carryforwards of approximately $30.5 million and aggregate U.S. research and development credits of approximately $4.1 million.

These net operating loss carryforwards could expire unused and be unavailable to offset future income tax liabilities. Under the newly enacted federal income tax law, federal net operating losses incurred in 2018 and in future years may be carried forward indefinitely, but the deductibility of such federal net operating losses is limited. It is uncertain if and to what extent various states will conform to the newly enacted federal tax law. In addition, under Sections 382 and 383 of the Internal Revenue Code of 1986, as amended, and corresponding provisions of state law, if a corporation undergoes an "ownership change" (which is generally defined as a greater than 50% change (by value) in its equity ownership over a three-year period), the corporation's ability to use its pre-change net operating loss carryforwards and other pre-change tax attributes to offset its post-change income or taxes may be limited. We have experienced an ownership change in the past and we may also experience additional ownership changes in the future as a result of subsequent shifts in our stock ownership, some of which may be outside of our control. If an ownership change occurs and our ability to use our net operating loss carryforwards is materially limited, it would harm our future operating results by effectively increasing our future tax obligations.

U.S. taxation of international business activities or the adoption of tax reform policies could materially impact our future financial position and results of operations.

Limitations on the ability of taxpayers to claim and utilize foreign tax credits and the deferral of certain tax deductions until earnings outside of the U.S. are repatriated to the U.S., as well as changes to U.S. tax laws that may be enacted in the future, could impact the tax treatment of future foreign earnings. Should the scale of our international business activities expand, any changes in the U.S. taxation of such activities could increase our worldwide effective tax rate and harm our future financial position and results of operations.

Provisions of our secured term loan facility with Western Alliance Bank may restrict our ability to pursue our business strategies. In addition, repayment of our outstanding debt and other obligations under our secured term loan facility with Western Alliance Bank is subject to acceleration upon the occurrence of an event of default, which would have a material adverse effect on our business, financial condition and results of operations.

We have entered into a secured term loan facility with Western Alliance Bank, or the Loan Facility, that is secured by a lien covering substantially all of our assets, including intellectual property, under which we have borrowed $7.0 million. Our secured term loan facility requires us, and any debt instruments we may enter into in the future may require us, to comply with various covenants that limit our ability to take on new indebtedness, to permit new liens, to pay dividends, to dispose of our property (including the ability to license our intellectual property in certain situations), to engage in mergers or acquisitions and make certain other changes to our business. The Loan Facility also requires us to either maintain a specified minimum liquidity level with Western Alliance Bank or achieve a minimum six-month revenue level. In addition, the Loan Facility requires us to raise $5 million from the sale of equity securities by no later than August 3, 2018. These restrictions could inhibit our ability to pursue our business strategies, including our ability to raise additional capital and make certain dispositions or investments without the consent of Western Alliance Bank.

The obligations under the Loan Facility are subject to acceleration upon the occurrence of specified events of default, including our failure to make payments when due, our breach or default in the performance of our covenants and obligations under the facility following a cure period, bankruptcy and similar events, our breach of any agreement with a third party subject to certain conditions, or any circumstance that could have a material adverse effect on (i) our business operations or conditions (financial or otherwise), (ii) our ability to repay the secured term loan facility or otherwise perform our obligations in accordance with the facility documents, or (iii) the value or priority of Western Alliance Bank's security interests in the collateral. While we do not believe it is probable that the lender would accelerate the obligations under the facility, the definition of a material adverse effect is inherently subjective in nature, and we cannot assure that a material adverse effect will not occur or be deemed to have occurred by the lender. If we default under the facility, Western Alliance Bank may accelerate all of our repayment obligations and, if we are unable to access funds to meet those obligations or to renegotiate our agreement, Western Alliance Bank could take control of our pledged assets and we could immediately cease operations. If we were to renegotiate our agreement under such circumstances, the terms may be significantly less favorable to us. If we were liquidated, Western Alliance Bank's right to repayment would be senior to the rights of our stockholders to receive any proceeds from the liquidation. Any declaration by Western Alliance Bank of an event of default could significantly harm our liquidity, financial condition, operating results, business, and prospects and cause the price of our common stock to decline.

Risks related to our business

If our products fail to achieve and sustain sufficient market acceptance, our revenue will be adversely affected.

Our success depends on our ability to develop and market products that are recognized and accepted as reliable, enabling and cost-effective. Most of the potential customers for our products already use expensive research systems in their laboratories that they have used for many years and may be reluctant to replace those systems with ours. Market acceptance of our systems will depend on many factors, including our ability to convince potential customers that our technology is an attractive alternative to existing technologies. Compared to some competing technologies, our technology is new and complex, and many potential customers have limited knowledge of, or experience with, our products. Prior to adopting our systems, some potential customers may need to devote time and effort to testing and validating our systems. Any failure of our systems to meet these customer benchmarks could result in potential customers choosing to retain their existing systems or to purchase systems other than ours. In addition, it is important that our gene mapping systems be perceived as accurate and reliable by the scientific and medical research community as a whole. Historically, a significant part of our sales and marketing efforts has been directed at demonstrating the advantages of our technology to industry leaders and encouraging such leaders to publish or present the results of their evaluation of our system. If we are unable to continue to motivate leading researchers to use our technology, or if such researchers are unable to achieve or unwilling to publish or present significant experimental results using our systems, acceptance and adoption of our systems will be slowed and our ability to increase our revenue would be adversely affected.

Our future success is dependent upon our ability to further penetrate our existing customer base and attract new customers.

Our current customer base is primarily composed of academic and governmental research institutions, as well as biopharmaceutical and contract research companies. Our success will depend upon our ability to respond to the evolving needs of, and increase our market share among, existing customers and additional potential customers, marketing new products as we develop them. Identifying, engaging and marketing to customers who are unfamiliar with our current products requires substantial time, expertise and expense and involves a number of risks, including:

- our ability to attract, retain and manage the sales, marketing and service personnel necessary to expand market acceptance for our technology;
- the time and cost of maintaining and growing a specialized sales, marketing and service force; and
- our sales, marketing and service force may be unable to execute successful commercial activities.

We have utilized third parties to assist with sales, distribution and customer support in certain regions of the world. There is no guarantee, when we enter into such arrangements, that we will be successful in attracting desirable sales and distribution partners. There is also no guarantee that we will be able to enter into such arrangements on favorable terms. Any failure of our sales and marketing efforts, or those of any third-party sales and distribution partners, would adversely affect our business.

We are currently limited to "research use only" with respect to many of the materials and components used in our consumable products including our assays.

Our instruments, consumable products and assays are purchased from suppliers with a restriction that they be used for research use only, or RUO. While we have focused initially on the life sciences research market and RUO products only, part of our business strategy is to expand our product line to encompass products that are intended to be used for the diagnosis of disease and precision healthcare, either alone or in collaboration with third parties. The use of our products for any such diagnostic purposes would require that we obtain regulatory clearance or approval to market our products for those purposes and also that we acquire the materials and components used in such products from suppliers without an RUO restriction.

There can be no assurance that we will be able to acquire these materials and components for use in diagnostic products on acceptable terms, if at all. If we are unable to do so, we would not be able to expand our product offerings beyond RUO, and our business and prospects would suffer.

The FDA Guidance on "Distribution of In Vitro Diagnostic Products Labeled for Research Use Only or Investigational Use Only", or, the RUO/IUO Labeling Guidance, emphasizes that the FDA will review the totality of the circumstances when evaluating whether equipment and testing components are properly labeled as RUO. It further states that merely including a labeling statement that a product is intended for research use only will not necessarily render the device exempt from the FDA's 510(k) clearance, PMA, or other requirements, if the circumstances surrounding the distribution of the product indicate that the manufacturer intends for its product to be offered for clinical diagnostic use. These circumstances may include written or verbal marketing claims or links to articles regarding a product's performance in clinical applications, a manufacturer's provision of technical support for clinical validation or clinical applications, or solicitation of business from clinical laboratories, all of which could be considered evidence of intended uses that conflict with RUO labeling. If the FDA were to determine that our RUO products were intended for use in clinical investigation, diagnosis or treatment decisions, or that express or implied clinical or diagnostic claims were made for our RUO products, those products could be considered misbranded or adulterated under the Federal Food, Drug, and Cosmetic Act. If the FDA determines that our RUO products are being marketed for clinical diagnostic use without the required PMA or 510(k) clearance, we may be required to cease marketing our products as planned, recall the products from customers, revise our marketing plans, and/or suspend or delay the commercialization of our products until we obtain the required authorization. We also may be subject to a range of enforcement actions by the FDA, including warning or untitled letters, injunctions, civil monetary penalties, criminal prosecution, and recall and/or seizure of products, as well as significant adverse publicity.

If, in the future, we choose to commercialize our products for clinical diagnostic use, we will be required to comply with the FDA's premarket review and post-market control requirements for IVDs, as may be applicable. Complying with the FDA's PMA and/or 510(k) clearance requirements may be expensive, time-consuming, and subject us to significant and/or unanticipated delays. Our efforts may never result in an approved PMA or 510(k) clearance for our products. Even if we obtain a PMA or 510(k) clearance, where required, such authorization may not be for the use or uses we believe are commercially attractive and/or are critical to the commercial success of our products. As a result, being subject to the FDA's premarket review and/or post-market control requirements for our products could materially and adversely affect our business, financial condition and results of operations.

In the near term, our business will depend on levels of research and development spending by academic and governmental research institutions and biopharmaceutical companies, a reduction in which could limit demand for our products and adversely affect our business and operating results.

In the near term, we expect that our revenue will be derived primarily from sales of our instruments and consumables to academic and governmental research institutions, as well as biopharmaceutical and contract research companies worldwide for research applications. The demand for our products will depend in part upon the research and development budgets of these customers, which are impacted by factors beyond our control, such as:

- changes in government programs that provide funding to research institutions and companies;
- macroeconomic conditions and the political climate;
- changes in the regulatory environment;
- differences in budgetary cycles; and
- market acceptance of relatively new technologies, such as ours.

For example, in March 2017, the federal government announced the intent to cut federal biomedical research funding by as much as 18%. While there has been significant opposition to these funding cuts, the uncertainty regarding the availability of research funding for potential customers may adversely affect our operating results. Our operating results may fluctuate substantially due to reductions and delays in research and development expenditures by these customers. Any decrease in customers' budgets or expenditures, or in the size, scope or frequency of capital or operating expenditures, could materially and adversely affect our business, operating results and financial condition.

The sales cycle for our systems can be lengthy and variable, which makes it difficult for us to forecast revenue and other operating results.

The sales process for our systems generally involves numerous interactions with multiple individuals within an organization, and often includes in-depth analysis by potential customers of our technology and products and a lengthy review process. Our customers' evaluation processes often involve a number of factors, many of which are beyond our control. As a result of these factors, the capital investment required to purchase our systems and the budget cycles of our customers, the time from initial contact with a customer to our receipt of a purchase order can vary significantly. Given the length and uncertainty of our sales cycle, we have in the past experienced, and expect to in the future experience, fluctuations in our sales on a period-to-period basis. In addition, any failure to meet customer expectations could result in customers choosing to retain their existing systems, use existing assays not requiring capital equipment or purchase systems other than ours.

Our long-term results depend upon our ability to improve existing products and introduce and market new products successfully.

Our business is dependent on the continued improvement of our existing products and our development of new products utilizing our current or other potential future technology. As we introduce new products or refine, improve or upgrade versions of existing products, we cannot predict the level of market acceptance or the amount of market share these products will achieve, if any. We cannot assure you that we will not experience material delays in the introduction of new products in the future. For example, the introduction of our Saphyr system replaced our Irys system, and as a result we may never sell the remaining Irys units currently in our inventory. Therefore, we may from time to time determine it necessary to write down or write off units of our Irys inventory.

Consistent with our strategy of offering new products and product refinements, we expect to continue to use a substantial amount of capital for product development and refinement. We may need additional capital for product development and refinement than is available on terms favorable to us, if at all, which could adversely affect our business, financial condition or results of operations.

We generally sell our products in industries that are characterized by rapid technological changes, frequent new product introductions and changing industry standards. If we do not develop new products and product enhancements based on technological innovation on a timely basis, our products may become obsolete over time and our revenues, cash flow, profitability and competitive position will suffer. Our success will depend on several factors, including our ability to:

- correctly identify customer needs and preferences and predict future needs and preferences;
- allocate our research and development funding to products with higher growth prospects;
- anticipate and respond to our competitors' development of new products and technological innovations;
- innovate and develop new technologies and applications, and acquire or obtain rights to third-party technologies that may have valuable applications in the markets we serve;
- successfully commercialize new technologies in a timely manner, price them competitively and manufacture and deliver sufficient volumes of new products of appropriate quality on time; and
- convince customers to adopt new technologies.

In addition, if we fail to accurately predict future customer needs and preferences or fail to produce viable technologies, we may invest heavily in research and development of products that do not lead to significant revenue. Even if we successfully innovate and develop new products and product enhancements, we may incur substantial costs in doing so, and our profitability may suffer.

Our ability to develop new products based on innovation can affect our competitive position and often requires the investment of significant resources. Difficulties or delays in research, development or production of new products and services or failure to gain market acceptance of new products and technologies may reduce future revenues and adversely affect our competitive position.

If we do not successfully manage the development and launch of new products, our financial results could be adversely affected.

We face risks associated with launching new products. If we encounter development or manufacturing challenges or discover errors during our product development cycle, the product launch dates of new products may be delayed. The expenses or losses associated with unsuccessful product development or launch activities or lack of market acceptance of our new products could adversely affect our business or financial condition.

Undetected errors or defects in our products could harm our reputation, decrease market acceptance of our products or expose us to product liability claims.

Our products may contain undetected errors or defects when first introduced or as new versions or new products are released. Disruptions affecting the introduction or release of, or other performance problems with, our products may damage our customers' businesses and could harm their and our reputation. If that occurs, we may incur significant costs, the attention of our key personnel could be diverted, or other significant customer relations problems may arise. We may also be subject to warranty and liability claims for damages related to errors or defects in our products. In addition, if we do not meet industry or quality standards, if applicable, our products may be subject to recall. A material liability claim, recall or other occurrence that harms our reputation or decreases market acceptance of our products could harm our business and operating results.

Although we do not, and cannot currently, promote the use of our products, or services based on our products, for diagnostic purposes, if our customers develop or use them for diagnostic purposes, someone could file a product liability claim alleging that one of our products contained a design or manufacturing defect that resulted in the failure to adequately perform, leading to death or injury. A product liability claim could result in substantial damages and be costly and time consuming to defend, either of which could materially harm our business or financial condition. We cannot assure investors that our product liability insurance would adequately protect our assets from the financial impact of defending a product liability claim. Any product liability claim brought against us, with or without merit, could increase our product liability insurance rates or prevent us from securing insurance coverage in the future.

Our reliance on distributors for sales of our products outside of the United States could limit or prevent us from selling our products and could impact our revenue.

We intend to continuel to grow our business internationally, and to do so we must attract additional distributors and retain existing distributors to maximize the commercial opportunity for our products. There is no guarantee that we will be successful in attracting or retaining desirable sales and distribution partners or that we will be able to enter into such arrangements on favorable terms. Distributors may not commit the necessary resources to market and sell our products to the level of our expectations or may choose to favor marketing the products of our competitors. If current or future distributors do not perform adequately, or we are unable to enter into effective arrangements with distributors in particular geographic areas, we may not realize long-term international revenue growth. In addition, if our distributors fail to comply with applicable laws and ethical standards, including anti-bribery laws, this could damage our reputation and could have a significant adverse effect on our business and our revenues.

We expect to generate a substantial portion of our revenue internationally in the future and can become further subject to various risks relating to our international activities, which could adversely affect our business, operating results and financial condition.

During 2017 approximately 60% of our product revenue was generated from customers located outside of the U.S. We believe that a substantial percentage of our future revenue will come from international sources as we expand our overseas operations and develop opportunities in additional areas. We have limited experience operating internationally and engaging in international business involves a number of difficulties and risks, including:

- required compliance with existing and changing foreign regulatory requirements and laws;
- difficulties and costs of staffing and managing foreign operations;
- difficulties protecting or procuring intellectual property rights;
- required compliance with anti-bribery laws, such as the U.S. Foreign Corrupt Practices Act, data privacy requirements, labor laws and anti-competition regulations;
- export or import restrictions;
- laws and business practices favoring local companies;
- longer payment cycles and difficulties in enforcing agreements and collecting receivables through certain foreign legal systems;
- political and economic instability; and
- potentially adverse tax consequences, tariffs, customs charges, bureaucratic requirements and other trade barriers.

Historically, most of our revenue has been denominated in U.S. dollars. In the future, we may sell our products and services in local currency outside of the U.S. As our operations in countries outside of the U.S. grow, our results of operations and cash flows may be subject to fluctuations due to changes in foreign currency exchange rates, which could harm our business in the future. For example, if the value of the U.S. dollar increases relative to foreign currencies, in the absence of a corresponding change in local currency prices, our revenue could be adversely affected as we convert revenue from local currencies to U.S. dollars. If we dedicate significant resources to our international operations and are unable to manage these risks effectively, our business, operating results and financial condition will suffer.

We are subject to U.S. and foreign anti-corruption and anti-money laundering laws with respect to our operations and non-compliance with such laws can subject us to criminal and/or civil liability and harm our business.

We are subject to the U.S. Foreign Corrupt Practices Act, as amended, the U.S. domestic bribery statute contained in 18 U.S.C. § 201, the U.S. Travel Act, the USA PATRIOT Act, the United Kingdom Bribery Act 2010, and other state and national anti-bribery and anti-money laundering laws in countries in which we conduct activities. Anti-corruption laws are interpreted broadly and prohibit companies and their employees and third-party intermediaries from authorizing, promising, offering, providing, soliciting, or accepting, directly or indirectly, improper payments or benefits to or from any person whether in the public or private sector for the purpose of obtaining or retaining business or securing any other improper advantage. We rely on third-party representatives, distributors, and other business partners to support sales of our products and services and our efforts to ensure regulatory compliance. In addition, as we increase our international sales and business, we may engage with additional business partners. We can be held liable for the corrupt or other illegal activities of our employees, representatives, contractors, business partners, and agents, even if we do not explicitly authorize or have actual knowledge of such activities.

Any violations of anti-corruption and anti-money laundering laws, or allegations of such violations, could disrupt our operations, involve significant management distraction, involve significant costs and expenses, including legal fees, and could result in a material adverse effect on our business, prospects, financial condition, or results of operations. We could also incur severe penalties, including criminal and civil penalties, disgorgement, and other remedial measures.

We are subject to governmental export and import controls that could impair our ability to compete in international markets due to licensing requirements and subject us to liability if we are not in compliance with applicable laws.

Our products are subject to export control and import laws and regulations, including the U.S. Export Administration Regulations, U.S. Customs regulations, and various economic and trade sanctions regulations administered by the U.S. Treasury Department's Office of Foreign Assets Controls. Exports of our products must be made in compliance with these laws and regulations. If we fail to comply with these laws and regulations, we and certain of our employees could be subject to substantial civil or criminal penalties, including the possible loss of export or import privileges; fines, which may be imposed on us and responsible employees or managers; and, in extreme cases, the incarceration of responsible employees or managers.

In addition, changes in our products or changes in applicable export or import laws and regulations may create delays in the introduction and sale of our products in international markets, prevent our customers from deploying our products or, in some cases, prevent the export or import of our products to certain countries, governments or persons altogether. Any change in export or import laws and regulations, shift in the enforcement or scope of existing laws and regulations, or change in the countries, governments, persons or technologies targeted by such laws and regulations, could also result in decreased use of our products, or in our decreased ability to export or sell our products to existing or potential customers. Any decreased use of our products or limitation on our ability to export or sell our products would likely adversely affect our business, financial condition and results of operations.

If we are unable to recruit, train, retain, motivate and integrate key personnel, we may not achieve our goals.

Our future success depends on our ability to recruit, train, retain, motivate and integrate key personnel, including our recently expanded senior management team, as well as our research and development, manufacturing and sales and marketing personnel. Competition for qualified personnel is intense. Our growth depends, in particular, on attracting and retaining highly-trained sales personnel with the necessary scientific background and ability to understand our systems at a technical level to effectively identify and sell to potential new customers and develop new products. Because of the complex and technical nature of our products and the dynamic market in which we compete, any failure to attract, train, retain, motivate and integrate qualified personnel could materially harm our operating results and growth prospects.

We have limited experience in marketing and selling our products, and if we are unable to successfully commercialize our products, our business and operating results will be adversely affected.

We have limited experience marketing and selling our products. We currently sell all our products for research use only, through our direct field sales and support organizations located in North America and Europe and through a combination of our own sales force and third-party distributors in additional major markets such as Australian, China, Japan and South Korea.

The future sales of our products will depend in large part on our ability to effectively market and sell our products, successfully manage and expand our sales force, and increase the scope of our marketing efforts. We may also enter into additional distribution arrangements in the future. Because we have limited experience in marketing and selling our products, our ability to forecast demand, the infrastructure required to support such demand and the sales cycle to customers is unproven. If we do not build an efficient and effective sales force, our business and operating results will be adversely affected.

We rely on a single contract manufacturer for our systems and rely on a single contract manufacturer for our chip consumables. If either of these manufacturers should fail or not perform satisfactorily, our ability to supply these instruments would be negatively and adversely affected.

We currently rely on a single contract manufacturer to manufacture and supply all of our instruments. See “Business–Key Agreements.” In addition, we rely on a single contract manufacturer to manufacture and supply all of our chip consumables. Since our contracts with these manufacturers do not commit them to supply quantities beyond the amounts included in our purchase orders, and do not commit them to carry inventory or make available any particular quantities, these contract manufacturers may give other customers’ needs higher priority than ours, and we may not be able to obtain adequate supplies in a timely manner or on commercially reasonable terms. If either of these manufacturers were to be unable to supply instruments, our business would be harmed.

In the event it becomes necessary to utilize different contract manufacturers for our instruments or chip consumables, we would experience additional costs, delays and difficulties in doing so as a result of identifying and entering into an agreement with a new supplier as well as preparing such new supplier to meet the logistical requirements associated with manufacturing our units, and our business would suffer. We may also experience additional costs and delays in the event we need access to or rights under any intellectual property of these current manufacturers.

We may experience manufacturing problems or delays that could limit the growth of our revenue or increase our losses.

We may encounter unforeseen situations that would result in delays or shortfalls in our production as well as delays or shortfalls caused by our outsourced manufacturing suppliers and by other third-party suppliers who manufacture components for our products. If we are unable to keep up with demand for our products, our revenue could be impaired, market acceptance for our products could be adversely affected and our customers might instead purchase our competitors’ products. Our inability to successfully manufacture our products would have a material adverse effect on our operating results.

We rely on a limited number of suppliers or, in some cases, one supplier, for some of our materials and components used in our consumable products, and may not be able to find replacements or immediately transition to alternative suppliers, which could have a material adverse effect on our business, financial condition, results of operations and reputation.

We rely on limited or sole suppliers for certain reagents and other materials and components that are used in our consumable products. While we periodically forecast our needs for such materials and enter into standard purchase orders with them, we do not have long-term contracts with many of these suppliers. If we were to lose such suppliers, there can be no assurance that we will be able to identify or enter into agreements with alternative suppliers on a timely basis on acceptable terms, if at all. An interruption in our operations could occur if we encounter delays or difficulties in securing these materials, or if the quality of the materials supplied do not meet our requirements, or if we cannot then obtain an acceptable substitute. The time and effort required to qualify a new supplier and ensure that the new materials provide the same or better quality results could result in significant additional costs. Any such interruption could significantly affect our business, financial condition, results of operations and reputation.

In addition, certain of the components used in our instruments are sourced from limited or sole suppliers. If we were to lose such suppliers, there can be no assurance that we will be able to identify or enter into agreements with alternative suppliers on a timely basis on acceptable terms, if at all. An interruption in our ability to sell and deliver instruments to customers could occur if we encounter delays or difficulties in securing these components, or if the quality of the components supplied do not meet specifications, or if we cannot then obtain an acceptable substitute. If any of these events occur, our business and operating results could be harmed.

If we cannot provide quality technical and applications support, we could lose customers and our business and prospects will suffer.

The placement of our products at new customer sites, the introduction of our technology into our customers' existing laboratory workflows and ongoing customer support can be complex. Accordingly, we need highly trained technical support personnel. Hiring technical support personnel is very competitive in our industry due to the limited number of people available with the necessary scientific and technical backgrounds and ability to understand our technology at a technical level. To effectively support potential new customers and the expanding needs of current customers, we will need to substantially expand our technical support staff. If we are unable to attract, train or retain the number of highly qualified technical services personnel that our business needs, our business and prospects will suffer.

Our business could be negatively impacted by cyber security threats.

In the ordinary course of our business, we collect and store sensitive data, intellectual property and proprietary business information owned or controlled by ourselves or our customers. We face various cyber security threats, including cyber security attacks to our information technology infrastructure and attempts by others to gain access to our proprietary or sensitive information. This information encompasses a wide variety of business-critical information including research and development information, commercial information, and business and financial information. The procedures and controls we use to monitor these threats and mitigate our exposure may not be sufficient to prevent cyber security incidents. The result of these incidents could include disrupted operations, lost opportunities, misstated financial data, liability for stolen assets or information, increased costs arising from the implementation of additional security protective measures, litigation and reputational damage. Any remedial costs or other liabilities related to cyber security incidents may not be fully insured or indemnified by other means.

The life sciences research and diagnostic markets are highly competitive. If we fail to effectively compete, our business, financial condition and operating results will suffer.

We face significant competition in the life sciences research and diagnostic markets. We currently compete with both established and early stage companies that design, manufacture and market systems and consumable supplies. We believe our principal competitors in the life sciences research and genome mapping markets include Pacific Biosciences of California, Oxford Nanopore Technologies, 10x Genomics, Genomic Vision and Dovetail Genomics. In addition, there are a number of new market entrants in the process of developing novel technologies for the life sciences research, diagnostic and screening markets.

Many of our current competitors are either publicly traded, or are divisions of publicly-traded companies, and may enjoy a number of competitive advantages over us, including:

- greater name and brand recognition;
- substantially greater financial and human resources;
- broader product lines;
- larger sales forces and more established distributor networks;
- substantial intellectual property portfolios;
- larger and more established customer bases and relationships; and
- better established, larger scale, and lower cost manufacturing capabilities.

We believe that the principal competitive factors in all of our target markets include:

- cost of instruments and consumables;
- accuracy, including sensitivity and specificity, and reproducibility of results;
- reputation among customers;
- innovation in product offerings;
- flexibility and ease of use; and
- compatibility with existing laboratory processes, tools and methods.

We cannot assure investors that our products will compete favorably or that we will be successful in the face of increasing competition from new products and technologies introduced by our existing competitors or new companies entering our markets. In addition, we cannot assure investors that our competitors do not have or will not develop products or technologies that currently or in the future will enable them to produce competitive products with greater capabilities or at lower costs than ours. Any failure to compete effectively could materially and adversely affect our business, financial condition and operating results.

Acquisitions or joint ventures could disrupt our business, cause dilution to our stockholders and otherwise harm our business.

We may acquire other businesses, products or technologies as well as pursue strategic alliances, joint ventures, technology licenses or investments in complementary businesses. We have not made any acquisitions to date, and our ability to do so successfully is unproven. Any of these transactions could be material to our financial condition and operating results and expose us to many risks, including:

- disruption in our relationships with customers, distributors or suppliers as a result of such a transaction;
- unanticipated liabilities related to acquired companies;
- difficulties integrating acquired personnel, technologies and operations into our existing business;
- diversion of management time and focus from operating our business to acquisition integration challenges;
- increases in our expenses and reductions in our cash available for operations and other uses; and
- possible write-offs or impairment charges relating to acquired businesses.

Foreign acquisitions involve unique risks in addition to those mentioned above, including those related to integration of operations across different cultures and languages, currency risks and the particular economic, political and regulatory risks associated with specific countries.

Also, the anticipated benefit of any acquisition may not materialize. Future acquisitions or dispositions could result in potentially dilutive issuances of our equity securities, the incurrence of debt, contingent liabilities or amortization expenses or write-offs of goodwill, any of which could harm our financial condition. We cannot predict the number, timing or size of future joint ventures or acquisitions, or the effect that any such transactions might have on our operating results.

Risks related to government regulation and diagnostic product reimbursement

If the FDA determines that our products are medical devices or if we seek to market our products for clinical diagnostic or health screening use, we will be required to obtain regulatory clearance(s) or approval(s), and may be required to cease or limit sales of our then marketed products, which could materially and adversely affect our business, financial condition and results of operations. Any such regulatory process would be expensive, time-consuming and uncertain both in timing and in outcome.

We have focused initially on the life sciences research market. This includes laboratories associated with academic and governmental research institutions, as well as pharmaceutical, biotechnology and contract research companies. Accordingly, our products are labeled as "Research Use Only," or RUO, and are not intended for diagnostic use. While we have focused initially on the life sciences research market and RUO products only, our strategy is to expand our product line to encompass products that are intended to be used for the diagnosis of disease, either alone or in collaboration with third parties (such as our collaboration with Berry Genomics). Such in-vitro diagnostic, or IVD, products will be subject to regulation by the FDA as medical devices, or comparable international agencies, including requirements for regulatory clearance or approval of such products before they can be marketed. If the FDA were to determine that our products are intended for clinical use or if we decided to market our products for such use, we would be required to obtain FDA 510(k) clearance or premarket approval in order to sell our products in a manner consistent with FDA laws and regulations. Such regulatory approval processes or clearances are expensive, time-consuming and uncertain; our efforts may never result in any approved premarket approval application, or PMA, or 510(k) clearance for our products; and failure by us or a collaborator to obtain or comply with such approvals and clearances could have an adverse effect on our business, financial condition or operating results.

IVD products may be regulated as medical devices by the FDA and comparable international agencies and may require either clearance from the FDA following the 510(k) pre-market notification process or PMA from the FDA, in each case prior to marketing. If we or our collaborators are required to obtain a PMA or 510(k) clearance for products based on our technology, we or they would be subject to a substantial number of additional requirements for medical devices, including establishment registration, device listing, Quality Systems Regulations which cover the design, testing, production, control, quality assurance, labeling, packaging, servicing, sterilization (if required), and storage and shipping of medical devices (among other activities), product labeling, advertising, recordkeeping, post-market surveillance, post-approval studies, adverse event reporting, and correction and removal (recall) regulations. One or more of the products we or a collaborator may develop using our technology may also require clinical trials in order to generate the data required for PMA approval. Complying with these requirements may be time-consuming and expensive. We or our collaborators may be required to expend significant resources to ensure ongoing compliance with the FDA regulations and/or take satisfactory corrective action in response to enforcement action, which may have a material adverse effect on the ability to design, develop, and commercialize products using our technology as planned. Failure to comply with these requirements may subject us or a collaborator to a range of enforcement actions, such as warning letters, injunctions, civil monetary penalties, criminal prosecution, recall and/or seizure of products, and revocation of marketing authorization, as well as significant adverse publicity. If we or our collaborators fail to obtain, or experience significant delays in obtaining, regulatory approvals for IVD products, such products may not be able to be launched or successfully commercialized in a timely manner, or at all.

Laboratory developed tests, or LDTs, are a subset of IVD tests that are designed, manufactured and used within a single laboratory. The FDA maintains that LDTs are medical devices and has for the most part exercised enforcement discretion for most LDTs. A significant change in the way that the FDA regulates any LDTs that we, our collaborators or our customers develop using our technology could affect our business. If the FDA requires laboratories to undergo premarket review and comply with other applicable FDA requirements in the future, the cost and time required to commercialize an LDT will increase substantially, and may reduce the financial incentive for laboratories to develop LDTs, which could reduce demand for our instruments and our other products. In addition, if the FDA were to change the way that it regulates LDTs to require that we undergo pre-market review or comply with other applicable FDA requirements before we can sell our instruments or our other products to clinical cytogenics laboratories, our ability to sell our instruments and other products to this addressable market would be delayed, thereby impeding our ability to penetrate this market and generate revenue from sales of our instruments and our other products.

Failure to comply with applicable FDA requirements could subject us to misbranding or adulteration allegations under the Federal Food, Drug, and Cosmetic Act. We could be subject to a range of enforcement actions, including warning letters, injunctions, civil monetary penalties, criminal prosecution, and recall and/or seizure of products, as well as significant adverse publicity. In addition, changes to the current regulatory framework, including the imposition of additional or new regulations, could arise at any time during the development or marketing of our products, which may negatively affect our ability to obtain or maintain FDA or comparable regulatory approval of our products, if required.

Foreign jurisdictions have laws and regulations similar to those described above, which may adversely affect our ability to market our products as planned in such countries. The number and scope of these requirements are increasing. As in the U.S., the cost and time required to comply with regulatory requirements may be substantial, and there is no guarantee that we will obtain the necessary authorization(s) required to make our products commercially viable. As a result, the imposition of foreign requirements may also have a material adverse effect on the commercial viability of our operations.

We expect to rely on third parties in conducting any required future studies of diagnostic products that may be required by the FDA or other regulatory authorities, and those third parties may not perform satisfactorily.

We do not have the ability to independently conduct clinical trials or other studies that may be required to obtain FDA and other regulatory clearance or approval for future diagnostic products. Accordingly, we expect that we would rely on third parties, such as clinical investigators, consultants, and collaborators to conduct such studies if needed. Our reliance on these third parties for clinical and other development activities would reduce our control over these activities. If these third parties do not successfully carry out their contractual duties or regulatory obligations or meet expected deadlines, if the third parties need to be replaced or if the quality or accuracy of the data they obtain is compromised, we may not be able to obtain regulatory clearance or approval.

If diagnostic procedures that are enabled by our technology are subject to unfavorable pricing regulations or third-party coverage and reimbursement policies, our business could be harmed.

Currently, our product is for research use only, but clinical laboratories may acquire our instrumentation through a capital purchase or capital lease and use the Saphyr and direct label stain chemistry to create their own potentially reimbursable products, such as laboratory developed tests for in vitro diagnostics. Our customers may generate revenue for these testing services by seeking the necessary approval of their product from the FDA or the Center for Medicare and Medicaid Services, or CMS, along with coverage and reimbursement from third-party payors, including government health programs and private health plans. The ability of our customers to commercialize diagnostic tests based on our technology will depend in part on the extent to which coverage and reimbursement for these test will be available from such third-party payors.

In the U.S., molecular testing laboratories have multiple options for reimbursement coding, but we expect that the primary codes used will be the genomic sequencing procedure codes, or GSPs. The American Medical Association, or AMA, added GSPs to its clinical laboratory fee schedule in 2015. In addition, CMS recently issued a coverage determination providing for the reimbursement of next-generation sequencing for certain cancer diagnostics using an FDA-approved in vitro diagnostic test. Private health plans often follow CMS to a substantial degree, and it is difficult to predict what CMS will decide with respect to reimbursement of any products our customers try to commercialize.

In Europe, coverage for molecular diagnostic testing is varied. Countries with statutory health insurance (e.g., Germany, France, The Netherlands) tend to be more progressive in technology adoption with favorable reimbursement for molecular diagnostic testing. In countries such as the United Kingdom with tax-based insurance, adoption and reimbursement for molecular diagnostic testing is not uniform and is influenced by local budgets.

Ultimately, coverage and reimbursement of new products is uncertain, and whether laboratories that use our instruments to develop their own products will attain coverage and adequate reimbursement is unknown. In the U.S., there is no uniform policy for determining coverage and reimbursement.

Coverage can differ from payor to payor, and the process for determining whether a payor will provide coverage may be separate from the process for setting the reimbursement rate, In addition, the U.S. government, state legislatures and foreign governments have shown significant interest in implementing cost containment programs to limit the growth of government-paid health care costs, including price controls and restrictions on reimbursement. We cannot be sure that coverage will be available for any diagnostic tests based on our technology, and, if coverage is available, the level of payments. Reimbursement may impact the demand for those tests. If reimbursement is not available or is available only to limited levels, our customers may not be able to successfully commercialize any tests for which they receive marketing authorization.

Current and future legislation may increase the difficulty and cost to obtain marketing approval of and commercialize any products based on our technology and affect the prices that may be obtained.

In March 2010, the Patient Protection and Affordable Care Act, as amended by the Health Care and Education Affordability Reconciliation Act, collectively, the ACA, became law. The ACA is a sweeping law intended to broaden access to health insurance, reduce or constrain the growth of healthcare spending, enhance remedies against fraud and abuse, add new transparency requirements for the healthcare and health insurance industries, impose new taxes and fees on the health industry and impose additional health policy reforms. The ACA's provisions of importance to our business include, but are not limited to, a 2.3% excise tax on certain entities that manufacture or import medical devices offered for sale in the U.S., with limited exceptions, which has been suspended, but due to subsequent legislative amendments, will be automatically reinstated for medical device sales beginning January 1, 2020, unless Congress takes additional action to delay the implementation of the tax.

Some of the provisions of the ACA have yet to be implemented, and there have been judicial and Congressional challenges to certain aspects of the ACA, as well as efforts by the Trump administration to repeal or replace certain aspects of the ACA. Since January 2017, President Trump has signed two Executive Orders and other directives designed to delay the implementation of certain provisions of the ACA or otherwise circumvent some of the requirements for health insurance mandated by the ACA. Concurrently, Congress has considered legislation that would repeal or repeal and replace all or part of the ACA. While Congress has not passed comprehensive repeal legislation, two bills affecting the implementation of certain taxes under the ACA have been signed into law. The 2017 U.S. Tax Cuts and Jobs Act, includes a provision repealing, effective January 1, 2019, the tax-based shared responsibility payment imposed by the ACA on certain individuals who fail to maintain qualifying health coverage for all or part of a year that is commonly referred to as the "individual mandate". Additionally, a 2018 continuing resolution on appropriations delays the implementation of certain ACA-mandated fees, including, without limitation, the medical device excise tax.

In addition, other legislative changes have been proposed and adopted since the ACA was enacted. For example, on April 1, 2014, the Protecting Access to Medicare Act of 2014, or PAMA, was signed into law, which, among other things, significantly altered the payment methodology under the Medicare Clinical Laboratory Fee Schedule, or CLFS. PAMA requires certain laboratories performing clinical diagnostic laboratory tests to report to CMS the amounts paid by private payors for laboratory tests. Beginning January 1, 2018, CMS will use reported private payor pricing to periodically revise payment rates under the CLFS.

We expect that the ACA, as well as other healthcare reform measures that may be adopted in the future, may result in more rigorous coverage criteria and additional downward pressure on the price that we or our collaborators will receive for any cleared or approved product. Any reduction in payments from Medicare or other government programs may result in a similar reduction in payments from private payors. The implementation of cost containment measures or other healthcare reforms may prevent our customers from successfully commercializing any tests for which they receive approval, which could prevent us from being able to generate revenue and attain profitability.

In addition, sales of our instruments outside of the U.S. will subject us to foreign regulatory requirements, which may also change over time.

We cannot predict whether future healthcare initiatives will be implemented at the federal or state level or in countries outside of the U.S. in which we may do business, or the effect any future legislation or regulation will have on us. The expansion in government's effect on the U.S. healthcare industry may result in decreased profits to us, lower reimbursements by payors for our products or reduced medical procedure volumes, all of which may adversely affect our business, financial condition and results of operations.

We may be subject, directly or indirectly, to federal and state healthcare fraud and abuse laws and other federal and state laws applicable to our marketing practices. If we are unable to comply, or have not complied, with such laws, we could face substantial penalties.

Our operations are directly or indirectly, through our customers, subject to various federal and state fraud and abuse laws, including, without limitation, the federal and state anti-kickback statutes and false claims laws. These laws may impact, among other things, our sales and marketing and education programs, and our financial and business relationships with researchers who use our instruments to develop marketed products. By way of example: the federal Anti-Kickback Statute prohibits, among other things, any person or entity from, among other things, knowingly and willfully soliciting, receiving, offering or paying any remuneration, directly or indirectly, to induce, or in return for, purchasing, leasing, ordering, or arranging for or recommending the purchase, lease, or order of any good, facility, item, or service reimbursable, in whole or in part, under a federal healthcare program; and the federal false claims laws, including, without limitation the federal civil False Claims Act, prohibit, among other things, anyone from knowingly and willingly presenting, or causing to be presented for payment, to the federal government (including Medicare and Medicaid) claims for reimbursement for, among other things, drugs or services that are false or fraudulent, claims for items or services not provided as claimed, or claims for medically unnecessary items or services. The ACA, among other things, amended the intent requirement of the federal Anti-Kickback Statute to clarify that a person or entity does not need to have actual knowledge of the statute or specific intent to violate it in order to have committed a crime. In addition, the ACA clarifies that the government may assert that a claim that includes items or service resulting from a violation of the federal Anti-Kickback Statute constitutes a false or fraudulent claim for purposes of the federal civil False Claims Act.

In addition, we may be subject to the Health Insurance Portability and Accountability Act of 1996, or HIPAA, as amended by the Health Information Technology for Economic and Clinical Health Act and its implementing regulations, which imposes certain requirements relating to the privacy, security and transmission of individually identifiable health information without appropriate authorization by entities subject to the rule, such as health plans, health care clearinghouses and certain health care providers and their business associates who create, use or disclose HIPAA protected health information on their behalf. We may also be subject to state and foreign laws that govern the privacy and security of health information in some circumstances, many of which differ from each other in significant ways and often are not preempted by HIPAA, thus complicating compliance efforts.

If our operations are found to be in violation of any of these laws, we may be subject to penalties, including, without limitation, civil, criminal, and administrative penalties, damages, fines, disgorgement, the curtailment or restructuring of our operations, exclusion from participation in federal and state healthcare programs, additional integrity oversight and reporting obligations, individual imprisonment, contractual damages, and reputational harm, any of which could adversely affect our ability to operate our business and our results of operations.

Risks Related to Intellectual Property

If we are unable to protect our intellectual property, it may reduce our ability to maintain any technological or competitive advantage over our competitors and potential competitors, and our business may be harmed.

We rely on patent protection as well as trademark, copyright, trade secret and other intellectual property rights protection and contractual restrictions to protect our proprietary technologies, all of which provide limited protection and may not adequately protect our rights or permit us to gain or keep any competitive advantage. As of April 13, 2018, we were the assignee or assignee-applicant of 10 granted U.S. patents and approximately 12 pending U.S. patent applications. We also were the assignee-applicant of approximately 79 pending patent applications and granted patents in particular jurisdictions outside the U.S. If we fail to protect and/or maintain our intellectual property, third parties may be able to compete more effectively against us, we may lose our technological or competitive advantage, and/or we may incur substantial litigation costs in our attempts to recover or restrict use of our intellectual property.

We cannot assure investors that any of our currently pending or future patent applications will result in granted patents, and we cannot predict how long it will take for such patents to issue, if at all. It is possible that, for any of our patents that have issued or that may issue in the future, our competitors may design their products around our patented technologies.

Further, we cannot assure investors that other parties will not challenge any patents granted to us, or that courts or regulatory agencies will hold our patents to be valid, enforceable, and/or infringed. We cannot guarantee investors that we will be successful in defending challenges made against our patents and patent applications. Any successful third-party challenge or challenges to our patents could result in the unenforceability or invalidity of such patents, or such patents being interpreted narrowly and/or in a manner adverse to our interests. Our ability to establish or maintain a technological or competitive advantage over our competitors and/or market entrants may be diminished because of these uncertainties. For these and other reasons, our intellectual property may not provide us with any competitive advantage. For example:

- we or our licensors might not have been the first to make the inventions claimed or disclosed by our pending patent applications or issued patents;
- we or our licensors might not have been the first to file patent applications for these inventions. To determine the priority of these inventions, we may have to participate in interference proceedings or derivation proceedings declared by the U.S. Patent and Trademark Office, or the USPTO, which could result in substantial cost to us, and could possibly result in a loss or narrowing of patent rights. No assurance can be given that our patent applications or granted patents (or those of our licensors) will have priority over any other patent or patent application involved in such a proceeding, or will be held valid as an outcome of the proceeding;
- other parties may independently develop similar or alternative products and technologies or duplicate any of our products and technologies, which can potentially impact our market share, revenue, and goodwill, regardless of whether intellectual property rights are successfully enforced against these other parties;
- it is possible that our owned or licensed pending patent applications will not result in granted patents, and even if such pending patent applications issue as patents, they may not provide intellectual property protection of commercially viable products or product features, may not provide us with any competitive advantages, or may be challenged and invalidated by third parties, patent offices, and/or the courts;
- we may be unaware of or unfamiliar with prior art and/or interpretations of prior art that could potentially impact the validity or scope of our patents or pending patent applications, or patent applications that we intend to file;
- we take efforts and enter into agreements with employees, consultants, collaborators, and advisors to confirm ownership and chain of title in intellectual property rights. However, an inventorship or ownership dispute could arise that may permit one or more third parties to practice or enforce our intellectual property rights, including possible efforts to enforce rights against us;
- we may elect not to maintain or pursue intellectual property rights that, at some point in time, may be considered relevant to or enforceable against a competitor;
- we may not develop additional proprietary products and technologies that are patentable, or we may develop additional proprietary products and technologies that are not patentable ;
- the patents or other intellectual property rights of others may have an adverse effect on our business; and
- we apply for patents relating to our products and technologies and uses thereof, as we deem appropriate. However, we or our representatives or their agents may fail to apply for patents on important products and technologies in a timely fashion or at all, or we or our representatives or their agents may fail to apply for patents in potentially relevant jurisdictions.

To the extent our intellectual property offers inadequate protection, or is found to be invalid or unenforceable, we would be exposed to a greater risk of direct or indirect competition. If our intellectual property does not provide adequate coverage of our competitors' products, our competitive position could be adversely affected, as could our business.

Software is an important component of at least some of our products and services. To the extent such software is not protected by our patents, our dependence on trade secret protection may not provide adequate protection. In addition, the Supreme Court's ruling *Alice Corporation Pty. Ltd. v. CLS Bank International*, has narrowed the scope of patent protection available for software in certain circumstances.

The measures that we use to protect the security of our intellectual property and other proprietary rights may not be adequate, which could result in the loss of legal protection for, and thereby diminish the value of, such intellectual property and other rights.

In addition to pursuing patents on our technology, we also rely upon trademarks, trade secrets, copyrights and unfair competition laws, as well as license agreements and other contractual provisions, to protect our intellectual property and other proprietary rights. Despite these measures, any of our intellectual property rights could be challenged, invalidated, circumvented or misappropriated. In addition, we take steps to protect our intellectual property and proprietary technology by entering into confidentiality agreements and intellectual property assignment agreements with our employees, consultants, corporate partners and, when needed, our advisors. Such agreements may not be enforceable or may not provide meaningful protection for our trade secrets and/or other proprietary information in the event of unauthorized use or disclosure or other breaches of the agreements, and we may not be able to prevent such unauthorized disclosure. Moreover, if a party having an agreement with us has an overlapping or conflicting obligation to a third party, our rights in and to certain intellectual property could be undermined. Monitoring unauthorized and inadvertent disclosure is difficult, and we do not know whether the steps we have taken to prevent such disclosure are, or will be, adequate. If we were to enforce a claim that a third party had illegally obtained and was using our trade secrets, it would be expensive and time consuming, the outcome would be unpredictable, and any remedy may be inadequate. In addition, courts outside the U.S. may be less willing to protect trade secrets.

In addition, competitors could purchase our products and attempt to replicate and/or improve some or all of the competitive advantages we derive from our development efforts, willfully infringe our intellectual property rights, design their products around our protected technology or develop their own competitive technologies that fall outside of our intellectual property rights. If our intellectual property does not adequately protect our market share against competitors' products and methods, our competitive position could be adversely affected, as could our business.

We have rights in some intellectual property that has been discovered through government funded programs and thus is subject to federal regulations such as "march-in" rights, certain reporting requirements, and a preference for U.S. industry. Compliance with such regulations may limit our exclusive rights, subject us to expenditure of resources with respect to reporting requirements, and limit our ability to contract with non-U.S. manufacturers.

Some of the intellectual property rights assigned to us and/or in-licensed to us have been generated through the use of U.S. government funding and are therefore subject to certain federal regulations. For example, all of the intellectual property rights licensed to us under our license agreement with Princeton University have been generated using U.S. government funds. As a result, the U.S. government has certain rights to intellectual property embodied in our current or future products pursuant to the Bayh-Dole Act of 1980. These U.S. government rights in certain inventions developed under a government-funded program include a non-exclusive, non-transferable, irrevocable worldwide license to use inventions for any governmental purpose. In addition, the U.S. government has the right to require us to grant exclusive, partially exclusive, or non-exclusive licenses to any of these inventions to a third party if the government determines that: (i) adequate steps have not been taken to commercialize the invention; (ii) government action is necessary to meet public health or safety needs; or (iii) government action is necessary to meet requirements for public use under federal regulations (also referred to as "march-in rights"). The U.S. government also has the right to take title to these inventions if we fail, or the applicable licensor fails, to disclose the invention to the government, elect title, and file an application to register the intellectual property within specified time limits. In addition, the U.S. government may acquire title to these inventions in any country in which a patent application is not filed within specified time limits. Intellectual property generated under a government funded program is also subject to certain reporting requirements, compliance with which may require us, or the applicable licensor, to expend substantial resources. In addition, the U.S. government requires that any products embodying the subject invention or produced through the use of the subject invention be manufactured substantially in the U.S. The manufacturing preference requirement can be waived if the owner of the intellectual property can show that reasonable but unsuccessful efforts have been made to grant licenses on similar terms to potential licensees that would be likely to manufacture substantially in the U.S. or that, under the circumstances, domestic manufacture is not commercially

feasible. This preference for U.S. manufacturing may limit our ability to license the applicable patent rights on an exclusive basis under certain circumstances.

If we enter into future arrangements involving government funding, and we make inventions as a result of such funding, intellectual property rights to such discoveries may be subject to the applicable provisions of the Bayh-Dole Act. To the extent any of our current or future intellectual property is generated through the use of U.S. government funding, the provisions of the Bayh-Dole Act may similarly apply. Any exercise by the government of certain of its rights could harm our competitive position, business, financial condition, results of operations and prospects.

We depend on technology that is licensed to us by Princeton University. Any loss of our rights to this technology could prevent us from selling our products.

Some technology that relates to analysis of nucleic acids is licensed exclusively to us from Princeton University, or Princeton. We do not own the patents that underlie this license. Our rights to use this technology and employ the inventions claimed in the licensed patents are subject to the continuation of and compliance with the terms of the license. Our principal obligations under our license agreement with Princeton are as follows:

- royalty payments;
- annual maintenance fees;
- using commercially reasonable efforts to develop and sell a product using the licensed technology and developing a market for such product;
- paying and/or reimbursing fees related to prosecution, maintenance and enforcement of patent rights; and
- providing certain reports.

If we breach any of these obligations, Princeton may have the right to terminate or modify the license, which could result in our being unable to develop, manufacture and sell our products or a competitor gaining access to the relevant technology. Termination or certain modifications of our license agreement with Princeton would have a material adverse effect on our business.

In addition, we are a party to a number of other agreements that include licenses to intellectual property, including non-exclusive licenses. We may need to enter into additional license agreements in the future. Our business could suffer, for example, if any current or future licenses terminate, if the licensors fail to abide by the terms of the license, if the licensed patents or other rights are found to be invalid or unenforceable, or if we are unable to enter into necessary licenses on acceptable terms.

As we have done previously, we may need or may choose to obtain licenses and/or acquire intellectual property rights from third parties to advance our research or begin commercialization of our current or future products, and

we cannot provide any assurances that third-party patents do not exist that might be enforced against our current or future products in the absence of such a license. We may fail to obtain any of these licenses or intellectual property rights on commercially reasonable terms. Even if we are able to obtain a license, it may be non-exclusive, thereby giving our competitors access to the same technologies licensed to us. In that event, we may be required to expend significant time and resources to develop or license replacement technology. If we are unable to do so, we may be unable to develop or commercialize the affected products, which could materially harm our business and the third parties owning such intellectual property rights could seek either an injunction prohibiting our sales, or, with respect to our sales, an obligation on our part to pay royalties and/or other forms of compensation.

Licensing of intellectual property is important to our business and involves complex legal, business and scientific issues. Disputes may arise between us and our licensors regarding intellectual property subject to a license agreement, including:

- the scope of rights granted under the license agreement and other interpretation-related issues;

- whether and the extent to which our technology and processes infringe any intellectual property of the licensor that is not subject to the licensing agreement;
- whether to take action to enforce any intellectual property rights against an allegedly infringing product or process of a third party;
- our right to sublicense patent and other rights to third parties;
- our diligence obligations with respect to the use of licensed technology in relation to our development and commercialization of our products, and what activities satisfy those diligence obligations; and
- the ownership of inventions and know-how, such as intellectual property resulting from the joint creation or use of intellectual property by our licensors and us and our partners.

If disputes over intellectual property that we have licensed prevent or impair our ability to maintain our current licensing arrangements on acceptable terms, we may be unable to successfully develop and commercialize the affected product, or the dispute may have an adverse affect on our results of operation.

In addition to agreements pursuant to which we in-license intellectual property, we may in the future grant licenses under our intellectual property, or sell certain intellectual property. Like in-licenses, out-licenses can be complex and disputes may arise between us and our licensees, such as the types of disputes described above. Moreover, licensees may breach their obligations, or we may be exposed to liability due to our failure or alleged failure to satisfy our obligations. Any such occurrence could have an adverse affect on our business.

If we or any of our partners is sued for infringing intellectual property rights of third parties, it would be costly and time consuming, and an unfavorable outcome in that litigation could have a material adverse effect on our business.

Our success also depends on our ability to develop, manufacture, market and sell our products and perform our services without infringing the proprietary rights of third parties. Numerous U.S. and foreign-issued patents and pending patent applications owned by third parties exist in the fields in which we are developing products and services. As part of a business strategy to impede our successful commercialization and entry into new markets, competitors may allege that our products and/or services infringe their intellectual property rights.

We could incur substantial costs and divert the attention of our management and technical personnel in defending ourselves against claims of infringement made by third parties. Any adverse ruling by a court or administrative body, or perception of an adverse ruling, may have a material adverse impact on our ability to conduct our business and our finances. Moreover, third parties making claims against us may be able to obtain injunctive relief against us, which could block our ability to offer one or more products or services and could result in a substantial award of damages against us. In addition, since we sometimes indemnify customers, collaborators or licensees, we may have additional liability in connection with any infringement or alleged infringement of third party intellectual property. Intellectual property litigation can be very expensive, and we may not have the financial means to defend ourselves or our customers, collaborators and licensees.

Because patent applications can take many years to issue, there may be pending applications, some of which are unknown to us, that may result in issued patents upon which our products or proprietary technologies may infringe. Moreover, we may fail to identify issued patents of relevance or incorrectly conclude that an issued patent is invalid or not infringed by our technology or any of our products. There is a substantial amount of litigation involving patents and other intellectual property rights in our industry. If a third-party claims that we or any of our licensors, customers or collaboration partners infringe upon a third-party's intellectual property rights, we may have to:

- seek to obtain licenses that may not be available on commercially reasonable terms, if at all;
- abandon any product alleged or held to infringe, or redesign our products or processes to avoid potential assertion of infringement;

- pay substantial damages including, in exceptional cases, treble damages and attorneys' fees, which we may have to pay if a court decides that the product or proprietary technology at issue infringes upon or violates the third-party's rights;
- pay substantial royalties or fees or grant cross-licenses to our technology; or
- defend litigation or administrative proceedings that may be costly whether we win or lose, and which could result in a substantial diversion of our financial and management resources.

We may be involved in lawsuits to protect or enforce our patents or the patents of our licensors, which could be expensive, time-consuming and unsuccessful.

Competitors may infringe our patents or the patents we license in. In the event of infringement or unauthorized use, we may file one or more infringement lawsuits, which can be expensive and time-consuming. An adverse result in any such litigation proceedings could put one or more of our patents at risk of being invalidated, being found to be unenforceable, and/or being interpreted narrowly and could put our patent applications at risk of not issuing and/or could impact the validity or enforceability positions of our other patents or those we license. Furthermore, because of the substantial amount of discovery required in connection with intellectual property litigation, there is a risk that some of our confidential information could be compromised by disclosure during this type of litigation.

Most of our competitors are larger than we are and have substantially greater resources. They are, therefore, likely to be able to sustain the costs of complex patent litigation longer than we could. In addition, the uncertainties associated with litigation could have a material adverse effect on our ability to raise the funds necessary to continue our operations, continue our internal research programs, in-license needed technology, pursue, obtain or maintain intellectual property rights, or enter into development partnerships that would help us bring our products to market.

In addition, patent litigation can be very costly and time-consuming. An adverse outcome in such litigation or proceedings may expose us or any of our future development partners to loss of our proprietary position, expose us to significant liabilities, or require us to seek licenses that may not be available on commercially acceptable terms, if at all.

Our issued patents could be found invalid or unenforceable if challenged in court or at the Patent Office or other administrative agency, which could have a material adverse impact on our business.

If we or any of our partners were to initiate legal proceedings against a third party to enforce a patent related to one of our products or services, the defendant in such litigation could counterclaim that our patent is invalid and/or unenforceable. In patent litigation in the U.S., defendant counterclaims alleging invalidity and/or unenforceability are commonplace, as are validity challenges by the defendant against the subject patent or other patents before the USPTO. Grounds for a validity challenge could be an alleged failure to meet any of several statutory requirements, including lack of novelty, obviousness or non-enablement, failure to meet the written description requirement, indefiniteness, and/or failure to disclose the best mode or to claim patent eligible subject matter. Grounds for an unenforceability assertion could be an allegation that someone connected with prosecution of the patent intentionally withheld material information from the USPTO, or made a misleading statement, during prosecution. Additional grounds for an unenforceability assertion include an allegation of misuse or anticompetitive use of patent rights, and an allegation of incorrect inventorship with deceptive intent. Third parties may also raise similar claims before the USPTO even outside the context of litigation. The outcome is unpredictable following legal assertions of invalidity and unenforceability. With respect to the validity question, for example, we cannot be certain that no invalidating prior art existed of which we and the patent examiner were unaware during prosecution. These assertions may also be based on information known to us or the Patent Office. If a defendant or third party were to prevail on a legal assertion of invalidity and/or unenforceability, we would lose at least part, and perhaps all, of the claims of the challenged patent. Such a loss of patent protection would or could have a material adverse impact on our business.

We may be subject to claims that our employees, consultants or independent contractors have wrongfully used or disclosed alleged trade secrets of their other clients or former employers to us, and/or that their other clients or former employers allegedly have rights in our intellectual property, which could subject us to costly litigation.

As is common in the life sciences industry, we engage the services of consultants and independent contractors to assist us in the development of our products. Many of these consultants and independent contractors were previously employed at, or may have previously or may be currently providing consulting or other services to, universities or other technology, biotechnology or pharmaceutical companies, including our competitors or potential competitors. We may become subject to claims that our company, a consultant or an independent contractor inadvertently or otherwise used or disclosed trade secrets or other information proprietary to their former employers or their former or current clients. We may similarly be subject to claims stemming from similar actions of an employee, such as one who was previously employed by another company, including a competitor or potential competitor. We may become subject to claims that one or more current or former employees, consultants, advisors, or independent contractors of ours owns rights in our intellectual property and/or has assigned or is under an obligation to assign rights in our intellectual property to another party. This may include a competitor of ours. If a competitor has rights in our patents, the competitor or a licensee or related entity may be able to make, use, sell, import, and/or export the patented technology without liability to us under our patents or the patents we license. Litigation may be necessary to defend against these claims. Even if we are successful in defending against these claims, litigation could result in substantial costs and be a distraction to our management team. If we were not successful we could lose valuable intellectual property rights.

We may be subject to claims challenging the inventorship or ownership of our patents and other intellectual property.

We generally enter into confidentiality and intellectual property assignment agreements with our employees, consultants, and contractors. These agreements generally provide that inventions conceived by the party in the course of rendering services to us will be our exclusive property. However, those agreements may not be honored and may not effectively assign or may be alleged to ineffectively assign intellectual property rights to us. For example, even if we have a consulting agreement in place with an academic advisor pursuant to which such academic advisor is required to assign any inventions developed in connection with providing services to us, such academic advisor may not have the right to assign such inventions to us, as it may conflict with his or her obligations to assign all such intellectual property to his or her employing institution.

In addition, we sometimes enter into agreements where we provide services to third parties, such as customers. Under such circumstances, our agreements may provide that certain intellectual property that we conceive in the course of providing those services is assigned to the customer. In those cases, we may not be able to use that particular intellectual property in, for example, our work for other customers without a license.

We may not be able to protect our intellectual property rights throughout the world, which could materially and negatively affect our business.

Filing, prosecuting, maintaining, and defending patents on current and future products in all countries throughout the world would be prohibitively expensive, and our intellectual property rights in some countries outside the U.S. can be less extensive than those in the U.S. In addition, the laws of some foreign countries do not protect intellectual property rights to the same extent as federal and state laws in the U.S. Consequently, regardless of whether we are able to prevent third parties from practicing our inventions in the U.S., we may not be able to prevent third parties from practicing our inventions in all countries outside the U.S., or from selling or importing products made using our inventions in and into the U.S. or other jurisdictions. Competitors may use our technologies in jurisdictions where we have not pursued and obtained patent protection to develop their own products, and further, may export otherwise infringing products to territories where we have patent protection, but enforcement is not as strong as it is in the U.S. These products may compete with our products and our patents or other intellectual property rights may not be effective or sufficient to prevent them from competing. Even if we pursue and obtain issued patents in particular jurisdictions, our patent claims or other intellectual property rights may not be effective or sufficient to prevent third parties from so competing. Patent protection must ultimately be sought on a country-by-country basis, which is an expensive and time-consuming process with uncertain outcomes. Accordingly, we may choose not to seek patent protection in certain countries, and we will not have the benefit of patent protection in such countries.

Many companies have encountered significant problems in protecting and defending intellectual property rights in foreign jurisdictions. The legal systems of certain countries, particularly certain developing countries, do not favor the enforcement of patents and other intellectual property protection, particularly those relating to biotechnology, which could make it difficult for us to stop the infringement of our patents or marketing of competing products in violation of our proprietary rights generally. Proceedings to enforce our patent rights in foreign jurisdictions could result in substantial costs and divert our efforts and attention from other aspects of our business, could put our patents at risk of being invalidated or interpreted narrowly and our patent applications at risk of not issuing, and could provoke third parties to assert claims against us. We may not prevail in any lawsuits that we initiate and the damages or other remedies awarded, if any, may not be commercially meaningful. Accordingly, our efforts to enforce our intellectual property rights around the world may be inadequate to obtain a significant commercial advantage from the intellectual property that we develop or license and may adversely impact our business.

In addition, we and our partners also face the risk that our products or components thereof are imported, reimported, or exported into markets with relatively higher prices from markets with relatively lower prices, which would result in a decrease of sales and any payments we receive from the affected market. Recent developments in U.S. patent law have made it more difficult to stop these and related practices based on theories of patent infringement.

Changes in patent laws or patent jurisprudence could diminish the value of patents in general, thereby impairing our ability to protect our products.

As is the case with other life science industry companies, our success is heavily dependent on intellectual property, particularly patents. Obtaining and enforcing patents involve both technological complexity and legal complexity. Therefore, obtaining and enforcing patents is costly, time-consuming and inherently uncertain. In addition, the America Invents Act, or the AIA, became effective on March 16, 2013.

An important change introduced by the AIA is that the U.S. transitioned to a “first-to-file” system for deciding which party should be granted a patent when two or more patent applications are filed by different parties claiming the same invention. A third party that files a patent application in the USPTO after that date but before us could therefore be awarded a patent claiming or disclosing an invention of ours even if we had made the invention before it was made by the third party. This will require us to be cognizant going forward of the time from invention to filing of a patent application, but circumstances could prevent us from promptly filing patent applications on our inventions. Additionally, there can be a trade-off between obtaining an earlier filing date, and waiting to obtain additional data and/or further refine a patent application. In some circumstances, the effects of a decision to pursue an earlier filing or a later filing will not be known until prior art or third party activities are subsequently discovered, such as by the USPTO or by a third party seeking to challenge patent rights. These circumstances may apply, for example, to patent applications prepared and filed around the time of the implementation of the AIA, or with a priority application that preceded the implementation of the AIA.

Among some of the other changes introduced by the AIA are changes that limit where a patent holder may file a patent infringement suit and providing additional opportunities for third parties to challenge an issued patent in the USPTO. This applies to all of our owned and in-licensed U.S. patents, even those issued before March 16, 2013. Because of a lower standard for evidence in USPTO proceedings compared to the standard for evidence in U.S. federal courts necessary to invalidate a patent claim, a third party could potentially provide evidence in a USPTO proceeding sufficient for the USPTO to hold a claim invalid even though the same evidence would be insufficient to invalidate the claim if first presented in a court action. Accordingly, a third party may try to use the USPTO procedures to invalidate our patent claims that would not have been invalidated if first challenged by the third party in court. The AIA and its implementation could increase the uncertainties and costs surrounding the prosecution of our patent applications and the enforcement or defense of our issued patents. In addition, the contours of the laws under the AIA are subject to further judicial interpretation and/or legislative changes.

Additionally, the U.S. Supreme Court has ruled on several patent cases in recent years, such as *Impression Products, Inc. v. Lexmark International, Inc.*, *Association for Molecular Pathology v. Myriad Genetics, Inc.*, *Mayo Collaborative Services v. Prometheus Laboratories, Inc.* and *Alice Corporation Pty. Ltd. v. CLS Bank International*, either narrowing the scope of patent protection available in certain circumstances or weakening the rights of patent owners in certain situations. In addition to increasing uncertainty with our ability to obtain patents in the future, this combination of events has created uncertainty as to the value of patents, once obtained, including patents in the molecular biology analysis and diagnostic space in particular. Depending on decisions by the U.S. Congress, the federal courts, and the USPTO, the laws and regulations governing patents could change in unpredictable ways that could weaken our ability to obtain new patents or to enforce our existing patents and patents that we might obtain in the future.

Obtaining and maintaining our patent protection depends on compliance with various procedural, document submission, fee payment and other requirements imposed by governmental patent agencies, and our patent protection could be reduced or eliminated for non-compliance with these requirements.

The USPTO and various foreign governmental patent agencies require compliance with a number of procedural, documentary, fee payment and other provisions during the patent process. There are situations in which noncompliance can result in abandonment or lapse of a patent or patent application, resulting in partial or complete loss of patent rights in the relevant jurisdiction. In such an event, competitors might be able to enter the market earlier than would otherwise have been the case. In some cases, our licensors may be responsible for these payments, thereby decreasing our control over compliance with these requirements.

If our trademarks and trade names are not adequately protected, then we may not be able to build name recognition in our markets of interest and our business may be adversely affected.

Our registered or unregistered trademarks or trade names may be challenged, infringed, circumvented or declared generic or determined to be infringing other marks. We may not be able to protect our rights to these trademarks and trade names, which we need to build name recognition by potential partners or customers in our markets of interest. At times, competitors may adopt trade names or trademarks similar to ours, thereby impeding our ability to build brand identity and possibly leading to market confusion. In addition, there could be potential trade name or trademark infringement claims brought by owners of other registered trademarks. Over the long term, if we are unable to establish name recognition based on our trademarks and trade names, then we may not be able to compete effectively and our business may be adversely affected.

We may use third-party open source software components in future products, and failure to comply with the terms of the underlying open source software licenses could restrict our ability to sell such products.

While our current products do not contain any software tools licensed by third-party authors under “open source” licenses, we may choose to use open source software in future products. Use and distribution of open source software may entail greater risks than use of third-party commercial software, as open source licensors generally do not provide warranties or other contractual protections regarding infringement claims or the quality of the code. Some open source licenses may contain requirements that we make available source code for modifications or derivative works we create based upon the type of open source software we use. If we combine our proprietary software with open source software in a certain manner, we could, under certain open source licenses, be required to release the source code of our proprietary software to the public. This would allow our competitors to create similar products with less development effort and time, and ultimately could result in a loss of product sales.

Although we intend to monitor any use of open source software to avoid subjecting our products to conditions we do not intend, the terms of many open source licenses have not been interpreted by U.S. courts, and there is a risk that any such licenses could be construed in a way that could impose unanticipated conditions or restrictions on our ability to commercialize our products. Moreover, we cannot assure investors that our processes for controlling our use of open source software in our products will be effective. If we are held to have breached the terms of an open source software license, we could be required to seek licenses from third parties to continue offering our products on terms that are not economically feasible, to re-engineer our products, to discontinue the sale of our products if re-engineering could not be accomplished on a timely basis, or to make generally available, in source code form, our proprietary code, any of which could adversely affect our business, operating results, and financial condition.

We use third-party software that may be difficult to replace or cause errors or failures of our products that could lead to lost customers or harm to our reputation.

We use software licensed from third parties in our products. In the future, this software may not be available to us on commercially reasonable terms, or at all. Any loss of the right to use any of this software could result in delays in the production of our products until equivalent technology is either developed by us, or, if available, is identified, obtained and integrated, which could harm our business. In addition, any errors or defects in third-party software or other third-party software failures could result in errors or defects or cause our products to fail, which could harm our business and be costly to correct. Many of these providers attempt to impose limitations on their liability for such errors, defects or failures, and, if enforceable, we may have additional liability to our customers or third-party providers that could harm our reputation and increase our operating costs.

We intend to maintain our relationships with third-party software providers and to seek software from such providers that does not contain any errors or defects. Any failure to do so could adversely impact our ability to deliver reliable products to our customers and could harm our results of operations.

Numerous factors may limit any potential competitive advantage provided by our intellectual property rights.

The degree of future protection afforded by our intellectual property rights is uncertain because intellectual property rights have limitations, and may not adequately protect our business, provide a barrier to entry against our competitors or potential competitors, or permit us to maintain our competitive advantage. Moreover, if a third party has intellectual property rights that cover or impact our use of our technology, we may not be able to fully use or extract value from our intellectual property rights. For example:

- others may be able to develop and/or use technology that is similar to our technology or aspects of our technology but that does not cover the claims of any our patents or patents that may issue from our patent applications or those we license;
- we or the licensor of our licensed-in patents might not have been the first to make the inventions disclosed and/or claimed in a pending patent application that we own or license;
- we or the licensor of our licensed-in patents might not have been the first to file patent applications disclosing and/or claiming an invention;
- others may independently develop similar or alternative technologies without infringing our or our licensors' intellectual property rights;
- pending patent applications that we own or license may not lead to issued patents or may not result in the claims that we want (for example, as to the scope of issued claims, if any);
- patents, if issued, that we own or license may not provide us with any competitive advantages, or may be held invalid or unenforceable, as a result of legal challenges by our competitors or other third parties;
- third parties may compete with us in jurisdictions where we do not pursue and obtain patent protection;
- we may not be able to obtain and/or maintain necessary or useful licenses on reasonable terms or at all;
- third parties may assert an ownership interest in our intellectual property and, if successful, such disputes may preclude us from exercising exclusive rights over that intellectual property;
- we may not be able to maintain the confidentiality of our trade secrets or other proprietary information;
- we may not develop or in-license additional proprietary technologies that are patentable; and
- the patents or other intellectual property of others may have an adverse effect on our business.

Should any of these events occur, they could significantly harm our business and results of operations.

Risks Related to This Offering and Ownership of our Common Stock

We do not know whether an active, liquid and orderly trading market will develop for our common stock or what the market price of our common stock will be and as a result it may be difficult for you to sell your shares of our common stock.

Prior to this offering there has been no public market for shares of our common stock. Although we have applied to list our common stock on The Nasdaq Global Market, or Nasdaq, an active trading market for our shares may never develop or be sustained following this offering. You may not be able to sell your shares quickly or at the market price if trading in shares of our common stock is not active. The initial public offering price for our common stock will be determined through negotiations with the underwriters, and the negotiated price may not be indicative of the market price of the common stock after the offering. As a result of these and other factors, you may be unable to resell your shares of our common stock at or above the initial public offering price. Further, an inactive market may also impair our ability to raise capital by selling shares of our common stock and may impair our ability to enter into strategic partnerships or acquire companies or products by using our shares of common stock as consideration.

The price of our stock may be volatile, and you could lose all or part of your investment.

The trading price of our common stock following this offering is likely to be highly volatile and could be subject to wide fluctuations in response to various factors, some of which are beyond our control, including limited trading volume. In addition to the factors discussed in this "Risk Factors" section and elsewhere in this prospectus, these factors include:

- our commercial progress in marketing and selling our systems, including sales and revenue trends;
- changes in laws or regulations applicable our systems;
- adverse developments related to our laboratory facilities;
- increased competition in the diagnostics services industry;
- the failure to obtain and/or maintain adequate reimbursement of our systems;
- adverse developments concerning our manufacturers and suppliers;
- our inability to establish future collaborations;
- additions or departures of key scientific or management personnel;
- introduction of new testing services offered by us or our competitors;
- announcements of significant acquisitions, strategic partnerships, joint ventures or capital commitments by us or our competitors;
- our ability to effectively manage our growth;
- the size and growth, if any, of our targeted markets;
- actual or anticipated variations in quarterly operating results;
- our cash position;
- our failure to meet the estimates and projections of the investment community or that we may otherwise provide to the public;
- publication of research reports about us or our industry or positive or negative recommendations or withdrawal of research coverage by securities analysts;
- changes in the market valuations of similar companies;

- overall performance of the equity markets;
- issuances of debt or equity securities;
- sales of our common stock by us or our stockholders in the future;
- trading volume of our common stock;
- changes in accounting practices;
- ineffectiveness of our internal controls;
- disputes or other developments relating to proprietary rights, including our ability to adequately protect our technologies;
- significant lawsuits, including patent or stockholder litigation;
- general political and economic conditions; and
- other events or factors, many of which are beyond our control.

In addition, the stock market in general, and diagnostic and biotechnology companies in particular, have experienced extreme price and volume fluctuations that have often been unrelated or disproportionate to the operating performance of these companies. Broad market and industry factors may negatively affect the market price of our common stock, regardless of our actual operating performance. If the market price of our common stock after this offering does not exceed the initial public offering price, you may not realize any return on your investment in us and may lose some or all of your investment. In the past, securities class action litigation has often been instituted against companies following periods of volatility in the market price of a company's securities. This type of litigation, if instituted, could result in substantial costs and a diversion of management's attention and resources, which would harm our business, operating results or financial condition.

We have never paid dividends and we do not intend to pay dividends on our common stock, so any returns on your investment in our common stock will be limited to appreciation in the value of our stock.

We have never declared or paid any cash dividend on our common stock. We currently anticipate that we will retain future earnings for the development, operation and expansion of our business and do not anticipate declaring or paying any cash dividends for the foreseeable future. Any determination to pay dividends in the future will be at the discretion of our board of directors and will depend upon results of operations, financial condition, contractual restrictions, restrictions imposed by applicable law and other factors our board of directors deems relevant. Accordingly, if you purchase shares in this offering, realization of a gain on your investment will depend on the appreciation of the price of our common stock, which may never occur. In addition, our loan and security agreement with Western Alliance Bank contains a negative covenant which prohibits us from paying dividends without the prior written consent of Western Alliance Bank.

Our principal stockholders and management own a significant percentage of our stock and will be able to exert significant control over matters subject to stockholder approval.

Our executive officers, directors, 5% stockholders and their affiliates held approximately 80.2% of our voting stock as of March 31, 2018, and, upon the closing of this offering, that same group will hold approximately % of our outstanding voting stock (assuming no exercise of the underwriters' over-allotment option), based upon the number of shares of our common stock outstanding as of March 31, 2018. Therefore, even after this offering, these stockholders will have the ability to influence us through this ownership position. These stockholders may be able to determine all matters requiring stockholder approval. For example, these stockholders may be able to control elections of directors, amendments of our organizational documents, or approval of any merger, sale of assets or other major corporate transaction. This may prevent or discourage unsolicited acquisition proposals or offers for our common stock that you may feel are in your best interest as one of our stockholders.

Purchasers in this offering will experience immediate and substantial dilution in the book value of their investment.

The initial public offering price of our common stock will be substantially higher than the pro forma net tangible book value per share of our common stock outstanding immediately following the completion of this offering. Therefore, if you purchase shares of our common stock in this offering at an assumed initial public offering price of $ per share, you will experience immediate dilution of $ per share, the difference between the price per share you pay for our common stock and its pro forma net tangible book value per share as of March 31, 2018, after giving effect to the issuance of shares of our common stock in this offering. This dilution is due in large part to the fact that our earlier investors paid substantially less than the initial public offering price when they purchased their shares of common stock.

In addition, we have issued options and warrants to acquire our capital stock at prices significantly below the initial public offering price. To the extent outstanding options and warrants are ultimately exercised, there will be further dilution to investors purchasing our common stock in this offering. In addition, if the underwriters exercise their option to purchase additional shares from us or if we issue additional equity securities, you will experience additional dilution.

We are an emerging growth company, and the reduced reporting requirements applicable to emerging growth companies could make our common stock less attractive to investors.

We are an emerging growth company, as defined in the Jumpstart Our Business Startups Act of 2012, or the JOBS Act. For as long as we continue to be an emerging growth company, we may take advantage of exemptions from various reporting requirements that are applicable to other public companies that are not emerging growth companies, including not being required to comply with the auditor attestation requirements of Section 404 of the Sarbanes-Oxley Act of 2002, or the Sarbanes-Oxley Act, reduced disclosure obligations regarding executive compensation in this prospectus and our periodic reports and proxy statements and exemptions from the requirements of holding nonbinding advisory votes on executive compensation and stockholder approval of any golden parachute payments not previously approved. We could be an emerging growth company for up to five years following the year in which we complete this offering, although circumstances could cause us to lose that status earlier, including if the market value of our common stock held by non-affiliates exceeds $700.0 million as of any June 30 before that time or if we have total annual gross revenue of $1.07 billion or more during any fiscal year before that time, in which cases we would no longer be an emerging growth company as of the following December 31 or, if we issue more than $1.0 billion in non-convertible debt during any three year period before that time, we would cease to be an emerging growth company immediately. Even after we no longer qualify as an emerging growth company, we may still qualify as a “smaller reporting company” which would allow us to take advantage of many of the same exemptions from disclosure requirements including not being required to comply with the auditor attestation requirements of Section 404 of the Sarbanes-Oxley Act and reduced disclosure obligations regarding executive compensation in our periodic reports and proxy statements. We cannot predict if investors will find our common stock less attractive because we may rely on these exemptions, which could result in a less active trading market for our common stock and increased volatility in our stock price.

Under the JOBS Act, emerging growth companies can also delay adopting new or revised accounting standards that have different effective dates for public and private companies until those standards apply to private companies. We have elected to use this extended transition period. As a result of this election, our timeline to comply with these standards will in many cases be delayed as compared to other public companies that are not eligible to take advantage of this election or have not made this election. Therefore, our financial statements may not be comparable to those of companies that comply with the public company effective dates for these standards.

In addition, if we cease to be an emerging growth company, we will no longer be able to use the extended transition period for complying with new or revised accounting standards. As a result, changes in rules of U.S. generally accepted accounting principles or their interpretation, the adoption of new guidance or the application of existing guidance to changes in our business could significantly affect our financial position and results of operations.

If we fail to maintain proper and effective internal controls, our ability to produce accurate financial statements on a timely basis could be impaired.

After the closing of this offering, we will be subject to the reporting requirements of the Securities Exchange Act of 1934, as amended, the Sarbanes-Oxley Act and the rules and regulations of Nasdaq. The Sarbanes-Oxley Act requires, among other things, that we maintain effective disclosure controls and procedures and internal controls over financial reporting. Internal control over financial reporting is a process designed to provide reasonable assurance regarding the reliability of financial reporting and the preparation of financial statements in accordance with accounting principles generally accepted in the U.S.. Commencing with our fiscal year ending December 31, 2018, we must perform system and process evaluation and testing of our internal controls over financial reporting to allow management to report on the effectiveness of our internal controls over financial reporting in our Form 10-K filing for that year, as required by Section 404 of the Sarbanes-Oxley Act. This will require that we incur substantial additional professional fees and internal costs to expand our accounting and finance functions and that we expend significant management efforts. Prior to this offering, we have never been required to test our internal controls within a specified period, and, as a result, we may experience difficulty in meeting these reporting requirements in a timely manner.

During the evaluation and testing process of our internal controls, if we identify one or more material weaknesses in our internal control over financial reporting, we will be unable to assert that our internal control over financial reporting is effective. We cannot assure you that there will not be material weaknesses or significant deficiencies in our internal control over financial reporting in the future. Any failure to maintain internal control over financial reporting could severely inhibit our ability to accurately report our financial condition or results of operations. If we are unable to conclude that our internal control over financial reporting is effective, or if our independent registered public accounting firm determines we have a material weakness or significant deficiency in our internal control over financial reporting, we could lose investor confidence in the accuracy and completeness of our financial reports, the market price of our common stock could decline, and we could be subject to sanctions or investigations by Nasdaq, the Securities and Exchange Commission, or the SEC, or other regulatory authorities. Failure to remedy any material weakness in our internal control over financial reporting, or to implement or maintain other effective control systems required of public companies, could also restrict our future access to the capital markets.

We will incur significant increased costs as a result of operating as a public company, and our management will be required to devote substantial time to new compliance initiatives.

As a public company, we will incur significant legal, accounting and other expenses that we did not incur as a private company. We will be subject to the reporting requirements of the Securities Exchange Act of 1934, as amended, which will require, among other things, that we file with the SEC annual, quarterly and current reports with respect to our business and financial condition. In addition, the Sarbanes-Oxley Act, as well as rules subsequently adopted by the SEC and Nasdaq to implement provisions of the Sarbanes-Oxley Act, impose significant requirements on public companies, including requiring establishment and maintenance of effective disclosure and financial controls and changes in corporate governance practices. Further, in July 2010, the Dodd-Frank Wall Street Reform and Consumer Protection Act, or the Dodd-Frank Act, was enacted. There are significant corporate governance and executive-compensation-related provisions in the Dodd-Frank Act that require the SEC to adopt additional rules and regulations in these areas. Recent legislation permits emerging growth companies to implement many of these requirements over a longer period and up to five years from the pricing of this offering. We intend to take advantage of this new legislation, but cannot assure you that we will not be required to implement these requirements sooner than planned and thereby incur unexpected expenses. Stockholder activism, the current political environment and the current high level of government intervention and regulatory reform may lead to substantial new regulations and disclosure obligations, which may lead to additional compliance costs and impact the manner in which we operate our business in ways we cannot currently anticipate.

We expect the rules and regulations applicable to public companies to substantially increase our legal and financial compliance costs and to make some activities more time-consuming and costly. If these requirements divert the attention of our management and personnel from other business concerns, they could have a material adverse effect on our business, financial condition and results of operations. The increased costs will decrease our net income or increase our consolidated net loss, and may require us to reduce costs in other areas of our business or increase the prices of our products or services. For example, we expect these rules and regulations to make it more difficult and more expensive for us to obtain director and officer liability insurance and we may be required to incur substantial costs to maintain the same or similar coverage. We cannot predict or estimate the amount or timing of additional costs we may incur to respond to these requirements. The impact of these requirements could also make it more difficult for us to attract and retain qualified persons to serve on our board of directors, our board committees or as executive officers.

Sales of a substantial number of shares of our common stock by our existing stockholders in the public market could cause our stock price to fall.

If our existing stockholders sell, or indicate an intention to sell, substantial amounts of our common stock in the public market after the lock-up and other legal restrictions on resale discussed in this prospectus lapse, the trading price of our common stock could decline. Based on shares of common stock outstanding as of March 31, 2018, upon the closing of this offering we will have outstanding a total of shares of common stock. Of these shares, only the shares of common stock sold in this offering by us, plus any shares sold upon exercise of the underwriters' over-allotment option, will be freely tradable without restriction in the public market immediately following this offering (except for any shares purchased by our affiliates, if any, and shares purchased through the directed share program). Roth Capital Partners, however, may, in its discretion, permit our officers, directors and other stockholders who are subject to these lock-up agreements to sell shares prior to the expiration of the lock-up agreements.

We expect that the lock-up agreements pertaining to this offering will expire 180 days from the date of this prospectus. After the lock-up agreements expire, up to an additional shares of common stock will be eligible for sale in the public market, though such shares held by directors, executive officers and other affiliates and may be subject to volume limitations under Rule 144 under the Securities Act. In addition, shares of common stock that are either subject to outstanding options or reserved for future issuance under our employee benefit plans will become eligible for sale in the public market to the extent permitted by the provisions of various vesting schedules, the lock-up agreements and Rule 144 and Rule 701 under the Securities Act. If these additional shares of common stock are sold, or if it is perceived that they will be sold, in the public market, the trading price of our common stock could decline.

After this offering, the holders of shares of our common stock will be entitled to rights with respect to the registration of their shares under the Securities Act, subject to the lock-up agreements described above. See "Description of Capital Stock—Registration Rights." Registration of these shares under the Securities Act would result in the shares becoming freely tradable without restriction under the Securities Act. Any sales of securities by these stockholders could have a material adverse effect on the trading price of our common stock.

Future sales and issuances of our common stock or rights to purchase common stock, including pursuant to our equity incentive plans, could result in additional dilution to our stockholders and could cause our stock price to fall.

Sales of a substantial number of shares of our common stock in the public market following the completion of this offering, or the perception that these sales might occur, could depress the market price of our common stock and could impair our ability to raise capital through the sale of additional equity securities. We are unable to predict the effect that such sales may have on the prevailing market price of our common stock.

All of our executive officers, senior management and directors and substantially all of the holders of all of our capital stock are subject to lock-up agreements that restrict the stockholders' ability to transfer shares of our capital stock for 180 days from the date of this prospectus. Subject to certain exceptions, the lock-up agreements limit the number of shares of capital stock that may be sold immediately following this initial public offering. We expect that the lock-up agreements pertaining to this offering will expire 180 days from the date of this prospectus. After the lock-up agreements expire, up to an additional shares of common stock will be eligible for sale in the public market, of which shares are held by directors, executive officers and other affiliates and will be subject to volume limitations under Rule 144 under the Securities Act of 1933, as amended, or the Securities Act. In addition, shares of common stock that are either subject to outstanding options or reserved for future issuance under our employee benefit plans will become eligible for sale in the public market to the extent permitted by the provisions of various vesting schedules, the lock-up agreements and Rule 144 and Rule 701 under the Securities Act. If these additional shares of common stock are sold, or if it is perceived that they will be sold, in the public market, the trading price of our common stock could decline. The underwriters of this offering may, in their sole discretion, permit our stockholders who are subject to these lock-up agreements to sell shares of common stock prior to the expiration of the lock-up agreements.

We have broad discretion in the use of the net proceeds from this offering and may not use them effectively.

Our management will have broad discretion in the application of the net proceeds from this offering, including for any of the purposes described in the section entitled "Use of Proceeds," and you will not have the opportunity as part of your investment decision to assess whether the net proceeds will be used appropriately. Because of the number and variability of factors that will determine our use of the net proceeds from this offering, their ultimate use may vary substantially from their currently intended use. Our management might not apply our net proceeds in ways that ultimately increase the value of your investment. We intend to use the net proceeds from this offering to expand our commercial capabilities in selling and marketing related to our products, to fund our ongoing research and development activities, and for general corporate purposes, including working capital, operating expenses and capital expenditures.

Our expected use of net proceeds from this offering represents our current intentions based upon our present plans and business condition. As of the date of this prospectus, we cannot predict with certainty all of the particular uses for the net proceeds to be received upon the completion of this offering, or the amounts that we will actually spend on the uses set forth above. The amounts and timing of our actual use of the net proceeds will vary depending on numerous factors, including the commercial success of our systems and the costs of our research and development activities, as well as the amount of cash used in our operations. The costs and timing of research and development activities and the build out of our commercial selling and marketing capabilities, particularly as related to expansion of our systems, are highly uncertain, subject to substantial risks and can often change. Depending on the outcome of these activities, our plans and priorities may change, and we may apply the net proceeds from this offering differently than we currently anticipate. For example, in the event we identify other opportunities that we believe are in the best interests of our stockholders, we may use a portion of the net proceeds from this offering for the acquisition of, or investment in, technologies, products or companies that complement our business, although we have no current intentions, commitments or agreements to do so. As a result, our management will have broad discretion in the application of the net proceeds, and investors will be relying on our judgment regarding the application of the net proceeds of this offering. In addition, we might decide to postpone or not pursue expansion of our systems if the net proceeds from this offering and other sources of cash are less than expected.

The failure by our management to apply these funds effectively could harm our business. Pending their use, we may invest the net proceeds from this offering in short-term, investment-grade, interest-bearing securities. These investments may not yield a favorable return to our stockholders. If we do not invest or apply the net proceeds from this offering in ways that enhance stockholder value, we may fail to achieve expected financial results, which could cause our stock price to decline.

Anti-takeover provisions under our charter documents and Delaware law could delay or prevent a change of control which could limit the market price of our common stock and may prevent or frustrate attempts by our stockholders to replace or remove our current management.

Our amended and restated certificate of incorporation and amended and restated bylaws, which are to become effective immediately prior to the closing of this offering, contain provisions that could delay or prevent a change of control of our company or changes in our board of directors that our stockholders might consider favorable. Some of these provisions include:

- a board of directors divided into three classes serving staggered three-year terms, such that not all members of the board will be elected at one time;
- a prohibition on stockholder action through written consent, which requires that all stockholder actions be taken at a meeting of our stockholders;
- a requirement that special meetings of stockholders be called only by the chairman of the board of directors, the chief executive officer, the president or by a majority of the total number of authorized directors;
- advance notice requirements for stockholder proposals and nominations for election to our board of directors;

- a requirement that no member of our board of directors may be removed from office by our stockholders except for cause and, in addition to any other vote required by law, upon the approval of not less than two-thirds of all outstanding shares of our voting stock then entitled to vote in the election of directors;
- a requirement of approval of not less than two-thirds of all outstanding shares of our voting stock to amend any bylaws by stockholder action or to amend specific provisions of our certificate of incorporation; and
- the authority of the board of directors to issue preferred stock on terms determined by the board of directors without stockholder approval and which preferred stock may include rights superior to the rights of the holders of common stock.

In addition, because we are incorporated in Delaware, we are governed by the provisions of Section 203 of the Delaware General Corporate Law, which may prohibit certain business combinations with stockholders owning 15% or more of our outstanding voting stock. These anti-takeover provisions and other provisions in our amended and restated certificate of incorporation and amended and restated bylaws could make it more difficult for stockholders or potential acquirers to obtain control of our board of directors or initiate actions that are opposed by the then-current board of directors and could also delay or impede a merger, tender offer or proxy contest involving our company. These provisions could also discourage proxy contests and make it more difficult for you and other stockholders to elect directors of your choosing or cause us to take other corporate actions you desire. Any delay or prevention of a change of control transaction or changes in our board of directors could cause the market price of our common stock to decline.

If securities or industry analysts do not publish research or publish inaccurate or unfavorable research about our business, our stock price and trading volume could decline.

The trading market for our common stock will depend in part on the research and reports that securities or industry analysts publish about us or our business. Securities and industry analysts do not currently, and may never, publish research on our company. If no securities or industry analysts commence coverage of our company, the trading price for our stock would likely be negatively impacted. In the event securities or industry analysts initiate coverage, if one or more of the analysts who covers us downgrades our stock or publishes inaccurate or unfavorable research about our business, our stock price may decline. If one or more of these analysts ceases coverage of our company or fails to publish reports on us regularly, demand for our stock could decrease, which might cause our stock price and trading volume to decline.

Our recurring losses and negative cash flows have raised substantial doubt regarding our ability to continue as a going concern.

Since inception, we have experienced recurring operating losses and negative cash flows, and we expect to continue to generate operating losses and consume significant cash resources for the foreseeable future. Without additional financing, these conditions raise substantial doubt about our ability to continue as a going concern, meaning that we may be unable to continue operations for the foreseeable future or realize assets and discharge liabilities in the ordinary course of operations. As a result, our financial statements include an explanatory paragraph expressing substantial doubt about our ability to continue as a going concern. If we are unable to obtain sufficient funding, our business, prospects, financial condition and results of operations will be materially and adversely affected and we may be unable to continue as a going concern. If we are unable to continue as a going concern, we may have to liquidate our assets and may receive less than the value at which those assets are carried on our consolidated financial statements, and it is likely that investors will lose all or a part of their investment. Future reports from our independent registered public accounting firm may also contain statements expressing doubt about our ability to continue as a going concern. If we seek additional financing to fund our business activities in the future and there remains doubt about our ability to continue as a going concern, investors or other financing sources may be unwilling to provide additional funding on commercially reasonable terms or at all.

Our amended and restated certificate of incorporation to be effective in connection with the closing of this offering will provide that the Court of Chancery of the State of Delaware or the U.S. federal district courts will be the exclusive forums for substantially all disputes between us and our stockholders, which could limit our stockholders' ability to obtain a favorable judicial forum for disputes with us or our directors, officers or other employees.

Our amended and restated certificate of incorporation to be effective in connection with the closing of this offering provides that the Court of Chancery of the State of Delaware is the sole and exclusive forum for any derivative action or proceeding brought on our behalf, any action asserting a breach of fiduciary duty, any action asserting a claim against us arising under the Delaware General Corporation Law, our amended and restated certificate of incorporation or our amended and restated bylaws, or any action asserting a claim against us that is governed by the internal affairs doctrine. Our amended and restated certificate of incorporation further provides that the U.S. federal district courts will be the exclusive forum for resolving any complaint asserting a cause of action arising under the Securities Act. These choice of forum provisions may limit a stockholder's ability to bring a claim in a judicial forum that it finds favorable for disputes with us or our directors, officers or other employees, which may discourage such lawsuits. If a court were to find either choice of forum provision contained in our amended and restated certificate of incorporation to be inapplicable or unenforceable in an action, we may incur additional costs associated with resolving such action in other jurisdictions, which could adversely affect our results of operations and financial condition.

SPECIAL NOTE REGARDING FORWARD-LOOKING STATEMENTS

This prospectus contains forward-looking statements about us and our industry that involve substantial risks and uncertainties. All statements other than statements of historical facts contained in this prospectus, including statements regarding our future results of operations or financial condition, business strategy and plans, and objectives of management for future operations, are forward-looking statements. In some cases, you can identify forward-looking statements because they contain words such as “anticipate,” “believe,” “contemplate,” “continue,” “could,” “estimate,” “expect,” “intend,” “may,” “plan,” “potential,” “predict,” “project,” “should,” “target,” “will” or “would” or the negative of these words or other similar terms or expressions.

We have based these forward-looking statements largely on our current expectations and projections about future events and financial trends that we believe may affect our financial condition, results of operations, business strategy and financial needs. These forward-looking statements are subject to known and unknown risks, uncertainties and assumptions, including risks described in “Risk Factors” and elsewhere in this prospectus, regarding, among other things:

- the size and growth potential of the markets for our products, and our ability to serve those markets;
- the rate and degree of market acceptance of our products;
- ability to expand our sales organization to address effectively existing and new markets that we intend to target;
- impact from future regulatory, judicial, and legislative changes or developments in the U.S. and foreign countries;
- ability to compete effectively in a competitive industry;
- the success of competing technologies that are or may become available;
- the performance of our third-party contract sales organizations, suppliers and manufacturers;
- our ability to attract and retain key scientific or management personnel;
- the accuracy of our estimates regarding expenses, future revenues, reimbursement rates, capital requirements and needs for additional financing;
- our ability to obtain funding for our operations;
- our ability to attract collaborators and strategic partnerships; and
- our use of the proceeds from this offering.

You should not rely on forward-looking statements as predictions of future events. We have based the forward-looking statements contained in this prospectus primarily on our current expectations and projections about future events and trends that we believe may affect our business, financial condition, results of operations and prospects. The outcome of the events described in these forward-looking statements is subject to risks, uncertainties and other factors described in “Risk Factors” and elsewhere in this prospectus. Moreover, we operate in a very competitive and rapidly changing environment. New risks and uncertainties emerge from time to time, and it is not possible for us to predict all risks and uncertainties that could have an impact on the forward-looking statements contained in this prospectus.

The results, events and circumstances reflected in the forward-looking statements may not be achieved or occur, and actual results, events or circumstances could differ materially from those described in the forward-looking statements.

In addition, statements that “we believe” and similar statements reflect our beliefs and opinions on the relevant subject. These statements are based on information available to us as of the date of this prospectus. And while we believe that information provides a reasonable basis for these statements, that information may be limited or incomplete. Our statements should not be read to indicate that we have conducted an exhaustive inquiry into, or review of, all relevant information. These statements are inherently uncertain, and investors are cautioned not to unduly rely on these statements.

The forward-looking statements made in this prospectus relate only to events as of the date on which the statements are made. We undertake no obligation to update any forward-looking statements made in this prospectus to reflect events or circumstances after the date of this prospectus or to reflect new information or the occurrence of unanticipated events, except as required by law. We may not actually achieve the plans, intentions, or expectations disclosed in our forward-looking statements, and you should not place undue reliance on our forward-looking statements. Our forward-looking statements do not reflect the potential impact of any future acquisitions, mergers, dispositions, joint ventures or investments.

MARKET, INDUSTRY AND OTHER DATA

This prospectus contains estimates and information concerning our industry, including market size and growth rates of the markets in which we participate, that are based on industry publications and reports. This information involves many assumptions and limitations, and you are cautioned not to give undue weight to these estimates. We have not independently verified the accuracy or completeness of the data contained in these industry publications and reports. The industry in which we operate is subject to a high degree of uncertainty and risk due to a variety of factors, including those described in "Risk Factors," that could cause results to differ materially from those expressed in these publications and reports.

USE OF PROCEEDS

We estimate that we will receive net proceeds from this offering of approximately $ million (or approximately $ million if the underwriters' option to purchase additional shares of our common stock from us is exercised in full) based on the assumed initial public offering price of $ per share, after deducting estimated underwriting discounts and commissions and estimated offering expenses payable by us.

A $1.00 increase (decrease) in the assumed initial public offering price of $ per share would increase (decrease) the net proceeds to us from this offering by approximately $ million, assuming the number of shares offered by us, as set forth on the cover page of this prospectus, remains the same, and after deducting estimated underwriting discounts and commissions. Similarly, each increase (decrease) of 1.0 million shares in the number of shares of common stock offered by us would increase (decrease) the net proceeds to us from this offering by approximately $ million, assuming the initial public offering price of $ per share remains the same, and after deducting estimated underwriting discounts and commissions.

We intend to use the net proceeds from the offering: (1) to expand our commercial operations to grow and support the installed base of our products among life sciences basic research, translational research and clinical-related customers in the U.S. and internationally; (2) to improve and update our technology and instruments and to develop additional labeling reagents; (3) to potentially establish a direct commercialization presence in China; (4) to assist existing and future partners in pursuing regulatory approvals or clearances to develop instruments and consumables in areas outside of life science research, including potentially LDTs; (5) to potentially pursue acquisitions or other business development opportunities; and (6) for working capital and other general corporate purposes.

The expected use of net proceeds from this offering represents our intentions based upon our present plans and business conditions. We cannot predict with certainty all of the particular uses for the proceeds of this offering or the amounts that we will actually spend on the uses set forth above. Accordingly, we will have significant flexibility in applying the net proceeds of this offering. The timing and amount of our actual expenditures will be based on many factors, including cash flows from operations and the anticipated growth of our business. Pending their use, we intend to invest the net proceeds of this offering in a variety of capital-preservation investments, including short-and intermediate-term, interest-bearing, investment-grade securities and government securities.

DIVIDEND POLICY

We do not anticipate declaring or paying, in the foreseeable future, any cash dividends on our capital stock. We intend to retain all available funds and future earnings, if any, to fund the development and expansion of our business, and we do not anticipate paying any cash dividends in the foreseeable future. Any future determination regarding the declaration and payment of dividends, if any, will be at the discretion of our board of directors and will depend on then-existing conditions, including our financial condition, operating results, contractual restrictions, capital requirements, business prospects and other factors our board of directors may deem relevant. In addition, we are currently prohibited from paying dividends on our common stock without the prior written consent of Western Alliance Bank, our senior lender.

CAPITALIZATION

The following table sets forth our cash and cash equivalents and capitalization as of March 31, 2018:

- on an actual basis;
- on a pro forma basis, giving effect to (i) the automatic conversion of all of our outstanding shares of convertible preferred stock into an aggregate of 121,992,497 shares of common stock, (ii) the net exercise of certain outstanding warrants to purchase shares of our Series B-1 convertible preferred stock for an aggregate of shares of common stock (based on an assumed initial public offering price of $ per share (the midpoint of the price range set forth on the cover page of this prospectus)), (iii) the net exercise of certain outstanding warrants to purchase shares of our Series D convertible preferred stock for an aggregate of shares of common stock (based on an assumed initial public offering price of $ per share (the midpoint of the price range set forth on the cover page of this prospectus)), and (iv) the conversion of approximately $13.4 million aggregate principal amount of outstanding convertible promissory notes plus accrued interest thereon into shares of common stock (based on an assumed initial public offering price of $ per share (the midpoint of the price range set forth on the cover page of this prospectus) and a conversation date of , 2018); and
- on a pro forma as adjusted basis, giving effect to (i) the pro forma adjustments set forth above and (ii) our receipt of estimated net proceeds from the sale of shares of common stock in the offering at the assumed initial public offering price of $ per share, after deducting the estimated underwriting discounts and commissions and estimated offering expenses payable by us.

You should read this table together with "Management's Discussion and Analysis of Financial Condition and Results of Operations" and our financial statements and related notes included elsewhere in this prospectus.

	As of March 31, 2018		
	Actual	Pro Forma (unaudited)	Pro Forma As Adjusted
Cash and cash equivalents	$ 7,552,716	$	$
Long-term debt	6,681,082		
Convertible note	13,329,843		
Preferred stock warrant liability	2,945,746		
Convertible preferred stock, $0.0001 par value; 218,044,977 shares authorized, 121,992,497 shares issued and outstanding, actual, and no shares authorized, issued and outstanding, pro forma and pro forma as adjusted	43,010,137		
Stockholders' deficit:			
Common stock, $0.0001 par value; 243,160,120 shares authorized, actual, 3,318,249 shares issued and outstanding, actual; XXX shares authorized, pro forma; XXX shares issued and outstanding, pro forma; XXX shares authorized, pro forma as adjusted; XXX shares issued and outstanding, pro forma as adjusted	333		
Additional paid-in capital	4,093,241		
Accumulated deficit	(58,113,398)		
Total stockholders' deficit	(54,019,824)		
Total capitalization	$ 11,946,984	$	$

A $1.00 increase (decrease) in the assumed initial public offering price of $ per share would increase (decrease) each of our pro forma as adjusted cash and cash equivalents, additional paid-in capital, total stockholders' (deficit) equity and total capitalization by approximately $ million, assuming the number of shares offered by us, as set forth on the cover page of this prospectus, remains the same, and after deducting estimated underwriting discounts and commissions. Similarly, each increase (decrease) of 1.0 million shares in the number of shares common stock offered by us would increase (decrease) each of our pro forma as adjusted cash and cash equivalents, additional paid-in capital, total stockholders' (deficit) equity and total capitalization by approximately $ million, assuming

the assumed initial public offering price of $ per share remains the same, and after deducting estimated underwriting discounts and commissions payable by us.

If the underwriters' option to purchase additional shares of our common stock from us is exercised in full, pro forma as adjusted cash and cash equivalents, additional paid-in capital, total stockholders' (deficit) equity, total capitalization and shares of common stock outstanding as of March 31, 2018 would be $, $, $, $ and , respectively.

The number of shares of our common stock that will be outstanding after this offering is based on 3,318,349 shares of common stock outstanding as of March 31, 2018, and excludes:

- 18,649,605 shares of our common stock issuable upon the exercise of stock options outstanding as of March 31, 2018 under our Amended and Restated 2006 Equity Compensation Plan, as amended, or 2006 Plan, with a weighted-average exercise price of $0.12 per share;
- shares of our common stock reserved for future issuance under our 2018 Equity Incentive Plan, or 2018 Plan, which will become effective once the registration statement of which this prospectus forms a part is declared effective, as well as any future increases in the number of shares of common stock reserved for issuance under our 2018 Plan and any shares underlying outstanding stock awards granted under our 2006 Plan that expire or are repurchased, forfeited, cancelled or withheld, as more fully described in the section titled "Executive Compensation – Equity Incentive Plans";
- shares of our common stock reserved for issuance under our 2018 Employee Stock Purchase Plan, or ESPP, which will become effective once the registration statement of which this prospectus forms a part is declared effective, and any automatic increases in the number of shares of common stock reserved for future issuance under our ESPP;
- shares of our common stock issuable upon the exercise of an outstanding warrant which, prior to the completion of this offering, is exercisable for 42,872 shares of our Series B convertible preferred stock;
- shares of our common stock issuable upon the exercise of outstanding warrants which, prior to the completion of this offering, are exercisable for 75,027 shares of our Series B-1 convertible preferred stock;
- shares of our common stock issuable upon the exercise of an outstanding warrant which, prior to the completion of this offering, is exercisable for 510,417 shares of our Series D convertible preferred stock;
- shares of our common stock issuable upon the exercise of an outstanding warrant which, prior to the completion of this offering, is exercisable for 291,667 shares of our Series D-1 convertible preferred stock; and
- shares of common stock issuable upon exercise of warrants to be issued to the Underwriters in connection with this offering, which will have an exercise price equal to 150% of the initial public offering price per share in this offering.

In addition, unless we specifically state otherwise, the information in this prospectus assumes or gives effect to:

- the filing of our amended and restated certificate of incorporation, which will be in effect upon the completion of this offering;
- the conversion of all of our outstanding shares of convertible preferred stock into an aggregate of 121,992,497 shares of common stock upon the closing of this offering;
- the net exercise of outstanding warrants to purchase shares of our Series B-1 convertible preferred stock for an aggregate of shares of common stock (based on an assumed initial public offering price of $ per share (the midpoint of the price range set forth on the cover page of this prospectus));

- the net exercise of outstanding warrants to purchase shares of our Series D convertible preferred stock for an aggregate of shares of common stock (based on an assumed initial public offering price of $ per share);
- the conversion of outstanding convertible promissory notes issued in February 2018 into shares of common stock (based on an assumed initial public offering price of $ per share (the midpoint of the price range set forth on the cover page of this prospectus);
- that the initial public offering price of our shares of common stock is $ per share, which is the midpoint of the price range set forth on the cover page of this prospectus;
- no exercise of the outstanding options described above;
- no exercise of the underwriters' option to purchase up to an additional shares of common stock from us in this offering; and
- a 1-for- reverse stock split of our common stock to be effected prior to the closing of this offering.

DILUTION

If you invest in our common stock in this offering, your interest will be diluted to the extent of the difference between the initial public offering price per share of common stock and the pro forma as adjusted net tangible book value per share immediately after this offering.

Our pro forma net tangible book value as of March 31, 2018 was $ million, or $ per share. Pro forma net tangible book value per share represents the amount of our total tangible assets less our total liabilities, divided by the number of our shares of common stock outstanding as of March 31, 2018, after giving effect to (i) the automatic conversion of all of our outstanding shares of convertible preferred stock into an aggregate of 121,992,497 shares of common stock, (ii) the net exercise of certain outstanding warrants to purchase shares of our Series B-1 convertible preferred stock for an aggregate of shares of common stock (based on an assumed initial public offering price of $ per share (the midpoint of the price range set forth on the cover page of this prospectus)), (iii) the net exercise of certain outstanding warrants to purchase shares of our Series D convertible preferred stock for an aggregate of shares of common stock (based on an assumed initial public offering price of $ per share (the midpoint of the price range set forth on the cover page of this prospectus)), and (iv) the conversion of approximately $13.4 million aggregate principal amount of outstanding convertible promissory notes plus accrued interest thereon into shares of common stock (based on an assumed initial public offering price of $ per share (the midpoint of the price range set forth on the cover page of this prospectus) and a conversation date of , 2018).

After giving effect to the sale by us of shares of common stock in this offering at the assumed initial public offering price of $ per share (the mid-point of the price range set forth on the cover page of this prospectus), and after deducting estimated underwriting discounts, commissions and estimated offering expenses payable by us, our pro forma as adjusted net tangible book value as of March 31, 2018 would have been $ million, or $ per share. This amount represents an immediate increase in pro forma as adjusted net tangible book value of $ per share to our existing stockholders and an immediate dilution in pro forma as adjusted net tangible book value of $ per share to investors purchasing common stock in this offering. We determine dilution by subtracting the pro forma as adjusted net tangible book value per share after this offering from the amount of cash paid by an investor for a share of common stock in this offering. The following table illustrates this dilution on a per share basis:

Assumed initial public offering price per share		$
Historical net tangible book value (deficit) per share as of March 31, 2018	$	
Pro forma increase in net tangible book value per share as of March 31, 2018 attributable to the conversion of convertible preferred stock and convertible notes described in the preceding paragraph		
Pro forma net tangible book value (deficit) per share as of March 31, 2018, before giving effect to this offering		
Increase in pro forma net tangible book value per share attributable to new investors participating in this offering		
Pro forma as adjusted net tangible book value (deficit) per share after this offering		
Dilution per share to new investors participating in this offering		$

The dilution information discussed above is illustrative only and may change based on the actual initial public offering price and other terms of this offering. A $1.00 increase (decrease) in the assumed initial public offering price of $ per share would increase (decrease) our pro forma as adjusted net tangible book value per share after this offering by $ per share and increase (decrease) the dilution to investors purchasing shares in this offering by $ per share, in each case assuming the number of shares of common stock offered by us, as set forth on the cover page of this prospectus, remains the same, and after deducting estimated underwriting discounts and commissions payable by us. Similarly, each increase or decrease of 1.0 million shares in the number of shares of common stock offered by us would increase (decrease) our pro forma as adjusted net tangible book value by approximately $ per share and decrease (increase) the dilution to investors purchasing shares in this offering by approximately $ per share, in each case assuming the assumed initial public offering price of $ per share remains the same, and after deducting estimated underwriting discounts and commissions.

If the underwriters exercise their option to purchase additional shares of common stock in full, the pro forma net tangible book value per share, as adjusted to give effect to this offering, would be $ per share, and the dilution in pro forma net tangible book value per share to investors in this offering would be $ per share.

The number of shares of our common stock that will be outstanding after this offering is based on 3,318,349 shares of common stock outstanding as of March 31, 2018, and excludes:

- 18,649,605 shares of our common stock issuable upon the exercise of stock options outstanding as of March 31, 2018 under our 2006 Plan with a weighted-average exercise price of $0.12 per share;
- shares of our common stock reserved for future issuance under the 2018 Plan, which will become effective once the registration statement of which this prospectus forms a part is declared effective, as well as any future increases in the number of shares of common stock reserved for issuance under our 2018 Plan and any shares underlying outstanding stock awards granted under our 2006 Plan that expire or are repurchased, forfeited, cancelled or withheld, as more fully described in the section titled “Executive Compensation – Equity Incentive Plans”;
- shares of our common stock reserved for issuance under the ESPP, which will become effective once the registration statement of which this prospectus forms a part is declared effective, and any automatic increases in the number of shares of common stock reserved for future issuance under our ESPP;
- shares of our common stock issuable upon the exercise of an outstanding warrant which, prior to the completion of this offering, is exercisable for 42,872 shares of our Series B convertible preferred stock;
- shares of our common stock issuable upon the exercise of outstanding warrants which, prior to the completion of this offering, are exercisable for 75,027 shares of our Series B-1 convertible preferred stock;
- shares of our common stock issuable upon the exercise of an outstanding warrant which, prior to the completion of this offering, is exercisable for 510,417 shares of our Series D convertible preferred stock;
- shares of our common stock issuable upon the exercise of an outstanding warrant which, prior to the completion of this offering, is exercisable for 291,667 shares of our Series D-1 convertible preferred stock; and
- shares of common stock issuable upon exercise of warrants to be issued to the Underwriters in connection with this offering, which will have an exercise price equal to 150% of the initial public offering price per share in this offering.

To the extent that any outstanding options or warrants are exercised or new options are issued under our stock-based compensation plans, or we issue additional shares of common stock in the future, there will be further dilution to investors participating in this offering. If all outstanding options and warrants under our 2006 Plan, as of March 31, 2018, were exercised, then our existing stockholders, including the holders of these options, would own % and our investors purchasing shares in this offering would own % of the total number of shares of common stock outstanding upon the completion of this offering. In addition, we may choose to raise additional capital because of market conditions or strategic considerations, even if we believe that we have sufficient funds for our current or future operating plans. If we raise additional capital through the sale of equity or convertible debt securities, the issuance of these securities could result in further dilution to our stockholders.

SELECTED FINANCIAL DATA

The selected statements of operations data for the years ended December 31, 2016 and 2017 and the balance sheet data as of December 31, 2016 and 2017 are derived from our audited financial statements that are included elsewhere in this prospectus. The selected statements of operations data for the three months ended March 31, 2017 and 2018 and the balance sheet data as of March 31, 2018 are derived from our unaudited financial statements that are included elsewhere in this prospectus. Our historical results are not necessarily indicative of our results in any future period and results from our interim period may not necessarily be indicative of the results of the entire year.

You should read the following selected financial data together with "Management's Discussion and Analysis of Financial Condition and Results of Operations" and our financial statements and the related notes included elsewhere in this prospectus. The selected financial data in this section are not intended to replace our financial statements and the related notes and are qualified in their entirety by the financial statements and related notes included elsewhere in this prospectus.

	Year ended December 31,		Three Months Ended March 31,	
	2016	2017	2017	2018
Total revenue	$ 6,792,789	$ 9,505,043	$ 1,720,754	$ 1,768,485
Operating expenses				
Cost of revenue	3,578,692	6,030,512	1,205,264	841,449
Research and development	11,431,941	12,009,170	3,190,416	2,367,093
Selling, general and administrative	12,950,572	14,079,658	3,513,059	2,895,404
Impairment of property and equipment	—	604,511	—	—
Total operating expenses	27,961,205	32,723,851	7,908,739	6,103,946
Interest expense	(470,072)	(590,927)	(142,294)	(301,981)
Other income	2,802,797	462,923	658,107	793,856
Provision for income taxes	(12,924)	(18,552)	(13,358)	(3,776)
Net loss	$ (18,848,615)	$ (23,365,364)	$ (5,685,530)	$ (3,847,362)
Net loss per share[1]:				
Basic and diluted	$ (7.30)	$ (7.66)	$ (1.89)	$ (1.16)
Pro forma net loss per share[1]:				
Basic and diluted				

(1) See Note 2 of the notes to our financial statements included elsewhere in this prospectus for a description of how we compute basic and diluted net income per share attributable to common stockholders and preferred stockholders and pro forma basic and diluted net loss per share attributable to common stockholders.

	Year ended December 31,		As of March 31,
	2016	2017	2018
Balance Sheet Data:			
Cash and cash equivalents	$ 5,249,620	$ 1,021,897	$ 7,552,716
Working capital	1,371,819	(9,512,886)	(13,006,514)
Total assets	14,787,737	10,145,153	16,462,320
Long term debt	6,633,171	6,729,752	6,681,082
Convertible note	—	—	13,329,843
Total liabilities	16,630,182	17,362,227	27,472,007
Convertible preferred stock	25,416,527	43,010,137	43,010,137
Accumulated deficit	(30,900,672)	(54,266,036)	(58,113,398)
Total stockholders' deficit	$ (27,258,972)	$ (50,227,211)	$ (54,019,824)

MANAGEMENT'S DISCUSSION AND ANALYSIS OF FINANCIAL CONDITION AND RESULTS OF OPERATIONS

The following discussion should be read in conjunction with the "Selected Financial Data" and our financial statements and related notes thereto included elsewhere in this prospectus. In addition to historical information, this discussion contains forward- looking statements that involve risks, uncertainties and assumptions that could cause actual results to differ materially from management's expectations. Factors that could cause such differences are discussed in the sections entitled "Special Note Regarding Forward-Looking Statements" and "Risk Factors." We are not undertaking any obligation to update any forward-looking statements or other statements we may make in the following discussion or elsewhere in this document even though these statements may be affected by events or circumstances occurring after the forward-looking statements or other statements were made. Therefore, no reader of this document should rely on these statements being current as of any time other than the time at which this document is declared effective by the U.S. Securities and Exchange Commission.

Overview

We are a life sciences instrumentation company in the genome analysis space. We develop and market the Saphyr system, a platform for ultra-sensitive and ultra-specific structural variation detection that enables researchers and clinicians to accelerate the search for new diagnostics and therapeutic targets and to streamline the study of changes in chromosomes, which is known as cytogenetics. Our Saphyr system comprises an instrument, chip consumables, reagents and a suite of data analysis tools.

Structural variation refers to large-scale structural differences in the genomic DNA of one individual compared to another. Each structural variation involves the rearrangement or repetition of as few as hundreds to as many as tens of millions of DNA base pairs. Those rearrangements may be insertions, deletions, duplications, inversions or translocations of segments of one or more chromosomes. Structural variations may be inherited or arise spontaneously and many cause genetic disorders and diseases. Until our commercial launch of the Saphyr system in February 2017, and since, we believe no products existed or exist that could more comprehensively and cost and time-efficiently detect structural variation.

Our Saphyr system comprises an instrument, chip consumables, reagents and a suite of data analysis tools. Our customers include researchers and clinicians who seek to uncover and understand the biological or clinical impact of genome variation to improve the diagnosis and treatment of patients with better clinical tests and new medicines or to replace existing cytogenetic tests that are expensive, slow and labor-intense, with a modern solution that simplifies workflow and reduces costs and that has the potential to significantly increase diagnostic yields across the industry. Our customers also include researchers in non-human segments such as agricultural genomics where they seek to advance their understanding of how structural variation impacts industrial applications of plants and animals.

To date, we have financed our operations principally through private placements of our convertible preferred stock, convertible promissory notes, borrowings from credit facilities and revenue from our commercial operations.

Since our inception, we have raised net equity proceeds of $129.3 million to fund our operations from the issuance of convertible preferred stock and convertible promissory notes. We have incurred losses in each year since our inception. Our net losses were $18.8 million and $23.4 million for the years ended December 31, 2016 and 2017, respectively, and $5.7 million and $3.8 million for the three months ended March 31, 2017 and 2018, respectively. As of March 31, 2018, we had an accumulated deficit of $58.1 million.

We expect to continue to incur significant expenses and operating losses as we:

- expand our sales and marketing efforts to further commercialize our products;
- continue research and development efforts to improve our existing products;
- hire additional personnel;

- enter into collaboration arrangements, if any;
- add operational, financial and management information systems; and
- incur increased costs as a result of operating as a public company.

Financial Overview

Revenue

We generate product revenue from sales of our instruments and consumables. We currently sell our products for research use only applications and our customers are primarily laboratories associated with academic and governmental research institutions, as well as pharmaceutical, biotechnology and contract research companies. Sales of our consumables have consistently increased due to an increasing number of our instruments being installed in the field, all of which require certain of our consumables to run customers' specific tests. Consumable revenue consists of sales of complete assays which are developed internally by us, plus sales of kits which contain all the elements necessary to run tests.

Other revenue consists of warranty and other service-based revenue.

The following table presents our revenue for the periods indicated:

	Year Ended December 31,		Three Months Ended March 31,	
	2016	2017	2017	2018
			(unaudited)	
Product revenue	$ 6,153,355	$ 8,769,704	$ 1,593,848	$ 1,662,222
Other revenue	639,434	735,339	126,906	106,263
Total	$ 6,792,789	$ 9,505,043	$ 1,720,754	$ 1,768,485

The following table reflects total revenue by geography and as a percentage of total revenue, based on the billing address of our customers. North America consists of the United States and Canada. EMEA consists of Europe, Middle East and Africa. Asia Pacific includes China, Japan, South Korea, Singapore and Australia.

	Year Ended December 31,				Three Months Ended March 31,			
	2016		2017		2017		2018	
	$	%	$	%	$	%	$	%
					(unaudited)			
North America	$ 2,078,987	31%	$ 3,801,481	40%	$ 972,006	57%	$ 648,551	37%
EMEA	1,666,188	24%	1,282,897	13%	74,054	4%	89,191	5%
Asia Pacific	3,047,614	45%	4,420,665	47%	674,694	39%	1,030,743	58%
Total	$ 6,792,789	100%	$ 9,505,043	100%	$ 1,720,754	100%	$ 1,768,485	100%

Cost of Revenue

Cost of revenue for our instruments and consumables includes cost from the manufacturer, raw material parts costs and associated freight, shipping and handling costs, contract manufacturer costs, salaries and other personnel costs, overhead and other direct costs related to those sales recognized as product revenue in the period.

Cost of other revenue consists of salaries and other personnel costs and costs related to warranties and other costs of servicing equipment at customer sites.

Research and Development Expenses

Research and development expenses consist of salaries and other personnel costs, stock-based compensation, research supplies, third-party development costs for new products, materials for prototypes, and allocated overhead costs that include facility and other overhead costs. We have made substantial investments in research and development since our inception, and plan to continue to make investments in the future. Our research and development efforts have focused primarily on the tasks required to support development and commercialization of new and existing products. We believe that our continued investment in research and development is essential to our long-term competitive position.

Selling, General and Administrative Expenses

Selling, general and administrative expenses consist primarily of salaries and other personnel costs, and stock-based compensation for our sales and marketing, finance, legal, human resources and general management, as well as professional services, such as legal and accounting services.

Results of Operations

Comparison of the Three Months Ended March 31, 2017 and 2018

The following table sets forth our results of operations for the three months ended March 31, 2017 and 2018:

	Three Months Ended March 31,		Period-to-Period Change	
	2017	2018	$	%
		(unaudited)		
Product revenue	$ 1,593,848	$ 1,662,222	$ 68,374	4.3%
Other revenue	126,906	106,263	(20,643)	-16.3%
Total revenue	1,720,754	1,768,485	47,731	2.8%
Cost of product revenue	1,204,683	840,582	(364,101)	-30.2%
Cost of other revenue	581	867	286	49.2%
Research and development	3,190,416	2,367,093	(823,323)	-25.8%
Selling, general and administrative	3,513,059	2,895,404	(617,655)	-17.6%
Impairment of property and equipment	—	—	—	N/A
Total operating expenses	7,908,739	6,103,946	(1,804,793)	-22.8%
Loss from operations	(6,187,985)	(4,335,461)	1,852,524	-29.9%
Interest expense	(142,294)	(301,981)	(159,687)	-112.2%
Change in fair value of preferred stock warrants and expirations	679,180	953,198	274,018	40.3%
Other expense	(21,073)	(159,342)	(138,269)	-656.1%
Loss before income taxes	(5,672,172)	(3,843,586)	1,828,586	-32.2%
Provision for income taxes	(13,358)	(3,776)	9,582	-71.7%
Net loss	$ (5,685,530)	$ (3,847,362)	$ (1,838,168)	-32.3%

Revenue

Revenue was relatively consistent at $1.8 million for the three months ended March 31, 2018, as compared to $1.7 million for the same period in 2017. Average sales prices, or ASPs, of instruments and consumables increased 19% and 23%, respectively in the three months ended March 31, 2018, as compared with the three months ended March 31, 2017 as we began selling our new Saphyr system, which includes higher priced instruments and consumables, in February 2017. We expect higher ASPs to continue in future periods.

Cost of Revenue

Cost of product revenue decreased by $0.4 million, or 30.2%, to $0.8 million for the three months ended March 31, 2018, as compared to $1.2 million for the same period in 2017. The decrease was primarily due to the increase in consumable revenue relative to instrument revenue for the three months ended March 31, 2018, as compared to the same period in 2017, as we typically realize higher margins on consumables compared to instruments. Cost of revenues could adversely be affected if we are unable to sell our remaining Irys instruments at the current carrying amount of $1.3 million.

Research and Development Expenses

Research and development expenses decreased $0.8 million, or 25.8%, to $2.4 million for the three months ended March 31, 2018 compared to $3.2 million for the same period in 2017. The decrease in research and development expenses during this period was primarily related to decreases in compensation and benefit expense as a result in a reduction in headcount during the second half of 2017.

Selling, General and Administrative Expenses

Selling, general and administrative expenses were $3.5 million and $2.9 million for the three months ended March 31, 2017 and 2018, respectively. The decrease in selling, general and administrative expenses during this period of $0.6 million was primarily related to decreases in compensation and benefit expense as a result of a reduction in headcount during the second half of 2017. We expect selling, general and administrative expenses to increase in future periods as the number of sales, technical support and marketing and administrative personnel grows and we continue to broaden our customer base and grow our business. We also expect to incur additional expenses as a public company, including expenses related to compliance with the rules and regulations of the Securities and Exchange Commission and The Nasdaq Stock Market, additional insurance expenses, and expenses related to investor relations activities and other administrative and professional services.

Interest Expense

Interest expense increased from $0.1 million to $0.3 million for the three months ended March 31, 2017 and 2018, respectively. The increase in interest expense is related to additional borrowing of convertible notes entered into during the three months ended March 31, 2018.

Change in Fair Value of Preferred Stock Warrants

Change in fair value of preferred stock warrants was $0.7 million and $1.0 million for the three months ended March 31, 2017 and 2018, respectively. The preferred stock warrants are subject to remeasurement at each reporting period, with changes in fair value recorded in the statement of operations.

Other Expense

Other expense was $0.02 million and $0.2 million for the three months ended March 31, 2017 and 2018, respectively. The increase is related to financing expenses incurred on the convertible notes entered into during the three months ended March 31, 2018.

Comparison of the Years Ended December 31, 2016 and 2017

The following table sets forth our results of operations for the years ended December 31, 2016 and 2017:

	Year Ended December 31,		Period-to-Period Change	
	2016	2017	$	%
Product revenue	$ 6,153,355	$ 8,769,704	$ 2,616,349	42.5%
Other revenue	639,434	735,339	95,905	15.0%
Total revenue	6,792,789	9,505,043	2,712,254	39.9%
Cost of product revenue	3,459,771	5,958,537	2,498,766	72.2%
Cost of other revenue	118,921	71,975	(46,946)	-39.5%
Research and development	11,431,941	12,009,170	577,229	5.0%
Selling, general and administrative	12,950,572	14,079,658	1,129,086	8.7%
Impairment of property and equipment	—	604,511	604,511	N/A
Total operating expenses	27,961,205	32,723,851	4,762,646	17.0%
Loss from operations	(21,168,416)	(23,218,808)	(2,050,392)	9.7%
Interest expense	(470,072)	(590,927)	(120,855)	-25.7%
Change in fair value of preferred stock warrants and expirations	3,006,082	751,933	(2,254,149)	-75.0%
Other expense	(203,285)	(289,010)	(85,725)	-42.2%
Loss before income taxes	(18,835,691)	(23,346,812)	(4,511,121)	23.9%
Provision for income taxes	(12,924)	(18,552)	(5,628)	43.5%
Net loss	$ (18,848,615)	$ (23,365,364)	$ 4,516,749	24.0%

Revenue

Revenue increased by $2.7 million, or 39.9% to $9.5 million for the year ended December 31, 2017, as compared to $6.8 million for the same period in 2016. ASPs of instruments and consumables increased in the year ended December 31, 2017, as compared with the year ended December 31, 2016 as we began selling our new Saphyr system, which includes higher priced instruments and consumables, in February 2017. The vast majority of the increase in product revenue of $2.6 million was due to a 37% increase in instrument unit sales and a 4% increase in consumable unit sales in the year ended December 31, 2017, as compared to 2016; higher priced instruments (instrument ASP increased 6%) and consumables (consumable ASP increased 18%) also contributed to the increase in product revenue, but to a much lesser extent than the increase in sales volume. The increase in other revenue of $0.1 million was due to increased warranty revenues.

Cost of Revenue

Cost of product revenue increased by $2.5 million, or 72.2%, to $6.0 million for the year ended December 31, 2017, as compared to $3.5 million for the same period in 2016. The increase was primarily due to increased sales of instruments and consumables and write-downs of Irys instruments (the predecessor to our Saphyr instrument) of $0.4 million included in inventory to net realizable value during 2017. During the year ended December 31, 2017, we also incurred higher costs related to the manufacturing of our instruments due to purchase quantities at lower volumes on a per-batch basis. In order to manage working capital, instruments were ordered as needed, limiting volume based purchase discounts. We expect the cost of product revenue per instrument to decrease in future periods as we benefit from economies of scale and modifications to the components and assembly over time. Cost of revenues could adversely be affected if we are unable to sell our remaining Irys instruments at the current carrying amount of $1.3 million.

Research and Development Expenses

Research and development expenses were relatively consistent at $11.4 million and $12.0 million for the year ended December 31, 2016 and 2017, respectively. During 2017, we began to transition our efforts from research and development to the commercialization of our products. As part of commercialization effort we reduced headcount related to research and development personnel during the second half of 2017. We expect our research and development expenses will be lower in the near term due to this transition.

Selling, General and Administrative Expenses

Selling, general and administrative expenses were $13.0 million and $14.1 million for the years ended December 31, 2016 and 2017, respectively. The increase in selling, general and administrative expenses during this period of $1.1 million was primarily related to increases in marketing expense due to the launch of Saphyr, our new product platform, in February 2017 and increased headcount for customer support services. We expect selling, general and administrative expenses to increase in future periods as the number of sales, technical support and marketing and administrative personnel grows and we continue to broaden our customer base and grow our business. We also expect to incur additional expenses as a public company, including expenses related to compliance with the rules and regulations of the Securities and Exchange Commission and The Nasdaq Stock Market, additional insurance expenses, and expenses related to investor relations activities and other administrative and professional services.

Impairment of Property and Equipment

We did not recognize any impairment losses during the year ended December 31, 2016. During the year ended December 31, 2017, we recognized an impairment loss of $0.6 million related to our Irys instruments at customer sites as the carrying amount of the assets were determined to be in excess of the assets fair value.

Interest Expense

Interest expense was relatively consistent with $0.5 million and $0.6 million for the year ended December 31, 2016 and 2017, respectively.

Change in Fair Value of Preferred Stock Warrants

Change in fair value of preferred stock warrants was $3.0 million and $0.8 million for the year ended December 31, 2016 and 2017, respectively. The preferred stock warrants are subject to remeasurement at each reporting period, with changes in fair value recorded in the statement of operations.

Other Expense

Other expense was relatively consistent with $0.2 million and $0.3 million for the year ended December 31, 2016 and 2017, respectively.

Liquidity and Capital Resources

Since our inception, we have incurred net losses and negative cash flows from operations. We incurred net losses of $18.8 million, $23.4 million and $3.8 million, and used $23.5 million, $20.8 million and $6.8 million of cash from our operating activities for the years ended December 31, 2016 and 2017 and the three months ended March 31, 2018, respectively. As of March 31, 2018, we had an accumulated deficit of $58.1 million and cash and cash equivalents of $7.6 million.

Sources of Liquidity

To date, we have financed our operations principally through private placements of our convertible preferred stock, borrowings from credit facilities and revenue from our commercial operations.

Preferred stock financings

As of December 31, 2017, we had raised approximately $129.3 million in net equity proceeds through sales of our preferred stock, including the sale of 49,819,157 shares of our Series D and D-1 convertible preferred stock and warrants to purchase 31,672,817 shares of our Series D convertible preferred stock, during the year ended December 31, 2016 at a purchase price of $0.48 per share for net proceeds of $23.5 million.

During the year ended December 31, 2017, we also issued 36,974,586 shares of Series D-1 Preferred Stock at a purchase price of $0.48 per share for net proceeds of $17.6 million.

See Note 8 to our consolidated financial statements for a discussion of the terms and provisions of our Series D and Series D-1 Preferred Stock issued in 2016 and 2017.

Loan facility

On March 8, 2016, we entered into a new term Loan and Security Agreement with Western Alliance Bank, or the Western Alliance LSA, for $7.0 million. The loan proceeds were used to repay the outstanding $5.0 million loan with Square 1 Bank, as required by the amended Loan and Security agreement between Square 1 Bank and us.

We received a notice of default from Western Alliance Bank notifying us that we were in default as of December 31, 2017, as we had failed to secure at least $15.0 million from the sale or issuance of our equity securities or subordinated debt as set forth in the amended Western Alliance LSA. Based on the loan default notice we determined to reclassify the total loan balance of approximately $6.7 million to current liabilities on the consolidated balance sheet as of December 31, 2017, as the loan could be called at any time by Western Alliance Bank.

In February 2018, the Western Alliance LSA was amended requiring the Company to secure $21.0 million in funding prior to June 30, 2018. As part of the amendment, Western Alliance Bank agreed to forbear from exercising any of its default remedies set forth in the LSA as a result of our loan default. As of March 31, 2018, the Company has raised $13.4 million of the $21.0 million financing milestone.

In June 2018, subsequent to the original issuance of our March 31, 2018 financial statements, the Western Alliance LSA was amended, replacing previously amended funding requirements and requiring the Company to secure $5.0 million in funding prior to August 3, 2018. Additionally, the amendment restricts the Company's use of all cash collected from customers, received on and after the amendment date, until a total of $2.5 million is collected. Through June 28, 2018, the Company has collected approximately $0.9 million of the $2.5 million requirement. As part of the amendment, Western Alliance Bank has waived the existing default.

See Note 7 to our consolidated financial statements for a discussion of terms and provisions to the Western Alliance LSA.

Note purchase agreement

On February 9, 2018, we entered into a Note Purchase Agreement with various investors, which included related parties, or the Investors, pursuant to which we agreed to sell the Investors 8% Convertible Promissory Notes, or the Convertible Notes, in the original principal amount up to approximately $16.0 million. On April 2, 2018, we amended the Note Purchase Agreement to, among other things, increase the principal amount available for issuance under the Note Purchase Agreement to approximately $18.4 million. The Convertible Notes have a maturity date of September 30, 2018 and are convertible either into our common stock or preferred stock, dependent on the conversion events as described in Note 12 to our consolidated financial statements.

As of May 1, 2018, the Company had received proceeds of approximately $13.4 million from the issuance of the Convertible Notes.

Cash Flows

The following table sets forth the cash flow from operating, investing and financing activities for the periods presented:

	Year Ended December 31,		Three Months Ended March 31,	
	2016	2017	2017	2018
Net cash provided by (used in):			(unaudited)	
Operating activities	$ (23,496,358)	$ (20,817,798)	$ (7,365,585)	$ (6,787,499)
Investing activities	(1,349,853)	(1,017,830)	(71,528)	(11,830)
Financing activities	25,431,061	17,607,905	6,975,074	13,330,148

Operating Activities

We derive cash flows from operations primarily from the sale of our products and services. Our cash flows from operating activities are also significantly influenced by our use of cash for operating expenses to support the growth of our business. We have historically experienced negative cash flows from operating activities as we have developed our technology, expanded our business and built our infrastructure and this may continue in the future.

Net cash used in operating activities was $7.4 million during the three months ended March 31, 2017 as compared to $6.8 million during the three months ended March 31, 2018. The decrease in cash used in operating activities of $0.6 million was primarily the result of lower operating expenses.

Net cash used in operating activities was $23.5 million during the year ended December 31, 2016 as compared to $20.8 million during the year ended December 31, 2017. The decrease in cash used in operating activities of $2.7 million was primarily the result of increased revenues.

Investing Activities

Historically, our primary investing activities have consisted of capital expenditures for the purchase of capital equipment to support our expanding infrastructure. We expect to continue to incur additional costs for capital expenditures related to these efforts in future periods.

Net cash used in investing activities was $0.07 million during the three months ended March 31, 2017 as compared to $0.01 million during the three months ended March 31, 2018.

Net cash used in investing activities was $1.4 million during the year ended December 31, 2016 as compared to $1.0 million during the year ended December 31, 2017. The decrease in cash used in investing activities of $0.4 million was the result of a decrease in the purchase of property and equipment in 2017.

Financing Activities

Historically, we have financed our operations principally through private placements of our convertible preferred stock and promissory notes and borrowings from credit facilities, as well as gross profits from our commercial operations.

Net cash provided by financing activities was $7.0 million during the three months ended March 31, 2017 as compared to $13.4 million during the three months ended March 31, 2018. The increase in cash provided by financing activities of $6.4 million was the result of proceeds from the issuance of convertible notes of approximately $13.4 million during the three months ended March 31, 2018, compared to proceeds from the issuance of convertible preferred stock of $7.0 million during the three months ended March 31, 2017.

Net cash provided by financing activities was $25.4 million during the year ended December 31, 2016 as compared to $17.6 million during the year ended December 31, 2017. The decrease in cash provided by financing activities of $7.8 million was the result of the issuance of a smaller aggregate amount of convertible preferred stock in 2017 as compared to 2016.

Capital Resources

We have not achieved profitability since our inception, and we expect to continue to incur net losses in the future. We also expect that our operating expenses will increase as we continue to increase our marketing efforts to drive adoption of our commercial products. Additionally, as a public company, we will incur significant audit, legal and other expenses that we did not incur as a private company. Our liquidity requirements have historically consisted, and we expect that they will continue to consist, of sales and marketing expenses, research and development expenses, working capital, debt service and general corporate expenses.

We believe that the net proceeds from this offering, together with our cash generated from commercial sales and our current cash and cash equivalents, including the proceeds from our recent financings, will be sufficient to meet our anticipated operating cash requirements for at least the next 18 months. In the future, we expect our operating and capital expenditures to increase as we increase headcount, expand our sales and marketing activities and grow our customer base. Our estimates of the period of time through which our financial resources will be adequate to support our operations and the costs to support research and development and our sales and marketing activities are forward-looking statements and involve risks and uncertainties and actual results could vary materially and negatively as a result of a number of factors, including the factors discussed in the section "Risk Factors" of this prospectus. We have based our estimates on assumptions that may prove to be wrong and we could utilize our available capital resources sooner than we currently expect. Our future funding requirements will depend on many factors, including:

- market acceptance of our products;
- the cost and timing of establishing additional sales, marketing and distribution capabilities;
- the cost of our research and development activities; and
- the effect of competing technological and market developments.

We cannot assure you that we will be able to obtain additional funds on acceptable terms, or at all. If we raise additional funds by issuing equity or equity-linked securities, our stockholders may experience dilution. Future debt financing, if available, may involve covenants restricting our operations or our ability to incur additional debt. Any debt or equity financing that we raise may contain terms that are not favorable to us or our stockholders. If we do not have or are not able to obtain sufficient funds, we may have to reduce our commercialization efforts or delay our development of new products. We also may have to reduce marketing, customer support or other resources devoted to our products or cease operations

Contractual Obligations

The following summarizes our significant contractual obligations as of December 31, 2017:

	Payment Due by Period				
Contractual Obligations	**Total**	**Less than 1 year**	**1-3 years**	**3-5 years**	**After 5 years**
Operating leases	$ 2,591,952	$ 826,884	$ 1,765,068	$ —	$ —
Principal payments, interest and end of term fees on loan	8,426,862	8,426,862	—	—	—
	$ 11,018,814	$ 9,253,746	$ 1,765,068	$ —	$ —

Our operating lease obligations primarily relate to leases for our current headquarters in San Diego, California.

We also have ongoing obligations related to license agreements which contain immaterial minimum annual payments that are credited against the actual royalty expense, which are not included in the table above.

Purchase orders or contracts for the purchase of supplies and other goods and services are not included in the table above. We have a contractual commitment with a supplier to purchase $0.1 million of products each quarter until the first quarter of 2019. We are not able to determine the aggregate amount of other such purchase orders that represent contractual obligations, as purchase orders may represent authorizations to purchase rather than binding agreements. Our purchase orders are based on our current procurement or development needs and are fulfilled by our vendors within short time horizons.

Off-Balance Sheet Arrangements

We did not have during the periods presented, and we do not currently have, any off-balance sheet arrangements, as defined under SEC rules, and similarly did not and do not have any holdings in variable interest entities.

Critical Accounting Policies and Estimates

Our management's discussion and analysis of our financial condition and results of operations is based on our consolidated financial statements, which have been prepared in accordance with generally accepted accounting principles in the United States. The preparation of our consolidated financial statements requires us to make estimates and assumptions that affect the reported amounts of assets, liabilities and expenses and the disclosure of contingent assets and liabilities in our consolidated financial statements and accompanying notes. We evaluate these estimates and judgments on an ongoing basis. We base our estimates on historical experience and on various other factors that we believe are reasonable under the circumstances, the results of which form the basis for making judgments about the carrying value of assets and liabilities that are not readily apparent from other sources. Actual results may differ from these estimates under different assumptions or conditions.

While our significant accounting policies are more fully described in Note 2 to our consolidated financial statements appearing elsewhere in this prospectus, we believe that the following accounting policies are the most critical for fully understanding and evaluating our financial condition and results of operations.

Revenue Recognition

Product Revenue

Product revenue represents the sale of our instruments and consumables to third parties. Timing of revenue recognition on instrument sales is based upon when delivery has occurred, the price is fixed or determinable, and collectability is reasonably assured.

The majority of our instruments contain embedded operating systems and other software which is included in the purchase price of the instrument. The software is deemed incidental to the system as a whole as it is not sold or marketed separately and its production costs are minor compared to those of the hardware system. Hardware and software elements are both delivered when ownership is transferred to the customer.

Installation services for direct sale customers are performed at the same time or shortly after the product is delivered and require only a minimal effort to complete. We believe installation is a perfunctory service and is not material to our obligations in the contract.

Other Revenue

Other revenue includes revenue from extended service contracts and other services that may be performed. Revenue for extended warranty contracts is recognized ratably over the service period. Revenue for other services is generally recognized based on proportional performance of the contract, when the Company's ability to complete project requirements is reasonably assured. Deferred revenue represents amounts received in advance for on-going service arrangements. Most of these services are completed in a short period of time from the receipt of the customer's order. When significant risk exists in the Company's ability to fulfill project requirements, revenue is recognized upon completion of the contract.

Multiple Element Arrangements

We regularly enter into contracts where revenue is derived from multiple deliverables, including products or services. These contracts typically include an instrument, consumables, and extended service contracts. Revenue recognition for contracts with multiple deliverables is based on the individual units of accounting determined to exist in the contract. A delivered item is considered a separate unit of accounting when the delivered item has value to the customer on a stand-alone basis. Items are considered to have stand-alone value when they are sold separately by any vendor or when the customer could resell the item on a stand-alone basis.

For transactions with multiple deliverables, consideration is allocated at the inception of the contract to all deliverables based on their relative selling price. The relative selling price for each deliverable is determined using vendor-specific objective evidence, or VSOE, of selling price or third-party evidence of selling price if VSOE does not exist. If neither VSOE nor third-party evidence exists, we use our best estimate of the selling price using average selling prices over an appropriate period coupled with an assessment of current market conditions. If the product or service has no history of sales or if the sales volume is not sufficient, we consider our approved standard prices adjusted for applicable discounts.

In order to establish VSOE of selling price, we must regularly sell the product or service on a standalone basis with a substantial majority priced within a relatively narrow range. In cases where there is not a sufficient number of standalone sales and VSOE of selling price cannot be determined, then we utilize third-party evidence to establish selling price.

Distributor Transactions

In certain markets, we sell products and provides services to customers through distributors that specialize in life sciences products. In cases where the product is delivered to a distributor, revenue recognition generally occurs when title transfers to the distributor. The terms of sales transactions through distributors are generally consistent with the terms of direct sales to customers, except the distributors do not require our services to install the instrument at the end customer and perform the services for the customer that are beyond our standard warranty in the first year following the sale. These transactions are accounted for in accordance with our revenue recognition policy described herein.

Stock-Based Compensation Expense

Stock-based compensation expense represents the cost of the grant date fair value of employee stock option grants recognized over the requisite service period of the awards (usually the vesting period) on a straight- line basis. We estimate the fair value of stock option grants using the Black-Scholes option-pricing model.

The Black-Scholes option-pricing model requires the use of subjective assumptions, including the risk- free interest rate, the expected stock price volatility, the expected term of stock options, the expected dividend yield and the fair value of the underlying common stock on the date of grant. See Note 8 to our consolidated financial statements included elsewhere in this prospectus for information concerning certain of the specific assumptions we used in applying the Black-Scholes option pricing model to determine the estimated fair value of our stock options granted in the years ended December 31, 2016 and 2017 and the three months ended March 31, 2017 and 2018.

Determination of the Fair Value of Common Stock

We are required to estimate the fair value of the common stock underlying our stock-based awards when performing the fair value calculations using the Black-Scholes option pricing model. Because our common stock is not currently publicly traded, the fair value of the common stock underlying our stock-based awards has been determined on each grant date by our board of directors, with input from management, considering our most recently available third-party valuation of common shares. All options to purchase shares of our common stock are intended to be granted with an exercise price per share no less than the fair value per share of our common stock underlying those options on the date of grant, based on the information known to us on the date of grant.

The third-party valuations of our common stock were performed using methodologies, approaches and assumptions consistent with the American Institute of Certified Public Accountants Audit and Accounting Practice Aid Series: *Valuation of Privately Held Company Equity Securities Issued as Compensation*. In addition, our board of directors considered various objective and subjective factors to determine the fair value of our common stock, including:

- the prices of our convertible preferred stock sold to investors in arm's length transactions;
- the rights, preferences and privileges of our convertible preferred stock as compared to those of our common stock, including the liquidation preferences of our convertible preferred stock;
- our results of operations and financial position;
- the composition of, and changes to, our management team and board of directors;
- the lack of liquidity of our common stock as a private company;
- the material risks related to our business and industry;
- external market conditions affecting the life sciences and biotechnology industry sectors;
- U.S. and global economic conditions;
- the likelihood of achieving a liquidity event for the holders of our common stock, such as an initial public offering, or IPO, or a sale of our company, given prevailing market conditions; and
- the market value and volatility of comparable companies.

Following the closing of this offering, the fair value of our common stock will be the closing price of our common stock on the date of the grant.

The fair value of the underlying preferred stock was determined using an Option Pricing Method, or OPM. Under the OPM, once the fair market value of the enterprise is established, shares are valued by creating a series of call options with exercise prices based on the liquidation preference and conversion behavior of the different classes of equity. Accordingly, the aggregate equity value is allocated to each of the classes of equity shares outstanding. The Company utilizes both the market and income approach to establish the fair market value of the enterprise.

Based on the assumed initial public offering price of $ per share (the midpoint of the price range set forth on the cover page of this prospectus), the intrinsic value of stock options outstanding as of December 31, 2017 would have been $ million, of which $ million and $ million would relate to stock options that were vested and unvested, respectively, at that date.

Preferred Stock Warrant Liability

As of December 31, 2016, and 2017 and March 31, 2018, we had outstanding warrants to purchase preferred stock of 36,676,737, 36,603,557 and 36,603,557, respectively. As of March 31, 2018, we had outstanding warrants to purchase 42,872 shares of Series B convertible preferred stock, 4,085,784 shares of Series B-1 convertible preferred stock, 32,183,234 shares of Series D convertible preferred stock and 291,667 shares of Series D-1 convertible preferred stock. See Note 8 to our consolidated financial statements included elsewhere in this prospectus for information concerning preferred stock warrant issuances during the years ended December 31, 2016 and 2017.

The warrants to purchase preferred stock are valued at each reporting period using the Black- Scholes-Merton model. This valuation includes observable inputs such as risk-free rate, as well as unobservable inputs for assumed volatility, the expected life of the warrants, and the fair value of the underlying preferred stock. See Note 3 to our consolidated financial statements included elsewhere in this prospectus for information concerning certain of the specific assumptions we used in applying the Black-Scholes option pricing model to determine the estimated fair value of our preferred stock warrants as of December 31, 2016 and 2017 and March 31, 2018. Following the closing of this offering, 35,683,574 of the outstanding warrants will be subject to a mandatory net exercise and be converted to common stock and 919,983 of the outstanding warrants will convert into common stock warrants.

JOBS Act

We are an "emerging growth company," as defined in the Jumpstart Our Business Startups Act, or JOBS Act. Under the JOBS Act, an emerging growth company can take advantage of an extended transition period for complying with new or revised accounting standards. This provision allows an emerging growth company to delay the adoption of new or revised accounting standards that have different transition dates for public and private companies until those standards would otherwise apply to private companies. We have elected to use this extended transition period. As a result of this election, our timeline to comply with these standards will in many cases be delayed as compared to other public companies that are not eligible to take advantage of this election or have not made this election. Therefore, our financial statements may not be comparable to those of companies that comply with the public company effective dates for these standards.

For so long as we are an emerging growth company we expect that:

- we will present only two years of audited consolidated financial statements, plus unaudited consolidated condensed financial statements for any interim period, and related management's discussion and analysis of financial condition and results of operations in our initial registration statement;
- we will avail ourselves of the exemption from the requirement to obtain an attestation and report from our auditors on the assessment of our internal control over financial reporting pursuant to the Sarbanes-Oxley Act;
- we will avail ourselves of the extended transition periods available to emerging growth companies under the JOBS Act for complying with new or revised accounting standards; and
- we will provide less extensive disclosure about our executive compensation arrangements.

We will remain an emerging growth company for up to five years, although we will cease to be an "emerging growth company" upon the earliest of: (1) the last day of the fiscal year following the fifth anniversary of this offering, (2) the last day of the first fiscal year in which our annual revenues are $1.07 billion or more, (3) the date on which we have, during the previous rolling three-year period, issued more than $1.0 billion in non-convertible debt securities, and (4) the date on which we are deemed to be a "large accelerated filer" as defined in the Exchange Act.

Recent Accounting Pronouncements

See Note 2 to our consolidated financial statements included elsewhere in this prospectus for information concerning recent accounting pronouncements.

Quantitative and Qualitative Disclosures about Market Risk

The market risk inherent in our financial instruments and in our financial position represents the potential loss arising from adverse changes in interest rates. As of March 31, 2018, we had $7.6 million in cash and cash equivalents, consisting of non-interest and interest-bearing bank accounts. Our primary exposure to market risk is interest rate sensitivity, which is affected by changes in the general level of U.S. interest rates. Due to the short-term, low-risk profile of our bank accounts, an immediate 100 basis point change in interest rates would not have a material effect on the fair market value of our cash equivalents.

Internal Control Over Financial Reporting

Pursuant to Section 404(a) of the Sarbanes-Oxley Act, commencing the year following our first annual report required to be filed with the SEC, our management will be required to report on the effectiveness of our internal control over financial reporting. To comply with the requirements of being a reporting company under the Exchange Act, we will need to implement additional financial and management controls, reporting systems and procedures and hire additional accounting and finance staff, as well as potentially upgrade our information technology systems.

BUSINESS

Overview

We are a life sciences instrumentation company in the genome analysis space. We develop and market the Saphyr system, a platform for ultra-sensitive and ultra-specific structural variation detection that enables researchers and clinicians to accelerate the search for new diagnostics and therapeutic targets and to streamline the study of changes in chromosomes, which is known as cytogenetics. Our Saphyr system comprises an instrument, chip consumables, reagents and a suite of data analysis tools.

Structural variation refers to large-scale structural differences in the genomic DNA of one individual compared to another. Each structural variation involves the rearrangement or repetition of as few as hundreds to as many as tens of millions of DNA base pairs. Those rearrangements may be insertions, deletions, duplications, inversions or translocations of segments of one or more chromosomes. Structural variations may be inherited or arise spontaneously, and many cause genetic disorders and diseases. Until our commercial launch of the Saphyr system in February 2017, and since, we believe no products existed or exist that could more comprehensively and cost and time-efficiently detect structural variation.

Our Saphyr system comprises an instrument, chip consumables, reagents and a suite of data analysis tools. Our customers include researchers and clinicians who seek to uncover and understand the biological or clinical impact of genome variation to improve the diagnosis and treatment of patients with better clinical tests and new medicines or to replace existing cytogenetic tests that are expensive, slow and labor-intense, with a modern solution that simplifies workflow and reduces costs and that has the potential to significantly increase diagnostic yields across the industry. Our customers also include researchers in non-human segments such as agricultural genomics where they seek to advance their understanding of how structural variation impacts industrial applications of plants and animals. We have established relationships with key opinion leaders in genomics research and clinical applications, including rare diseases and oncology, and our installed base of over 90 systems made up of Saphyr and its predecessor system includes some of the world's most prominent clinical, translational research, basic research, academic and government institutions as well as leading pharmaceutical and diagnostic companies. Examples include Children's National Health System, DuPont Pioneer, Garvan Institute of Medical Research, Genentech, Icahn School of Medicine at Mount Sinai, McDonnell Genome Institute at Washington University, National Cancer Institute, National Institutes of Health, Pennsylvania State University and Salk Institute for Biological Studies.

Approximately 6,000 research use only, or RUO, high throughput sequencers are currently installed worldwide. These sequencers are developed and sold almost entirely by Illumina and are owned by an estimated 3,000 unique customers. Sequencing is very good at detecting genome differences involving just a few base pairs or single-nucleotide variations, which Saphyr cannot detect, but sequencing including next-generation sequencing, or NGS, cannot reliably detect the larger structural variations that our Saphyr system can detect. Therefore, Saphyr is being adopted alongside this installed base of sequencers as a complement that gives users the ability to see a much wider scope of genome variation than ever before.

The Saphyr system, which is for research use only, or RUO is also beginning to be adopted by cytogenetics labs that seek to use it in commercial clinical tests of its patients as an LDT. These labs currently rely on existing methods such as karyotyping, fluorescence in situ hybridization, or FISH, and microarrays for clinical tests and research that look at chromosomal structure, location and function in cells. Major guidelines for oncology and genetic disease clinical diagnostics recommend first-line structural variation testing by these existing methods. The organizations issuing these guidelines include, among many others, World Health Organization (WHO), National Comprehensive Cancer Network (NCCN), American College of Medical Genetics (ACMG) and American College of Obstetricians & Gynecologists (ACOG).

Saphyr and its predecessor system, which we collectively refer to as our system in this prospectus, have been cited by researchers and clinicians in approximately 130 publications covering structural variations in areas of high unmet medical need and research interest, such as rare and undiagnosed pediatric diseases, muscular diseases, developmental delays and disorders, prostate cancer and leukemia. Importantly, Saphyr can be used alone to provide comprehensive detection of structural variations and enable diagnostic calls without the need for any sequencing or cytogenetic technology.

Industry Background

Genome analysis is the process of extracting biological information from DNA. DNA is the code that is found in all living cells and determines the characteristics and health of all living organisms. Although each organism's DNA order is unique, all DNA is composed of the same four nucleotides that come in pairs, which are referred to as base pairs. The human genome is composed of six billion of these base pairs (three billion of which are the maternal copy and three billion of which are the paternal copy of the genome), distributed across 23 pairs of chromosomes ranging in size from approximately 50 million to approximately 250 million base pairs. Genome variation is defined as at least one base pair differing in a comparison of sequence against a reference standard and can be as large as tens of millions of base pairs.

It had long been believed by the scientific community that all problems in genome analysis could be addressed by DNA sequencing, which is a method of determining the precise order of the bases adenine (A), guanine (G), cytosine (C) and thymine (T) in a genome. Many in the industry felt that the only bottlenecks for sequencing companies to address were the cost per genome and the throughput of the sequencers. If these issues could be addressed, it was generally believed that sequencing would usher in a new wave of medical-grade genome analysis that would give rise to an abundance of highly impactful discoveries in medicine. These discoveries would lead to novel therapies and patient management pathways driven by exquisitely specific and sensitive diagnostic tests.

In recent years, however, it has become evident that sequencing is not completely fulfilling the needs of researchers and clinicians. For example, after 10 years with next-generation sequencing in use, the diagnostic yields of the leading genetic testing laboratories in the world continue to hover around only 50%, which is where they have been for at least two decades, meaning that only half of patients receive a confirmed pathogenic diagnosis. Researchers and clinicians now agree that despite major advances in the speed and cost-effectiveness of sequencing, it fails to reliably detect structural variations, which represent an entire class of genome variation.

Structural variation is one of the most biologically important aspects of the human genome. It is the underlying driver of many known human diseases, including numerous genetic disorders, inherited diseases and cancer. Structural variations occur when relatively large groups of base pairs change their existence or position in the genome relative to a normal standard. Structural variations can be as small as a few hundred base pairs or as large as tens of millions of base pairs and can be confined to one chromosome or can unfold between chromosomes. The changes can be rearrangements in location, order or orientation, and they can involve the insertion, deletion or duplication of entire blocks of base pairs. As an example of the importance of structural variations, thousands of base pairs can be rearranged and result in the ABL gene from one chromosome joining the BCR gene on an entirely different chromosome to form BCR-ABL, an oncogenic fusion gene which causes certain leukemias.

We believe the available methods to detect structural variations for research and clinical applications, other than Saphyr, are antiquated and cumbersome and can only detect a small proportion of the structural variations across an entire genome. These methods therefore have very limited utility in population research studies that seek to discover new structural variations to explain pathology. Without additional tools, researchers and clinicians cannot comprehensively study the genome, which will ultimately result in the failure of genomics to deliver on its full promise of new therapies and diagnostics.

The Saphyr system provides a solution for comprehensive structural variation analysis. The Saphyr system is a proprietary, sample-to-result platform based on physical mapping of the genome, which is the process of assigning the chromosomal location, order and orientation of the functional elements of the genome. We believe that Saphyr is the only product capable of detecting structural variations at high sensitivity and specificity with a workflow that is cost-effective and time-efficient. A complete and accurate physical map of the genome enables the user to much more readily and systematically detect the structural variations that sequencing and cytogenetics technologies miss. Our mapping makes it possible for researchers and clinicians to more comprehensively detect structural variations and measure the complete scope of genome variation present in their study populations.

Market Opportunity

According to Research and Markets, the worldwide market for genomics products and services is expected to reach approximately $23.9 billion by 2022, up from approximately $14.7 billion in 2017, representing a compound annual growth rate of 10.2%. We believe that the market opportunity is predominantly split among three regions: North America, Europe and Asia. Within Asia, one of the fastest growing genomics markets is China, where adoption of genome analysis technology has been growing at approximately 20% per year.

The two segments of the genomics market that are driving the uptake of our product are:

- ***Sequencing for Discovery Research.*** In discovery research across patient cohorts, sequencing is primarily used to find single nucleotide variations responsible for disease or therapeutic response. Sequencing alone, however, is significantly limited due to its inability to reveal structural variations. Our Saphyr system has been expanding this market segment by complementing sequencing to expand the scope of genome variation that can be analyzed in a study and achieve a more comprehensive view of the genome.
- ***Cytogenetics.*** To provide a clinical diagnosis, cytogenetic tests detect known variations that are linked to specific diseases or therapeutic responses. The technologies used for detecting structural variations are expensive and involve cumbersome workflows with relatively limited ability to scale to higher volumes or more complex testing panels. Sequencers tend not to be used for cytogenetics due to their inability to reliably detect structural variations. Cytogenetics laboratories are beginning to adopt Saphyr as a more effective and efficient approach to finding the structural variations relevant to cytogenetics. For this segment, Saphyr is used alone to provide comprehensive detection of structural variations and enable diagnostic calls without the need for any sequencing or cytogenetic technology.

We believe that the discovery research and cytogenetics segments together comprise an addressable opportunity for us to sell up to approximately 8,500 Saphyr systems, representing a current total instrument market opportunity of approximately $2.1 billion. Importantly, we expect this market opportunity to expand at the rate of adoption of new RUO high throughput sequencers which we estimate is over 15% per year. While we do not expect the number of cytogenetics labs to increase significantly, we do expect our growth in this market to be driven by conversion of traditional cytogenetics methodologies to our Saphyr system.

In addition to the instrument sales opportunity, Saphyr instruments generate recurring revenue from chip consumables that are used on a per-sample basis. We believe each Saphyr instrument has the potential to create recurring revenue in a range of approximately $75,000 to approximately $150,000 per year, suggesting a potential annual recurring revenue opportunity of approximately $0.6 billion to approximately $1.3 billion.

Therefore, we believe that our currently addressable portion of the genome analysis market is estimated to be between $2.7 billion and $3.4 billion.

Existing Technologies and Their Limitations

Existing technologies fail to adequately address the need for structural variation detection because they do not overcome the inherent complexity of the genome or they are not capable of providing a cost-effective, scalable solution to meet the increasing demands of genomics research and clinical applications.

The Genome Is Complex

Genome composition itself makes the measurement of genome structure and structural variation inherently difficult. Genome sequence is built from combinations of only the A, G, C and T nucleotides. The nucleotides have a natural pairing system in which A pairs with T and G pairs with C. Each pair of nucleotides is referred to as a base pair. In humans, the approximately six billion base pairs are distributed across 23 pairs of chromosomes. A chromosome is an organizational unit that biology has evolved to compartmentalize genomic information. One set of 23 chromosomes (three billion base pairs) is inherited from each parent. Within each chromosome, the base pairs are organized into functional elements such as genes, which code for protein production, and other elements that regulate how and when the genes are expressed for protein production.

The six billion base pairs that make up the human genome cannot be read by any existing technology in a simple linear, contiguous fashion. Due in part to only four unique nucleotides being available to write the entire genetic code, it is very common for stretches of sequence to be identical either within the same chromosome or between chromosomes. As much as two-thirds of the human genome is made up of repetitive DNA sequences. This repetition tends to cause structural variations to be flanked by sequences that are identical to sequences in other parts of the genome which further complicates structural variation detection.

The Genome Orchestrates Life and Genome Structure Is Key

Genome structure is the way in which the functional elements are organized. Namely, the location on each chromosome where the gene or functional regulatory elements are found, what order and orientation they are in and how many of each element are present. This organization is an essential part of the instructions that the organism uses in every one of its cells to develop and differentiate and to react and respond to its environment over its lifetime. When this critical location, order, orientation or quantity vary, it is termed structural variation.

Even though both single nucleotide variation and structural variation are each very common, a much larger number of variant nucleotides in the average human genome are found in structural variations as compared to single nucleotide variations. A recent study showed that 30 million base pairs, on average, in the human genome are part of structural variations while only 10 million are single nucleotide variations. Most variations are inconsequential and make up the background variation responsible for the diversity of life. Over time, these variations can randomly affect genes and proteins which, through natural selection, drive diversity and evolution across species and diversity within them. Variations can also cause disease.

Relative to single nucleotide variations, structural variations are much more apt to be profoundly disruptive. They often cause a tectonic shift in the genome. These genomic shifts can have devastating effects on the health of a human. Examples where structural variations caused a disruption of genes resulting in disease include:

- dystrophin gene variation – structural variation disrupting dystrophin production that is found in Duchenne Muscular Dystrophy;
- 9pminus variation – deletion found in a rare developmental syndrome in children;
- TMPRSS2-ERG fusion – gene fusion found in prostate cancer;
- EML4-ALK fusion – gene fusion found in lung cancer; and
- BCR-ABL fusion (Philadelphia chromosome) – gene fusion found in leukemias such as chronic myelogenous leukemia, acute lymphoblastic leukemia and acute myelogenous leukemia.

It is important to detect these structural variations and the potentially thousands of other structural variations in each individual. Sequencing and cytogenetics simply do not elucidate comprehensive structural variations in a systematic and cost- and time-efficient manner. Most structural variations found to date that have been implicated in disease, such as those listed above, were discovered through laborious, expensive, unindustrialized and non-comprehensive methods over the course of many years. Thousands of additional important structural variations are believed to exist and are expected to be found with a systematic structural variation detection tool such as our Saphyr.

The Limitations of Sequencing

As the first complete draft of the human genome was being assembled in 2000, the belief arose that most questions in genome analysis could be addressed by sequencing. Over the course of over 15 years, sequencing proliferated across the entire genome analysis community with Illumina becoming the clear sequencing industry leader. As more sequencing data emerged, it became apparent that sequencing alone would not adequately elucidate the causes of human disease. The promise of sequencing was not fully delivered due to sequencing's inability to address the complexities of genome composition.

Nearly all genome sequencing, including next-generation sequencing, uses a method called sequencing by synthesis. Sequencing by synthesis is an in-vitro process for synthesizing a copy of DNA, one base at a time in a way that makes it possible to measure the identity of each base as it is incorporated into the growing DNA copy. Sequencing by synthesis involves cutting genomic DNA into small pieces of a few hundred base pairs each, amplifying these pieces many times and anchoring them to a solid support where they are copied by a polymerase using fluorescently labeled bases. These copies are called sequencing reads. Illumina, which is the world leader in next-generation sequencing technology, markets systems that provide average read lengths that are 100 to 300 base pairs long. These short reads are matched by computer programs to a reference genome in a process called alignment. The reference is meant to represent the "standard" human genome in a normal, non-diseased state. It is the result of billions of dollars spent on the Human Genome Project and other initiatives begun in the late 1990s and early 2000s to put together the first complete set of human DNA code. When a patient's genome is sequenced today, the short reads are compared against the reference as a template. Using this approach, sequencing attempts to reconstruct, or "resequence," the genome and infer genome variations.

The read lengths typical for next-generation sequencing are often too short to determine the right location and orientation of a reading frame in the genome because many of the reads from one chromosome are identical to reads from either another chromosome or even another location on the same chromosome. When reads are indistinguishable from one another, computations cannot be performed to place the reads in the correct location in the genome.

The other significant limitation with next-generation sequencing is that the genome fragments used as templates in the copying process are also very short. This fragmentation is a result of the methods used for DNA isolation from the cell and the use of polymerase chain reaction, or PCR. These short lengths disconnect and destroy most of the structural information of the original genome and make next-generation sequencing unable to reliably detect genomic variations larger than a few hundred base pairs.

If the sequencing reads were accurate, on the order of hundreds of thousands of base pairs long and from templates that were even longer, they would overcome the redundancy of genome composition and every read would have a unique position in the genome. It would then be possible to assemble a structurally accurate picture of the genome. Accurate structural variation would be revealed upon comparing structurally accurate assemblies of genomes across a population to determine the structural changes that are driving the observed pathology or physiology.

The recognition of the need for greater lengths of sequence reads to determine genome structure, birthed the so-called long-read sequencing submarket. Because of the need for long-read sequencing, Pacific Biosciences of California developed a system that uses another alternative form of sequencing by synthesis, while Oxford Nanopore Technologies developed a system that uses nanopore technology. These systems provide users with average read lengths in the tens of thousands of base pairs. However, these read lengths have proven not to be long enough to reliably and comprehensively detect structural variations. Pacific Biosciences' polymerases cannot regularly produce reads that are the necessary hundreds of thousands of base pairs in length. In addition, Oxford Nanopore's system has difficulty reliably feeding molecules that are, on average, hundreds of thousands of base pairs in length through each nanopore. The time and cost of providing a comprehensive whole genome analysis of a patient in a clinical setting is prohibitive when using these longer-read technologies.

In summary, all existing sequencing technologies, whether short or long, do no provide a solution for integrating structural variation into patient diagnosis and management.

The Limitations of Cytogenetics

Cytogenetics is the study of chromosomal structure and how structural variations impact health. The field has historically relied on karyotyping, FISH and more recently, microarrays. These methods each can detect some structural variations, but they are all inadequate solutions for high volume and low cost genetic testing for structural variations and none is an approach that can comprehensively detect structural variations with the ultra-high sensitivity and ultra-high specificity of the Saphyr system.

Karyotyping

Karyotyping is the gross optical examination of the chromosomes using a microscope. It is a laboratory technique, modernized in the 1960s, whereby the chromosomes from one cell are stained and visualized by a pathologist or technician to investigate the total number and structure of chromosomes.

Karyotyping has many limitations. It is cell culture dependent and therefore requires live and actively dividing cells. Karyotyping has extremely low resolution and is therefore only sensitive for very large structural variations that are unambiguous to identify. Given that chromosomes are being directly viewed on a slide by a pathologist with a microscope, resolution tends to be limited to structural events that are larger than five million base pairs. When karyotyping is used to diagnose unknown genetic disease, only about 5% of karyotyping tests result in a confirmed pathogenic finding. The test is costly, and its results are subject to each pathologist's interpretation which introduces variability in diagnostic calls and makes the methodology not amenable to automation.

FISH

FISH is a molecular cytogenetic technique that is used to detect chromosomal aberrations. FISH is based on the idea of using a specifically developed probe to detect a particular gene abnormality that is suspected to be in the genome. When the probe finds targeted variation, it binds to it and generates a fluorescent signal which is observed with a fluorescence microscope.

Several characteristics of FISH limit its productivity and efficiency for use in structural variation detection. Like karyotyping, it is cell culture dependent and therefore requires live and actively dividing cells. Also, FISH is limited to known targets and cannot be used for discovery. Every FISH test performed needs to be chosen to look for a specific genetic marker that the clinician anticipates may be found based on the clinical symptoms of the patient. In addition, the test results can be ambiguous and inconclusive, and reproducibility and variability among users can be a significant issue. Like karyotyping, FISH's diagnostic yield is very low when used to diagnose unknown genetic disease with only an estimated 7% of FISH providing a confirmed pathogenic finding. In addition, FISH is expensive, especially for the limited amount of information that it provides.

Microarrays

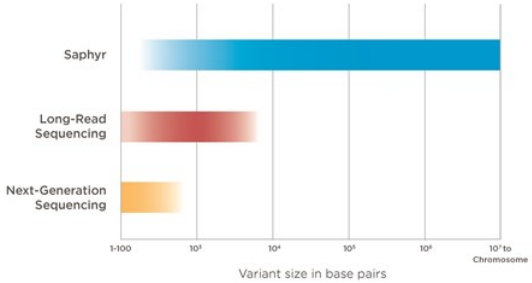
Chromosomal microarrays and SNP (single nucleotide polymorphism) arrays are tests consisting of slides that contain thousands of spots of DNA fragments that bind to the DNA of the sample. Microarrays detect gains and losses of specifically chosen DNA sequence and can also infer gene expression levels. Microarrays interrogate thousands of genes simultaneously that are known to be associated with presumed genetic disorders of interest to the user. Probe coverage is typically highly focused in regions of known clinical significance.

Microarrays have limited utility as a diagnostic tool as they are only useful when there are gains and losses of base pairs within the sample's genome that are specific to the probes that are populated on the array. Microarrays are also limited in their ability to provide specific locations of gains or losses on a chromosome, or even identify on which chromosome that the gains or losses occur. In addition, microarrays have low resolution as they cannot reliably detect structural variants smaller than 50,000 base pairs. Also, the diagnostic yield of microarrays is low. Only an estimated 20% of microarray tests provide a confirmed pathogenic finding when used to diagnose unknown genetic disease.

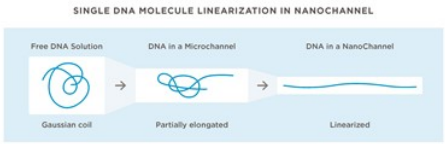
Our Solution

Our approach to measuring genome structure and structural variation is novel and highly differentiated. Most efforts in the genomic industry to address structural variation have been based on taking sequencing by synthesis as the starting point and attempting to overcome its deficiencies to make it applicable to structural variation analysis. In contrast, the Saphyr system directly observes extremely long genomic DNA without any amplification to construct a physical map that accurately assigns the chromosomal location, order, orientation and quantity of all the genome's functional elements. Our solution is built upon four key elements:

- **Extremely long molecules for analysis.** Structural accuracy can only come from analysis of extremely long chromosomal fragments. The Saphyr system is capable of analyzing single molecules that are on average approximately 250,000 base pairs long. Such fragments will contain enough unique sequence information that they are distinguishable from other fragments. These lengths are over 1,000 times longer than the average read length with Illumina systems and approximately 10 times longer than the average read lengths with Pacific Biosciences and Oxford Nanopore systems. Building a picture of the genome with massive building blocks overcomes the inherent challenge of genome complexity and is the key to Saphyr's unprecedented sensitivity and specificity.



- **Proprietary nanotechnology for massively parallel linearization and analysis of long molecules with single molecule imaging.** Analyzing these extremely long chromosomal fragments required invention. Molecules of this size are more like balls of yarn in a test tube and must be unraveled for meaningful analysis. We invented, patented, developed and commercialized nanochannel arrays to capture them from solution and unwind and linearize them for structural variation analysis. Each molecule is imaged separately, making it possible to deconvolute complex mixtures including haplotypes and heterogeneous tumors, as shown in the graphic below.



- **DNA labeling chemistry specifically for physical mapping.** The detailed analysis of sequence we use is also highly unique and novel. Instead of identifying the sequence of every base pair in these long fragments, we label and detect specific sequence patterns or motifs that occur universally across every genome with an average frequency of approximately one site for every few thousand base pairs. The key to our method entails introducing fluorescent tags at the sequence-specific site using highly specific and robust enzymatic chemistry along the extremely long fragments. These fragments, stretched out in nanochannels, are then directly imaged allowing us to measure the distance between labels with high accuracy. The pattern of labels detected on all these fragments can then be related to the pattern of sequence motif sites in a reference genome for comparison. Changes in the pattern indicate structural variation.
- **Bioinformatic tools for structural variation analysis.** Finally, our approach includes a novel bioinformatics platform that we developed from the ground-up to take advantage of the unique benefits of our solution. It comprises proprietary algorithms for the construction of a structurally accurate physical map of the genome without using a reference genome in assignment of structure. Physical maps of a test subject are then compared in cross-mapping analysis that allows our system to detect genome wide structural variation, including the most complex balanced events. Our system can do so by comparing one physical map against a common reference, or against the maps of a mother and father in the case of an afflicted child with an undiagnosed disease for example, or against maps of normal blood when studying solid tumor cancers. This comparative approach uses our proprietary database of healthy individuals to filter out the non-disease causing structural variants found in the general healthy population.

Our Focus Areas

Our Saphyr system serves many segments of the genomics market seeking to find and understand structural variation. We have identified focus areas where we concentrate our resources to ensure robust adoption of our system and frequent utilization of consumables. We have selected these segments because of their urgent need to detect structural variations and the significant economic opportunity they represent. Our current focus areas are human genetic diseases, including rare diseases and oncology. Our Saphyr system, which is for RUO, is being used for basic and translational research and also beginning to be adopted by cytogenetics labs that seek to use it in commercial clinical tests of its patients as an LDT.

Rare Diseases

In genetic disease, existing tools have reached a plateau where almost half of patients with genetic disease who are tested in clinical laboratories fail to receive a molecular diagnosis. In order to increase diagnostic yield, a massive increase in the understanding of the complete structure and variation of the genome is essential. We believe the various studies presented below illustrate how Saphyr is essential to achieving this objective.

Example: Undiagnosed Diseases Network Patient

The National Institutes of Health funded Undiagnosed Diseases Network, or UDN, brings together top clinical and genomics teams from several key institutes in the U.S. to study the most difficult to diagnose genetic disease patients. Through a collaboration with UCLA, Dr. Eric Vilain of Children's National Medical Center runs all UDN patients of the UCLA cohort on Saphyr to identify pathogenic variants that go undetected using sequencing or cytogenetics in known or novel genes.

While data collection and a full analysis of the cohort is ongoing, at the American Society of Human Genetics, or ASHG, annual meeting, Dr. Vilain's team presented preliminary results on the first 12 UDN patients and their parents analyzed with Saphyr. In each family, Saphyr detected thousands of variants of which more than 100 were rare, and typically three to seven structural variations that were new to the patient, referred to as de novo structural variations, were identified. In one case presented at ASHG, whole genome sequencing and chromosomal microarray on the DNA of a girl with developmental delay, autism, poor sleep and self-mutilation failed to identify pathogenic variants. Saphyr was able to detect a 2,500-base pair insertion inherited from the father in a gene where whole genome sequencing had picked up a random mutation inherited from the mother. Together, the two variants create a compound heterozygous mutation in a gene with a known phenotype that includes poor sleep, developmental delay and autism with self-mutilation. Large heterozygous insertions like the one presented here are seldomly detected by next-generation sequencing and are too small for microarrays. The diagnosis of this patient was only possible by the combination of next-generation sequencing and Saphyr.

Based on Dr. Vilain's results, including a study on patients with Duchenne Muscular Dystrophy published in Genome Medicine, Saphyr targets the 40% to 70% of genetics patients who cannot be diagnosed with exome or whole genome sequencing. Saphyr has the power to replace multiple tests for genetic disorders, including microarrays, PCR tests and chromosomal cytogenetic tests. Each existing test requires a patient to visit a clinician and most often provides an inconclusive result. Dr. Vilain showed evidence that integration of Saphyr into existing diagnostic regimens can help to change the way that medicine is practiced.

Example: Rare Familial Cancer

A rare cancer, occurring in approximately one in one million people, was found in four members of a single extended family. A team at MD Anderson Cancer Center had used all standard clinical tools and whole genome sequencing on the affected family members but failed to identify any causative variants. Using Saphyr data, a 38,000-base pair sequence was found in these patients in six tandem copies, while unaffected family members had a single copy of this sequence. The duplication was found to be upstream of an important gene in the pathway known to be upregulated in this rare cancer. The identification of this mutation could be useful for pre-implantation embryo analysis and targeted treatments.

Example: Repeat Expansion Disorder

In a study by Dr. Eric Wang of the University of Florida, Saphyr was able to precisely count the number of times that a sequence segment was repeated in muscle cells derived from a patient with Myotonic Dystrophy. This devastating disease is a repeat expansion disorder, caused by the extreme lengthening of short repeat array in the genome. Other diseases in this category include ALS, Huntington's Disease, and Fragile-X disease. Current methods that do not utilize our Saphyr system cannot measure the length of such repeat arrays accurately. Saphyr's ability to measure the normal and expanded repeat with unprecedented accuracy and detail on single molecules could help allow the development of better targeted tests and medicines.

Example: Greenwood Genetic Center

Greenwood Genetic Center, based in South Carolina, has acquired Saphyr as part of a project to increase the diagnostic yield for patients with genetic disorders and cancer. As one of the first centers in the world to introduce next-generation sequencing in a diagnostic setting, Greenwood Genetic Center aims to introduce a lab developed test, or LDT, based on Saphyr. As such, a number of patients with a variety of birth defects and developmental disorders are being analyzed on Saphyr.

In genetic disease, the standard of care consists usually of a combination of both phenotype-dependent targeted tests, and whole-genome analysis approaches. Targeted tests can consist of Multiple Ligation Probe Amplification, or MLPA, to test for the presence or absence of specific exons, PCR amplification and Sanger sequencing of candidate genes and multiple FISH probes to pick up specific structural variants common to the expected disease. For whole genome approaches, first tier diagnostic tools include karyotyping techniques like metaphase chromosome spreads and in some cases microarrays. More recently, whole exome sequencing or whole genome sequencing are increasingly being introduced.

A future workflow in which Saphyr replaces the large majority of FISH and MLPA tests for a genetics clinic such as Greenwood Genetic Center would rely on Saphyr to detect all structural variants larger than 500 base pairs, and on next-generation sequencing to detect all single nucleotide variants and other variants smaller than 500 base pairs. Since up to numerous FISH and MLPA tests are often performed, Saphyr's single whole genome analysis provides a cost effective solution that saves significant amounts of time, labor and analysis in lieu of such tests.

Oncology

In cancer, each patient has a unique disease with a complex pattern of genome changes. Traditional and recently-developed treatments do not attack the individual changes in each patient's tumor. Recent personalized medicine programs aim to provide clinicians with individual treatments specifically targeting the mutations found in each patient's cancer. For personalized cancer medicine to be successful, all variants in the cancer genome need to be detected, which is not feasible with cytogenetic or whole genome sequencing approaches. The studies presented below demonstrate that Saphyr is critical for a complete understanding of a cancer genome, which is essential to enable truly targeted treatments.

Example: Hematologic Malignancies

In a study to be published in Nature Genetics, Dr. James Broach, Director of the Penn State Institute for Personalized Medicine, presented system's ability to detect large rearrangements in leukemia, with a strong focus on translocations. In his research, our system detected all known translocations identified with standard clinical tools and, importantly, many structural variations never before identified in cancer, plus hundreds of structural variations that could not be seen by other methodologies.

Attempts by Dr. Broach to detect translocations using next-generation sequencing were unsuccessful because of the large number of false positive translocation calls. Because of the highly repetitive nature of the human genome, many remote genomic regions have high sequence homology, and short-read sequencing often fails to correctly map reads to the correct genomic origin, leading to excessive false positive calls. The extremely long molecules that our system analyzes span long repetitive segments of sequence and can anchor sequences into the correct genomic context, leading to extremely few false positive calls.

Given the high speed, low cost, industry-leading sensitivity and high reliability of our system displayed in this study, Dr. Broach showed evidence that our system is well positioned to eventually become the primary tool for clinical detection of genomic structural variation.

Example: Prostate Cancer

In a study published in Oncotarget, Dr. Vanessa Hayes at the Garvan Institute of Medical Research in Australia presented a complete tumor-normal comparison from a primary prostate cancer. Dr. Hayes' team identified 85 large somatic deletions and insertions, of which half directly impact potentially oncogenic genes or regions. Only 11% of these large structural variations were detected using high-coverage, short-read next-generation sequencing and bioinformatics analyses using a combination of the leading structural variation calling algorithms for next-generation sequencing data. Many structural variations detected with our system were flanked by repetitive sequences, making them undetectable to short-read sequencing.

In subsequent studies presented at the Advances in Genome Biology and Technology annual meeting, Dr. Hayes detected several oncogenic driver mutations in metastasized prostate cancer samples. Several of the reported mutations were variants previously found in other cancer types but never before reported in prostate cancer, and for which effective treatments are available. Existing gene panels or FISH tests performed on cancer samples only test for expected variants. Our system's whole genome analysis approach is the only molecular method that is capable of identifying all major structural variants in a cancer genome with sufficiently high sensitivity. To make existing targeted cancer therapies more effective and to discover new ones, a complete characterization of the genome is important, making our system valuable in personalized cancer medicine.

Our Products

We develop and market the Saphyr system, a complete sample-to-result solution for structural variation analysis that empowers comprehensive genome analysis and facilitates a deeper understanding of genetic variation and function. We believe it is the only solution capable of addressing the needs for structural variation analysis because it is:

- **Highly sensitive.** We believe Saphyr is the most sensitive structural variation detector currently on the market in that it can identify structural variations that no other system can.
- **Highly specific.** The structural variations found by Saphyr are found by direct observation rather than inference. Saphyr has a very low false positive rate, typically less than 2%.
- **Cost effective.** We anticipate that the Saphyr users' cost per sample will reach $500 in 2018, which would represent one-tenth of what it was in 2014. We expect this cost per sample to continue to decline to less than $300 per sample in 2019 and less than $100 per sample in 2020.

- **Fast.** Saphyr generates greater than 640 giga base pairs of information per day, on par with some of the faster short-read sequencers in the market. For highly sensitive structural variation detection, this allows Saphyr to process two human samples per day. We expect Saphyr's throughput to increase to six per day by the middle of 2019 and 12 per day by the end of 2020. Over this same period, we expect to continuously improve the automation of sample prep and bioinformatics to help drive efficiencies of workflow.

Saphyr is being adopted across an extensive base of customers in world-class clinical, translational research, basic research, academic and governmental institutions as well as pharmaceutical and biotechnology companies. We began marketing the Saphyr system in February 2017 after previously marketing Irys, our first-generation system, which was a slower system. We sell through a direct sales force and support organizations in North America and Europe, and through distribution partners in the Asia-Pacific and other regions of the world. We have sold more than 90 of our systems to over 80 customers globally. We continually seek to expand our product offerings to meet the needs of our customers.

When customers adopt the Saphyr system, they acquire one or more instruments, chips, reagents for DNA isolation and labeling and a suite of bioinformatics tools. The chips and reagents are used on a recurring basis. We also sell them ancillary solutions such as servers, reagents and other non-proprietary components used with the system. We designed Saphyr to accommodate performance upgrades without the need for replacement of the entire instrument. We intend for these performance enhancements to be delivered through software upgrades, purchased hardware upgrades and new chips and reagents.

The Saphyr Instrument

The Saphyr instrument is a single-molecule imager that includes high performance optics, automated sample loading based on machine learning algorithms and computational hardware and control software. The instrument's high-performance optics simultaneously image DNA linearized in hundreds of thousands of nanochannels. The instrument's control interface is the user's primary control center to design and monitor experiments as they occur in real time. The computational hardware is responsible for the secondary processing of the image data being produced on the Saphyr.

The Saphyr instrument currently analyzes one Saphyr chip, containing up to two samples, per day with statistically relevant depth of coverage across each whole genome. An upgrade of the capability of the Saphyr instrument to process two chips, instead of one, per run is planned for the middle of 2019. This instrument upgrade along with the planned improvements to the chip mentioned below will enable Saphyr to process up to six human samples per day by the middle of 2019 and 12 per day by the end of 2020.

The Saphyr Chip

The Saphyr chip is the consumable that packages the nanochannel arrays for use in genome analysis. In its current form, each Saphyr chip has two flow cells. Each flow cell contains approximately 120,000 nanochannels that are roughly 50 nanometers wide and can hold a unique sample, which enables a researcher to analyze two samples per chip per day. We plan to offer a new chip to our customers in the middle of 2019 that will have three flow cells which, combined with the instrument upgrade mentioned above, will allow Saphyr to process six human samples per day. In 2020, we expect to offer a 12-flow cell version of the chip.

The instrument at that time will be able to run two chips per run; however, given the increased processing load of the 12-flow cell chip relative to the three-flow cell chip, Saphyr is expected to take two days to process two 12-flow cell chips, thereby enabling a throughput of 12 samples per day in 2020.

To manufacture the arrays, we use photolithography in a semiconductor fabrication facility to print hundreds of thousands of tiny grooves on silicon wafers and then dice the wafers into individual chips. Our chips are inexpensive to manufacture and highly scalable. The fluidic environment in each channel allows individual molecules to move swiftly utilizing only the charge of DNA. Our nanochannels allow only a single linearized molecule at a time to enter a given channel while preventing the molecule from tangling or folding back on itself. Importantly, hundreds of thousands of molecules can move through hundreds of thousands of parallel nanochannels simultaneously, enabling extremely high-throughput processing on a single-molecule basis.

Saphyr Sample Prep and Labeling Kits

Our Bionano Prep Kits™ and labeling kits provide the critical reagents and protocols needed to extract and label high molecular weight, or HMW, DNA for use with the Saphyr™ system. These kits are optimized for performing our genome mapping applications on a variety of sample types.

Our workflow begins with the isolation of ultra-high molecular weight DNA. Our sample prep kits are optimized for isolating and purifying ultra-high molecular weight DNA in a process that is gentler than existing DNA extraction methods. The resulting purified DNA is millions of base pairs long and optimal for use with our systems. Each Bionano Prep Kit allows customers to perform five to 10 HMW DNA preps. Our kits and protocols enable the extraction of HMW DNA from a variety of sample types including soft or fibrous animal tissue, plant tissue, cell lines and human blood.

Our labeling reagents are optimized for applications on our genome mapping systems. Starting with HMW DNA purified using the appropriate Bionano Prep Kit, fluorescent labels are attached to specific sequence motifs. The result is uniquely identifiable genome-specific label patterns that enable de novo map assembly, anchoring sequencing contigs and discovery of structural variations as small as 500 base pairs to up to chromosome arm lengths.

Our newest and most powerful kit for DNA labeling, the Direct Label and Stain, or DLS, Kit is a proprietary, nondestructive chemistry for sequence motif labeling of genomic DNA that improves every aspect of our genome mapping. DLS uses a single direct-labeling enzymatic reaction to attach a fluorophore to the DNA at a specific 6-base pair sequence motif, yielding approximately 16 labels per 100,000 base pairs in the human genome. After labeling, the molecules are linearized in the Saphyr chip on the Saphyr instrument and imaged. Through the isolation, labeling and linearization steps, the molecules maintain an average length of around 250,000 base pairs. The label patterns on each molecule allow them to be uniquely identified and aligned in a pair-wise comparison against all other molecules imaged from the same sample.

Data Solutions

Our data solutions offering includes a complete suite of hardware and software for end-to-end experiment management, algorithms for assembling genome maps and algorithms and databases for bioinformatics processing, all of which is driven through convenient web-based management and monitoring tools.

Bionano Access is our web-based hub for Saphyr operations. It provides all the software that our customers need for experiment management and our structural variation analysis in one place. With Bionano Access our customers can:

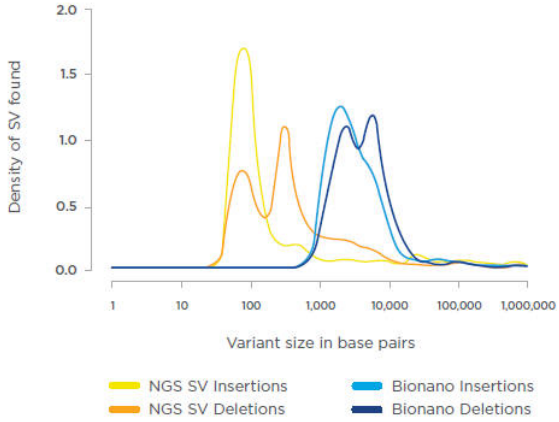
- set up runs and monitor real-time data quality metrics remotely to flag potential sample quality issues early;
- automatically start de novo assemblies and structural variation analysis when the desired amount of data has been collected;
- visualize and manipulate maps and structural variants; and
- analyze trios and clinical samples by filtering through uncommon variants to identify inherited and de novo variants, and export in a file format that is used consistently throughout the industry.

We have a suite of proprietary algorithms and databases that fully enable our proprietary bioinformatic and structural variation analysis pipelines. Using pairwise alignment of the single molecule images, consensus genome maps are constructed, refined, extended and merged. Molecules are then clustered into two alleles, and a diploid assembly is created to allow for heterozygous structural variation detection. Genome maps typically span entire chromosome arms in single, contiguous maps. Comparative analysis of maps reveals structural variation. Our customers use our variant annotation workflow to specifically uncover rare and sample-specific mutations. For example, to help a customer determine genomic variant frequency in a tumor, Saphyr compares the cancer sample structural calls against over 600,000 structural variations from over 160 humans with no evidence of diseases. To identify somatic mutations, the workflow can run comparisons of the tumor specimen against a control sample to determine whether the cancer mutations are present in low abundance among the control's genome. Using this high through-put pipeline approach we can efficiently focus on dozens of clinically significant structural candidates for further analysis.

Our hardware solution includes the Saphyr Compute Server, which provides offers cluster-like performance in an affordable, compact solution and the Bionano Compute Server, which expands the analytical capacity of the suite of tools. With these solutions, our customers are capable of performing multiple simultaneous analyses and sustaining continuous throughput, which allows them to spend less time waiting for data, so they can focus on investigating results. We also offer a cloud-based solution for data analysis through a third party provider and expect to launch our own cloud-based solution by the fourth quarter of 2018.

The Saphyr System's Industry-Leading Sensitivity and Specificity

Our Saphyr system detects structural variations that Illumina's systems miss. As shown in the graphic below, the Garvan Institute of Medical Research generated data that we expect to be published which shows the density of structural variations found relative to the size of the structural variation found for our system (blue lines) against next-generation sequencing (Illumina; orange lines). Next-generation sequencing has a very significant deficiency in detecting structural variations. Given our system's ability to detect structural variations, it picks up essentially where next-generation sequencing drops off, as shown below.



Retaining long-range contiguity throughout the genome mapping process is critical for any comprehensive study of genome structure and function, particularly for the analysis of structural variation in complex genomes. Saphyr offers unmatched sensitivity for the detection of large structural variations greater than 500 base pairs. Saphyr's specific sensitivity percentages from recent studies are shown below:

- 99% sensitivity for homozygous insertions/deletions larger than 500 base pairs;
- 95% sensitivity for heterozygous insertions/deletions larger than 500 base pairs;
- 95% sensitivity for balanced and unbalanced translocations larger than 50,000 base pairs;
- 99% sensitivity for inversions larger than 30,000 base pairs;
- 97% sensitivity for duplications larger than 30,000 base pairs; and
- 97% sensitivity for copy number variants larger than 500,000 base pairs.

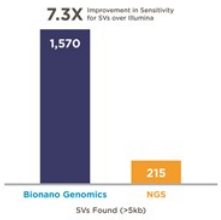
A study of Pacific Biosciences' long-read sequencing's ability to detect homozygous and heterozygous insertions and deletions was published recently. The sensitivity to detect homozygous structural variations using Pacific Biosciences was 87%, compared to 99% using Saphyr. The sensitivity to detect heterozygous structural variations using Pacific Biosciences was only 41%, which is less than half the 84% sensitivity for heterozygous structural variation detection using Saphyr. Even when the Pacific Biosciences structural variation calls were limited to insertions and deletions larger than 500 base pairs, the sensitivity for homozygous structural variations was only 81%, and for heterozygous structural variations was only 49%.

SV Sensitivity[1]		
	Bionano Genomics	Pacific Biosciences
Insertions		
Homozygous	99.3%	80.4%
Heterozygous	81.2%	39.7%
Deletions		
Homozygous	98.8%	82.4%
Heterozygous	87.9%	62.0%

[1]Sensitivity for variations >500 base pairs

Saphyr detects duplications over 30,000 base pairs, in direct or inverse orientation, with a sensitivity of 97%. Saphyr detects 99% of inversions of that same size range. Inversions are the invisible variants and have traditionally been the hardest to detect structural events. They are balanced, without gain or loss of sequence, and unlike translocations they do not create easily visible changes in genomic context. Inversions often escape detection by traditional cytogenetic techniques. Chromosomal microarrays cannot identify balanced events, and metaphase chromosome spreads can only visualize some megabase-size inversions. Next-generation sequencing approaches tend to miss inversions because reads from inside the inversion tend to map back to the reference without any indication that the orientation of the sequence has changed. Detection of the breakpoints often fails, especially if the inversion is flanked by segmental duplications, repeat sequences or other non-unique sequences. Saphyr's imaging of extremely long molecules overcomes these obstacles to identifying inversions.

In a separate study, our system detected seven times more structural variations larger than 5,000 base pairs compared to next-generation sequencing. Dr. Pui-Yan Kwok at the University of California, San Francisco, demonstrated the robustness of our system for genome-wide discovery of structural variations in a trio from the 1000 Genomes Project. Using our system, hundreds of insertions, deletions, and inversions greater than 5,000 base pairs were uncovered amounting to 7.3 times more than the large structural variation events detected by next-generation sequencing. Importantly, many of the structural variations that were found were in regions believed to contain functional elements leading to disruption of gene function or regulation.



Our Strengths

We have established ourselves as one of the leaders in the field of genome analysis, and we believe we are the industry's performance leader in structural variation detection. Below are our strengths that we believe will enable us to capture a significant portion of the genome analysis market and retain our leadership position in structural variation:

- ***Highly differentiated technology platform enables researchers and clinicians to obtain information that cannot be had systematically and cost efficiently from traditional technologies.*** Saphyr's unique ability to systematically and cost efficiently see structural variations across the genome from 500 base pairs to tens of millions of base pairs is unique in the industry. We believe this greater insight will facilitate a paradigm shift in healthcare from an emphasis on treatment with relatively untargeted therapies to a focus on earlier detection, more precise diagnosis and treatment with better targeted therapies.
- ***Validated solution recognized industry-wide.*** We have deep and expanding scientific validation. Our system has been cited in approximately 130 publications, and we believe our technology is becoming a vital tool in cutting-edge life sciences research.
- ***Strong installed base of premier customers.*** We have sold more than 90 of our systems to over 80 customers globally. Our customers include some of the world's most prominent clinical, translational research, basic research, academic and government institutions as well as leading pharmaceutical and diagnostic companies. Examples include Examples include Children's National Health System, DuPont Pioneer, Garvan Institute of Medical Research, Genentech, Icahn School of Medicine at Mount Sinai, McDonnell Genome Institute at Washington University, National Cancer Institute, National Institutes of Health, Pennsylvania State University and Salk Institute for Biological Studies.
- ***Attractive business model with a growing, high-margin recurring revenue component.*** As we continue to grow our installed base of Saphyr systems, optimize workflows and expand our structural variation detection capabilities, we expect to rapidly increase our high-margin revenues derived from consumables. The successful integration of our technology into our customers' projects provides ongoing sales of assays and consumables.
- ***Industry-leading intellectual property portfolio.*** We have developed a global patent portfolio that includes 43 issued patents across 14 patent families and an exclusively licensed portfolio of patents and applications from Princeton University, which includes 22 patents across two families. This global patent portfolio has filing dates ranging from 2001 to 2017. We have robust intellectual property protection surrounding our devices, systems, and methods for macromolecular analysis. Our ideation stems from our highly active research programs and results in our patent portfolio continually expanding at a significant pace.

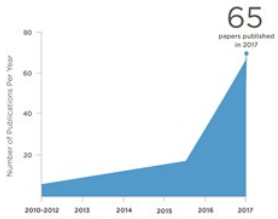
- ***Highly experienced senior management team.*** We are led by a dedicated and highly experienced senior management team with significant industry experience and proven ability to develop novel solutions. Each of the members of our senior management has more than 20 years of relevant experience.

Our Strategy

Our goal is to enable new research in genomics to allow greater insight into their role in human health in ways that have not been possible with any other current research and diagnostic technologies.

Our strategy to achieve this includes:

- ***Drive adoption of Saphyr in discovery research and cytogenetics markets.*** Saphyr has the potential to significantly expand the life science research market and genomics-based diagnostics market because of its unrivaled sensitivity, by enabling researchers to perform studies on structural variations that they were previously unable to perform. We believe Saphyr has the capability to enable the development of a new category of diagnostic tests and tools.
- ***Support the publication of findings with Saphyr by our customers beyond the over 130 papers published to date.*** The chart below shows the annual number of publications released since 2010 which featured data generated by Saphyr and its predecessor system. Recently, the overall number of these publications has grown significantly. For example, of the over 130 papers published to date, approximately half were published in 2017 alone. We will continue to support and foster our customer base to help grow the number of publications featuring our systems' data. We believe that these publications are impactful as our customers' studies cover structural variations in areas of high unmet medical need, such as rare and undiagnosed pediatric diseases, muscular diseases, developmental delays and disorders, prostate cancer and leukemia.



- ***Expand gross margins through economies of scale and growing sales of consumables.*** Our overall gross margin has historically been driven by our instrument gross margin as the sales of our instruments have constituted the vast majority of our total revenues to date. Our instrument gross margin is significantly lower than our consumables gross margin. We expect our overall gross margin to expand in 2018 and beyond as:
  - We further negotiate with silicon fabrication manufacturers for better contract pricing of our consumables. As our manufacturing lot volumes increase, we expect to have lower costs of goods sold. This is driven by the pass along of some of the economies of scale of contract manufacturers that mainly operate in the ultra-high-volume silicon computer chip industry.
  - Consumables sales continue to represent the fastest growing component of overall revenues. As consumables growth continues to outpace instrument growth, we expect the proportion of our product mix which is higher gross margin to increase, thereby expanding our overall gross margin.
- ***Continue to innovate our products and technologies.*** We designed Saphyr to accommodate performance enhancements without the need for replacement of the entire instrument. For example, hardware upgrades and new consumables are made available to purchase by customers. We intend for these performance enhancements to be delivered on a regular basis. In addition, we periodically make available software upgrades to customers through download at no charge. We will continue to develop and refine our technologies to improve the ease of use of our Saphyr system and enable our existing installed systems to meaningfully increase sample throughput and sensitivity and specificity of structural variation detection.

- ***Partner with industry-leading companies and laboratories to accelerate adoption in clinical markets.*** Establish additional collaborations with customers to help drive validating studies. Expand partnership efforts with clinical diagnostic companies to commercialize LDTs in the U.S. as well as LDTs and approved tests outside the U.S.

Sales and Marketing

Our commercial team includes 16 individuals, including seven salespeople, two marketing personnel, and seven sales support personnel, including customer solutions personnel, field specialists and application specialists.

This commercial staff is primarily located in North America and Europe. Most of our sales support team is located at our headquarters in San Diego and some work remotely throughout the U.S., Europe and China.

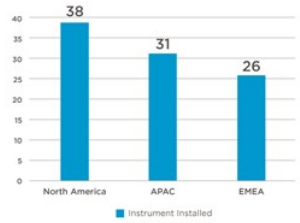
We sell our products through a direct sales force in North America and Europe. Our sales strategy involves the use of a combination of sales managers, sales representatives and field application specialists. Our direct sales force includes four salespeople located in the U.S. and three located in Europe. We expect to increase our sales force as we expand our business.

We sell our products through a network of distributors in the Asia-Pacific region and select other markets outside of North America and Europe. Specifically, we distribute our instruments and reagents via third-party distributors in markets such as China, Japan, South Korea, Singapore, Australia, India and South Africa. Four of our distributors are in China, one in Australia, one in Japan and one in South Korea.

The role of our sales managers and sales representatives is to educate customers on the advantages of Saphyr and the applications that our system makes possible. The role of our field application specialists is to provide on-site training and scientific technical support to prospective and existing customers. Our field application specialists are technical experts with advanced degrees, including four with Ph.D.s, and generally have extensive experience in academic research and core sequencing lab experience.

In addition, we maintain an applications lab team in San Diego, California composed of scientific experts who can transfer knowledge from the research and development team to the field application specialists. The applications lab team also runs foundational scientific collaborations and proof of principle studies, which help demonstrate the value of our product offering to prospective customers.

Our domestic and international sales force informs our current and potential customers of current product offerings, new product and new assay introductions, and technological advances in Saphyr systems, workflows, and notable research being performed by our customers or ourselves. As our primary point of contact in the marketplace, our sales force focuses on delivering a consistent marketing message and high level of customer service, while also attempting to help us better understand evolving market and customer needs.



We intend to significantly expand our sales, support, and marketing efforts in the future by expanding our direct footprint in North America and Europe as well as developing a more comprehensive support network in China where significant market opportunities exist. Additionally, we believe that there is significant opportunity in other European, South American, Asia-Pacific and Middle Eastern regions. We plan to expand into these regions via initial penetration with distributors.

Our sales and marketing efforts are targeted at key opinion leaders, laboratory directors and principal investigators at leading translational research, clinical institutions, governmental research institutions and pharmaceutical companies. In addition to our selling activities, we align with key opinion leaders at leading institutions and clinical research laboratories to help increase scientific and commercial awareness of our technology, demonstrate its benefits relative to existing technologies and accelerate its adoption. We also seek to increase awareness of our products through participation at trade shows, academic conferences, online webinars and dedicated scientific events attended by prominent users and prospective customers.

Our systems are relatively new to the life science marketplace and require a capital investment by our customers. The sales process typically involves numerous interactions and demonstrations with multiple people within an organization. Some potential customers conduct in-depth evaluations of the system including having us run experiments on in-house Saphyr systems. In addition, in most countries, sales to academic or governmental institutions require participation in a tender process involving preparation of extensive documentation and a lengthy review process. Because of these factors and the budget cycles of our customers, our sales cycle, the time from initial contact with a customer to our receipt of a purchase order, can often be nine to 12 months.

Manufacturing and Supply

Our manufacturing strategy is to outsource instrument and chip manufacturing and internally develop and assemble reagent kits in our own facility.

Instruments

Our Saphyr instrument is manufactured by a third party medical device manufacturer. Nearly complete Saphyr instruments are shipped by the manufacturer to us for final assembly and quality control testing. Upon completion, we ship directly to our customers' locations globally, or distributors' locations in the case of certain systems sold in the Asia-Pacific region. Installation of, and training on, our products is provided by our employees in the markets where we conduct direct sales, and by distributors in those markets where we operate with distributors.

We believe this manufacturing strategy is efficient and conserves capital. However, in the event it becomes necessary to utilize a different contract manufacturer for Saphyr, we would experience additional costs, delays and difficulties in doing so, and our business could be harmed.

This manufacturer actively manages obsolescence of all components in our system. This is done through their supply management process where we get notified of any parts that will become obsolete with enough lead time to identify alternatives.

Consumables

All of our chip consumables are produced by a third party manufacturer at its facility; however, we have established procedures for a replacement manufacturer if required. We complete final assembly and quality control assessments of our chips at our headquarters in San Diego.

Our reagents are sourced from a limited number of suppliers, including certain single source suppliers. Reagents include all components required to run a sample on Saphyr, such as capture and detector reagents, enzyme reagents and enzyme substrate. Although we believe that alternatives would be available, it would take time to identify and validate replacement reagents for our assay kits, which could negatively affect our ability to supply assay kits on a timely basis. Reagents are supplied through a single source supplier. This supplier requires a sufficient notification period to allow for supply continuity and the identification and technology transfer to a new supplier in the event either party wishes to terminate the relationship.

We actively manage component obsolescence by subscribing to our vendors' end-of-life notifications. If a vendor is unable to provide sufficient notification, we keep safety stock of the component to minimize disruption to operations.

Key Agreements

License Agreement with Princeton University

In January 2004, we entered into a license agreement, or the License Agreement, with Princeton University, or Princeton. Pursuant to the License Agreement, we received a worldwide, exclusive right and license to, among other things, manufacture and market products or services utilizing patents and inventions related to our sample preparation, DNA imaging and genomic data analysis platform and other key technology.

We are obligated to pay Princeton an annual license maintenance fee in the mid-four digits, which can be reduced by royalties paid to Princeton during the preceding 12 month period. We are also obligated to make royalty payments to Princeton equal to (i) a percentage in the mid-single digits of our and any of our sub-licensees' net sales of products covered by the License Agreement and (ii) a percentage in the low-single digits of our and any of our sub-licensees' revenue from services covered by the License Agreement. Our royalty obligations continue on a licensed product-by-licensed product and licensed service-by-licensed service basis, in every country of the world, until the later of the last sale of a licensed product or service or the expiration of all Princeton patent rights.

The term of the License Agreement will continue until all of our royalty payment obligations have expired, unless terminated earlier. Princeton may terminate the License Agreement upon written notice in the event of our material breach of the License Agreement if such breach remains uncured for 60 days. We may terminate the License Agreement without cause upon 60 days' advance written notice to Princeton.

Agreement for the Manufacture of Our Instruments

We have engaged a single third party manufacturer to produce and test our instruments on an as-ordered basis. The manufacturer of our instruments has no obligation to manufacture our instruments without a purchase order. In addition, this manufacturer has no obligation to maintain inventory in excess of any open purchase orders or materials in excess of the amount it reasonably determines will be consumed within 90 days. We are obligated to purchase any material deemed in excess pursuant to the agreement. The price we pay is determined according to a mutually agreed-upon pricing formula. We may terminate a purchase order by giving the manufacturer at least 30 days' written notice.

Agreement for the Manufacture of Our Chip Consumables

We have engaged a single third party manufacturer to manufacture our chip consumables used in our Saphyr system and provide engineering services to us. This third party has no obligation to manufacture our chip consumables without a purchase order. The prices and fees we pay are established in our agreement with this manufacturer or determined by the manufacturer pursuant if supported by appropriate information. Our agreement with this manufacturer automatically renews for successive one year terms unless a party notifies the other party in writing at least 30 days prior to the expiration of the then-current term. We may terminate an order of the agreement at any time upon 30 days' written notice.

Berry Genomics Agreement

We have entered into a collaboration agreement, or the Berry Agreement, with Berry Genomics Co., Ltd, or Berry. Under the terms of the Berry Agreement, Berry agreed to develop, market and commercialize a Berry-branded in-vitro diagnostic, or IVD, system (which is comprised of both kits and instruments) in the People's Republic of China, or the PRC, in certain specified fields, as well as for clinical use by its partners. Pursuant to the Berry Agreement, Berry agreed to purchase certain of our components for use exclusively within the kits and instruments that make up the IVD system. Berry is then responsible for manufacturing the finished system, as well as for obtaining regulatory approvals for the sale of our components in the PRC. Per the Berry Agreement, we are obligated to provide the necessary support and documentation for the components, as well as provide training to enable Berry's after-sales installation and support for the IVD system.

Pursuant to the terms of the Berry Agreement, we granted to Berry and its affiliates, an irrevocable, exclusive, sublicensable, fully paid-up, royalty-free, license during the term of the agreement, solely to seek and obtain CFDA registration, manufacture, market, distribute and sell IVD kits and IVD instruments. We also have the right to all IVD system improvements. We have the first right, but not obligation, to take any measures we deem appropriate to enforce our intellectual property rights. We also agree to provide reasonable assistance related to such enforcement actions as Berry may request at the cost and expenses of Berry.

The Berry Agreement may be renewed by either party upon 90 days written notice and subject to the negotiation of an agreement facilitating such renewal. Either party may terminate the agreement for a material breach if such breach remains uncured for 30 days, or immediately if the breach is not curable. We may also immediately terminate the Berry Agreement if Berry fails to fulfill its minimum quantity purchase requirements.

Intellectual Property

Our core technology for nucleic acid research is related to methods and devices for non-sequencing based analysis of macromolecules such as nucleic acids. Using this technology, long (high-molecular weight) nucleic acids can be suitably labeled and elongated in order to ascertain structural information such as scaffold organization, copy number, and de novo analysis of genomic repeats that is not readily obtained with current sequencing-based approaches. We have secured and continue to pursue intellectual property rights globally, including rights related to analysis of nucleic acid molecules, as well as innovations in the molecular biology and bioinformatics spaces.

We have developed a global patent portfolio that includes 43 issued patents across 14 patent families and an exclusively licensed portfolio of patents and applications from Princeton University, which includes 22 patents across two families. This global patent portfolio has filing dates ranging from 2001 to 2017. The owned and licensed families contain issued patents and pending applications that relate to devices, systems, and methods for macromolecular analysis, and reflect our active and ongoing research programs. The commercial foci of these patent families are discussed below.

Commercial Focus	Number of Issued and Pending Patents
Nanochannel devices and systems	70
Methods of macromolecule analysis using nanochannel arrays	62
Methods of genetic detection and copy number analysis	28
Method of genomic sequence and epigenomic analysis.	48
Biomolecule isolation and processing for use in nanochannel analysis	3
Method of optimizing nanochannel analysis	6
Next-generation products	11

In addition to pursuing patents, we have taken steps to protect our intellectual property and proprietary technology by entering into confidentiality agreements and intellectual property assignment agreements with our employees, consultants, corporate partners and, as applicable, our advisors.

Government Regulation

Our products are currently intended for research use only, or RUO, applications, although our customers may use our products to develop their own products that are subject to regulation by the FDA. Although most products intended for RUO are not currently subject to clearance or approval by the FDA, RUO products fall under the FDA's jurisdiction if they are used for clinical rather than research purposes. Consequently, our products are labeled "For Research Use Only."

The FDA's 2013 Guidance for Industry and Food and Drug Administration Staff on "Distribution of In Vitro Diagnostic Products Labeled for Research Use Only or Investigational Use Only," or, the RUO/IUO Guidance, provides the FDA's thinking on when IVD products are properly labeled for RUO or for IUO. The RUO/IUO Guidance explains that the FDA will review the totality of the circumstances when evaluating whether equipment and testing components are properly labeled as RUO. Merely including a labeling statement that a product is intended for research use only will not necessarily exempt the device from the FDA's 510(k) clearance, premarket approval, or other requirements, if the circumstances surrounding the distribution of the product indicate that the manufacturer intends its product to be used for clinical diagnostic use. These circumstances may include written or verbal marketing claims or links to articles regarding a product's performance in clinical applications, a manufacturer's provision of technical support for clinical validation or clinical applications, or solicitation of business from clinical laboratories, all of which could be considered evidence of intended uses that conflict with RUO labeling.

When marketed for clinical diagnostic use, our products will be regulated by the FDA as medical devices. The FDA defines a medical device in part as an instrument, apparatus, implement, machine, contrivance, implant, in vitro reagent, or other similar or related article which is intended for the diagnosis of disease or other conditions or in the cure, mitigation, treatment, or prevention of disease in man. FDA regulates the development, testing, manufacturing, marketing, post-market surveillance, distribution, advertising and labeling of medical devices requires them to be register by the medical device manufacturer and listed as marketed products.

The FDA classifies medical devices into one of three classes on the basis of the intended use of the device, the risk associated with the use of the device for that indication, as determined by the FDA, and on the controls deemed by the FDA to be necessary to reasonably ensure their safety and effectiveness. Class I devices, which have the lowest level of risk associated with them, are subject to general controls. Class II devices are subject to general controls and special controls, including performance standards. Class III devices, which have the highest level of risk associated with them, are subject to general controls and premarket approval. Most Class I devices and some Class II devices are exempt from a requirement that the manufacturer submit a premarket notification, or 510(k), and receive clearance from the FDA which is otherwise a premarketing requirement for a Class II device. Class III devices may not be commercialized until a premarket approval application, or PMA, is submitted to and approved by the FDA.

510(k) Clearance Pathway

To obtain 510(k) clearance, a sponsor must submit to the FDA a premarket notification demonstrating that the device is substantially equivalent, or SE, to a device legally marketed in the U.S. for which a PMA was not required. The FDA is supposed to make a SE determination within 90 days of FDA's receipt of the 510(k), but it often takes longer if the FDA requests additional information. Most 510(k)s do not require supporting data from clinical trials, but the FDA may request such data.

Premarket Approval Pathway

A PMA must be submitted if a new device cannot be cleared through the 510(k) process. The PMA process is generally more complex, costly and time consuming than the 510(k) process. A PMA must be supported by extensive data including, but not limited to, technical, preclinical, clinical trials, manufacturing and labeling to demonstrate to the FDA's satisfaction the safety and effectiveness of the device for its intended use. After a PMA is sufficiently complete, the FDA will accept the application for filing and begin an in-depth review of the submitted information. By statute, the FDA has 180 days to review the accepted application, although, review of the application generally can take between one and three years. During this review period, the FDA may request additional information or clarification of information already provided. Also during the review period, an advisory panel of experts from outside the FDA may be convened to review and evaluate the application and provide recommendations to the FDA as to the approvability of the device. In addition, the FDA will conduct a preapproval inspection of the manufacturing facility to ensure compliance with its quality system regulations, or QSRs. New premarket approval applications or premarket approval application supplements are also required for product modifications that affect the safety and efficacy of the device.

Clinical Trials

Clinical trials are usually required to support a PMA and are sometimes required for a 510(k). In the U.S., if the device is determined to present a "significant risk," the manufacturer may not begin a clinical trial until it submits an investigational device exemption application, or IDE, and obtains approval of the IDE from the FDA. These clinical trials are also subject to the review, approval and oversight of an institutional review board, or IRB, at each clinical trial site. The clinical trials must be conducted in accordance with the FDA's IDE regulations and good clinical practices. A clinical trial may be suspended by FDA, the sponsor or an IRB at its institution at any time for various reasons, including a belief that the risks to the study participants outweigh the benefits of participation in the trial.

Even if a clinical trial is completed, the results may not demonstrate the safety and efficacy of a device to the satisfaction of the FDA, or may be equivocal or otherwise not be sufficient to obtain approval of a device.

After a medical device is placed on the market, numerous regulatory requirements apply. These include among other things:

- compliance with QSRs, which require manufacturers to follow stringent design, testing, control, documentation, record maintenance, including maintenance of complaint and related investigation files, and other quality assurance controls during the manufacturing process;
- reporting of device malfunctions, serious injuries or deaths;
- registration of the establishments where the devices are produced;
- labeling regulations, which prohibit the promotion of products for uncleared or unapproved uses; and
- medical device reporting obligations, which require that manufacturers investigate and report to the FDA adverse events, including deaths, or serious injuries that may have been or were caused by a medical device and malfunctions in the device that would likely cause or contribute to a death or serious injury if it were to recur.

Failure to comply with applicable regulatory requirements can result in enforcement action by the FDA, which may include sanctions, including but not limited to, warning letters; fines, injunctions, and civil penalties; recall or seizure of the device; operating restrictions, partial suspension or total shutdown of production; refusal to grant 510(k) clearance or PMA approvals of new devices; withdrawal of 510(k) clearance or PMA approvals; and civil or criminal prosecution. To ensure compliance with regulatory requirements, medical device manufacturers are subject to market surveillance and periodic, pre-scheduled and unannounced inspections by the FDA.

Laboratories that purchase certain of our products and perform clinical diagnostic testing are also subject to extensive regulation under the Clinical Laboratory Improvement Amendments of 1988, or CLIA, requiring clinical laboratories to meet specified standards in areas such as personnel qualifications, administration, participation in proficiency testing, patient test management, quality control, quality assurance and inspections. Adverse interpretations of current CLIA regulations or future changes in CLIA regulations could have an adverse effect on sales of any affected products. Moreover, if we decide to operate our own clinical testing laboratory, we will be required to comply with CLIA. If, in the future, we operate our own clinical laboratory to perform clinical diagnostic testing, we would become subject to the Health Insurance Portability and Accountability Act of 1996, or HIPAA, as well as additional federal and state laws that impose a variety of fraud and abuse prohibitions on healthcare providers, including clinical laboratories.

Europe/Rest of World Government Regulation

Whether or not we obtain FDA approval for a product, we must obtain the requisite approvals from regulatory authorities in non-U.S. countries prior to the commencement of clinical trials or marketing of our product for clinical diagnostic use in those countries. The regulations in other jurisdictions vary from those in the U.S. and may be easier or more difficult to satisfy and are subject to change. For example, the European Union recently published new regulations that will result in greater regulation of medical devices and IVDs. The IVD Regulation is significantly different from the IVD Directive that it replaces in that it will ensure that the new requirements apply uniformly and on the same schedule across the member states, include a risk-based classification system and increase the requirements for conformity assessment. The conformity assessment process results in the receipt of a CE designation which has been sufficient to begin marketing many types of IVDs. That process will become more difficult and costly to complete.

Other Governmental Regulation

We are subject to laws and regulations related to the protection of the environment, the health and safety of employees and the handling, transportation and disposal of medical specimens, infectious and hazardous waste and radioactive materials. For example, the U.S. Occupational Safety and Health Administration, has established extensive requirements relating specifically to workplace safety for healthcare employers in the U.S. This includes requirements to develop and implement multi-faceted programs to protect workers from exposure to blood-borne pathogens, including preventing or minimizing any exposure through needle stick injuries. For purposes of transportation, some biological materials and laboratory supplies are classified as hazardous materials and are subject to regulation by one or more of the following agencies: the U.S. Department of Transportation, the U.S. Public Health Service, the U.S. Postal Service and the International Air Transport Association. We generally use third-party vendors to dispose of regulated medical waste, hazardous waste and radioactive materials that we may use during our research.

Coverage and Reimbursement

Currently, our product is for research use only, but clinical laboratories may acquire our instrumentation through a capital purchase or capital lease and use the Saphyr and direct label stain chemistry to create their own potentially reimbursable products, such as laboratory developed tests for in vitro diagnostics, Our customers may generate revenue for these testing services by seeking the necessary approval of their product from the FDA or the Center for Medicare and Medicaid Services, or CMS, along with coverage and reimbursement from third-party payors, including government health programs and private health plans. The ability of our customers to commercialize diagnostic tests based on our technology will depend in part on the extent to which coverage and reimbursement for these tests will be available from such third-party payors.

In the U.S., molecular testing laboratories have multiple options for reimbursement coding, but we expect that the primary codes used will be the genomic sequencing procedure codes, or GSPs. The American Medical Association, or AMA, added GSPs to its clinical laboratory fee schedule in 2015. In addition, CMS recently issued a coverage determination providing for the reimbursement of next-generation sequencing for certain cancer diagnostics using an FDA-approved in vitro diagnostic test. Private health plans often follow CMS to a substantial degree, and it is difficult to predict what CMS will decide with respect to reimbursement of any products our customers try to commercialize.

In Europe, coverage for molecular diagnostic testing is varied. Countries with statutory health insurance (e.g., Germany, France, The Netherlands) tend to be more progressive in technology adoption with favorable reimbursement for molecular diagnostic testing. In countries such as the United Kingdom with tax-based insurance, adoption and reimbursement for molecular diagnostic testing is not uniform and is influenced by local budgets.

Ultimately, coverage and reimbursement of new products is uncertain, and whether laboratories that use our instruments to develop their own products will attain coverage and adequate reimbursement is unknown. In the U.S., there is no uniform policy for determining coverage and reimbursement. Coverage can differ from payor to payor, and the process for determining whether a payor will provide coverage may be separate from the process for setting the reimbursement rate, In addition, the U.S. government, state legislatures and foreign governments have shown significant interest in implementing cost containment programs to limit the growth of government-paid health care costs, including price controls and restrictions on reimbursement.

Healthcare Reform

In the U.S. and abroad, there have been and continue to be a number of legislative initiatives to contain healthcare costs and change the way healthcare is financed. By way of example, in March 2010, the Patient Protection and Affordable Care Act, as amended by the Health Care and Education Affordability Reconciliation Act, collectively, the ACA, became law. The ACA is a sweeping law intended to broaden access to health insurance, reduce or constrain the growth of healthcare spending, enhance remedies against fraud and abuse, add new transparency requirements for the healthcare and health insurance industries, impose new taxes and fees on the health industry and impose additional health policy reforms. The ACA's provisions of importance to our business include, but are not limited to, a 2.3% excise tax on certain entities that manufactures or imports medical devices offered for sale in the U.S., which has been suspended, but due to subsequent legislative amendments, will be automatically reinstated for medical device sales beginning January 1, 2020, unless Congress takes additional action to delay the implementation of the tax.

Some of the provisions of the ACA have yet to be implemented, and there have been judicial and Congressional challenges to certain aspects of the ACA, as well as efforts by the Trump administration to repeal or replace certain aspects of the ACA. Since January 2017, President Trump has signed two Executive Orders and other directives designed to delay the implementation of certain provisions of the ACA or otherwise circumvent some of the requirements for health insurance mandated by the ACA. Concurrently, Congress has considered legislation that would repeal or repeal and replace all or part of the ACA. While Congress has not passed comprehensive repeal legislation, two bills affecting the implementation of certain taxes under the ACA have been signed into law. The 2017 U.S. Tax Cuts and Jobs Act includes a provision repealing, effective January 1, 2019, the tax-based shared responsibility payment imposed by the ACA on certain individuals who fail to maintain qualifying health coverage for all or part of a year that is commonly referred to as the "individual mandate". Additionally, a 2018 continuing resolution on appropriations delays the implementation of certain ACA-mandated fees, including, without limitation, the medical device excise tax.

Further, other legislative changes have been proposed and adopted since the ACA was enacted. For example, on April 1, 2014, the Protecting Access to Medicare Act of 2014, or PAMA, was signed into law, which, among other things, significantly altered the payment methodology under the Medicare Clinical Laboratory Fee Schedule, or CLFS. PAMA requires certain laboratories performing clinical diagnostic laboratory tests to report to CMS the amounts paid by private payors for laboratory tests. Beginning on January 1, 2018, CMS has begun using reported private payor pricing to periodically revise payment rates under the CLFS.

We expect that additional state and federal healthcare reform measures will be adopted in the future, any of which could limit the amounts that federal and state governments will pay for healthcare products and services. In addition, sales of our tests outside of the U.S. will subject us to foreign regulatory requirements, which may also change over time.

Other Healthcare Laws

Our operations are directly or indirectly, through our customers, subject to various federal and state fraud and abuse laws, including, without limitation, the federal and state anti-kickback statutes and false claims laws. These laws may impact, among other things, our sales and marketing and education programs, and our financial and business relationships with researchers who use our instruments to develop marketed products. By way of example: the federal Anti-Kickback Statute prohibits, among other things, any person or entity from, among other things, knowingly and willfully soliciting, receiving, offering or paying any remuneration, directly or indirectly, to induce, or in return for, purchasing, leasing, ordering, or arranging for or recommending the purchase, lease, or order of any good, facility, item, or service reimbursable, in whole or in part, under a federal healthcare program; and the federal false claims laws, including, without limitation the federal civil False Claims Act, prohibit, among other things, anyone from knowingly and willingly presenting, or causing to be presented for payment, to the federal government (including Medicare and Medicaid) claims for reimbursement for, among other things, drugs or services that are false or fraudulent, claims for items or services not provided as claimed, or claims for medically unnecessary items or services. The ACA, among other things, amended the intent requirement of the federal Anti-Kickback Statute to clarify that a person or entity does not need to have actual knowledge of the statute or specific intent to violate it in order to have committed a crime. In addition, the ACA clarifies that the government may assert that a claim that includes items or service resulting from a violation of the federal Anti-Kickback Statute constitutes a false or fraudulent claim for purposes of the federal civil False Claims Act.

In addition, we may be subject to HIPAA, as amended by the Health Information Technology for Economic and Clinical Health Act and its implementing regulations, which imposes certain requirements relating to the privacy, security and transmission of individually identifiable health information without appropriate authorization by entities subject to the rule, such as health plans, health care clearinghouses and certain health care providers and their business associates who create, use or disclose HIPAA protected health information on their behalf. We may also be subject to state and foreign laws that govern the privacy and security of health information in some circumstances, many of which differ from each other in significant ways and often are not preempted by HIPAA, thus complicating compliance efforts.

If our operations are found to be in violation of any of these laws, we may be subject to penalties, including, without limitation, civil, criminal, and administrative penalties, damages, fines, disgorgement, the curtailment or restructuring of our operations, exclusion from participation in federal and state healthcare programs, additional integrity oversight and reporting obligations, individual imprisonment, contractual damages, and reputational harm, any of which could adversely affect our ability to operate our business and our results of operations.

Employees

As of March 31, 2018, we had 65 employees, of which 28 work in sales, sales support and marketing, 28 work in research and development, four work in manufacturing and operations and five work in general and administrative. As of March 31, 2018, of our 65 employees, 57 were located in the U.S. and eight were employed outside the U.S. None of our employees is represented by a labor union or is subject to a collective bargaining agreement.

Facilities

We lease approximately 33,128 square feet of office, laboratory, and manufacturing space at our headquarters in San Diego, California, under a lease that expires on December 31, 2020. We believe that we will need additional space as we grow our operations, but believe that suitable additional or substitute space will be available to accommodate future growth of our business. We believe that our existing office, laboratory and manufacturing space will be sufficient to meet our needs in the interim.

MANAGEMENT

Executive Officers and Directors

The following table sets forth information regarding our directors and executive officers as of April 30, 2018.

Name	Age	Position
Executive Officers:		
R. Erik Holmlin, Ph.D.	50	President, Chief Executive Officer and Director
Mike Ward	46	Chief Financial Officer
Han Cao, Ph.D.	49	Chief Scientific Officer
Warren Robinson	49	Chief Commercial Officer
Mark Borodkin	44	Chief Operating Officer
Non-Employee Directors:		
David L. Barker, Ph.D.( )	76	Chairman, Director
Darren Cai, Ph.D.( )	53	Director
Albert Luderer, Ph.D.( )	69	Director
Junfeng Wang( )	43	Director

(1) Member of the compensation committee.
(2) Member of the audit committee.
(3) Member of the nominating and corporate governance committee.

Executive Officers

R. Erik Holmlin, Ph.D. Dr. Holmlin has served as our President and Chief Executive Officer and as a member of our board of directors since January 2011. From June 2010 to February 2011, Dr. Holmlin served as president and Chief Executive Officer of GenVault Corporation, a private biosample management solutions company. Previously, Dr. Holmlin held positions as an entrepreneur in residence at Domain Associates, a dedicated life sciences venture capital firm; Chief Commercial Officer of Exiqon A/S, a publicly traded RNA research solutions company; founder and executive at GeneOhm Sciences, which was acquired by Becton Dickinson and Company; and a National Institutes of Health postdoctoral fellow at Harvard University. Until June 2016, Dr. Holmlin served as a director of Nanosphere, Inc., a publicly traded molecular diagnostic company, which was subsequently acquired by Luminex Corporation, a publicly traded biological testing company. Dr. Holmlin received his bachelor's degree in chemistry from Occidental College, his Ph.D. in chemistry from the California Institute of Technology and MBAs from University of California, Berkeley and Columbia University. Our board of directors believes that Dr. Holmlin's over 17 years of experience in the life sciences and health care industries, which includes the areas of technology development, product commercialization and venture financing, qualifies him to serve on our board of directors.

Mike Ward. Mr. Ward has served as our Chief Financial Officer since May 2018, and previously served as our Chief Business Officer from July 2017 and as our Vice President, Corporate Development since April 2014. From September 2009 to September 2013, Mr. Ward served as a Director and Vice President of the Private Equity and Venture Capital Investment team of Lurie Investment Fund. In addition, Mr. Ward previously served in investment banking positions at Leerink Partners, BMO Capital Markets, Dresdner Kleinwort Wasserstein, Prudential Securities and Credit Suisse. Mr. Ward is also a member of the board of directors of CytoPherx, Inc., a private medical device company, and has previously served on the boards of directors of other public and private companies, including Nanosphere, Inc., Aperion Biologics, Inc. and Impact Health, Inc. Mr. Ward has over 20 years of experience in the areas of investment banking, private equity and venture capital in the life sciences industry. Mr. Ward received his bachelor's degree in finance from the University of Illinois.

Han Cao, Ph.D. Dr. Cao founded Bionano in 2003 and has served as our Chief Scientific Officer since July 18, 2011. From January 2000 to October 2003, Dr. Cao worked as a Research Fellow in the Nanostructure lab in the Department of Engineering at Princeton University. Dr. Cao was a postdoctoral fellow from October 2000 to December 2003 at the Institute for Human Gene Therapy, in the Department of Molecular and Cellular Biology at the University of Pennsylvania Medical Center. Dr. Cao received his bachelor's degree in molecular and cellular biology from the University of Science and Technology of China and his Ph.D. in molecular biology from the University of Delaware.

Warren Robinson. Mr. Robinson has served as our Chief Commercial Officer since November 2017 and previously served as a Vice President with us in various sales and marketing functions from October 2015 to November 2017, including most recently as our Vice President of Global Sales and Marketing. From June 2013 to October 2015, Mr. Robinson served as Division Vice President of Aegis Chemical Solutions, LLC, a private oil production services company. Previously, Mr. Robinson held various leadership roles in sales-focused positions with Life Technologies Corporation, a publicly traded research tools development company acquired by Thermo Fisher Scientific Inc. in February 2014, and Invitrogen Corporation, a publicly traded research tools development company acquired by Life Technologies in January 2008. Mr. Robinson received his bachelor's degree in biochemistry from The University of Lethbridge, a research university located in Canada.

Mark Borodkin. Mr. Borodkin has served as our Chief Operating Officer since November 2017 and previously served as our Vice President, Product Development and Operations since October 2014. From December 2011 to August 2014, Mr. Borodkin served as the Senior Director of Engineering and Chief Product Officer at Brooks Life Science Systems, a provider of automation and cryogenic solutions for the life science industry, and from April 2009 to October 2011 as a Director of Engineering at Affymetrix, Inc., a private life science systems company that was acquired by Thermo Fisher Scientific in March 2016. From December 2007 to April 2009, Mr. Borodkin served as a Senior Manager and Core Team Leader of R&D for Siemens Healthcare Diagnostics, and for the prior 13 years, he developed sequencing and real-time PCR systems at Applied Biosystems, now a part of Thermo Fisher Scientific. Mr. Borodkin received both his bachelor's degree in electrical engineering and his master's degree in computer and systems engineering from Rensselaer Polytechnic Institute.

Non-Employee Directors

David L. Barker, Ph.D. Dr. Barker has served on our board of directors since May 2010, and as Chairman of our board of directors since August 2016. Dr. Barker also serves as a member of the board of directors of AmideBio, LLC, a private biotechnology company, Singular Genomics Systems, Inc., a private biotechnology company, and Integrated Diagnostics Inc., a private molecular diagnostics company. In addition, Dr. Barker is a scientific advisor to MiNDERA Corp., a private molecular dermatology company, and Luna DNA Inc., a private medical research database company. From January 2000 to January 2007, Dr. Barker served as Vice President and Chief Scientific Officer of Illumina, Inc., a public DNA sequencing technology company, and until May 2016 served as a member of the scientific advisory board of Illumina. Dr. Barker previously served as a member of the board of directors of IntegenX, Inc., a private Rapid human DNA identification technology company acquired by Thermo Fisher Scientific in May 2018, Zephyrus Biosciences, Inc., a private protein analysis research platform company acquired by Bio-Techne Corporation, a public life sciences company, in March 2016, ProteinSimple, a private protein analysis platform development company acquired by BioTechne in June 2014, and NextBio, a private genomic data analysis company acquired by Illumina in October 2013. Dr. Barker received his bachelor's degree in chemistry from the California Institute of Technology and a Ph.D. in biochemistry from Brandeis University. Our board of directors believes Dr. Barker's extensive experience in managing and leading early stage and established companies within the clinical diagnostic and biotechnology industries qualifies him to serve on our board of directors.

Darren Cai, Ph.D. Dr. Cai has served on our board of directors since September 2014. From April 2015 to April 2018, Dr. Cai served as a Managing Director of Legend Capital, a Chinese early stage and expansion stage venture capital firm, and held a previous position as a Director of Legend Capital from October 2012. Dr. Cai also served as Chief Financial Officer of Beijing Genomics Institute, a genome sequencing company, from 2014 to 2016. During his tenure at Legend Capital, Dr. Cai focused on investment opportunities in the healthcare sector and led investment in more than 20 companies located in the U.S. and China. In addition, Dr. Cai previously served on the board of directors of Beijing Genomics Institute. Dr. Cai received his bachelor's degree in biophysics from the University of Science and Technology of China, MBA from Yale University and Ph.D. in vision science from the University of California, Berkeley. Our board of directors believes Dr. Cai's extensive experience in managing and developing investment and business opportunities within the health care sector qualifies him to serve on our board of directors.

Albert Luderer, Ph.D. Dr. Luderer has served on our board of directors since October 2011. Since March 2010, Dr. Luderer has served as Chief Executive Officer and a member of the board of directors of Integrated Diagnostics Inc., a private molecular diagnostics company. In addition, Dr. Luderer currently serves as the Chief Executive Officer and a member of the board of directors of Indi Molecular, Inc., synthetic antibody technology company, and as a the Executive Chairman of the board of directors of Prostate Management Diagnostics Inc. Dr. Luderer has over 30 years of experience in executive leadership roles in the areas of technology development, operations and business development. Dr. Luderer received his bachelor's degree in zoology from Drew University and his MS in immunochemistry and Ph.D. in immunogenics from Rutgers University. Our board of directors believes Dr. Luderer's experience in the biotechnology sector, with special focuses on technology, business development and commercialization, qualifies him to serve on our board of directors.

Junfeng Wang. Mr. Wang has served on our board of directors since February 2018. Since October 2009, Mr. Wang has served as a Managing Director of Legend Capital, and held previous positions with Legend Capital as Executive Director from October 2007, Senior Vice President from October 2006 and Vice President from October 2005. Through his tenure at Legend Capital, Mr. Wang has worked in the healthcare and chemical industries, developing research and investment expertise in growth capital investment. Mr. Wang received his bachelor's degree in polymer chemistry from Lanzhou University, a research university located in China, and his MBA from McMaster University, a research university located in Canada. Our board of directors believes Mr. Wang's extensive experience as a venture capital investor in the healthcare and chemical industries qualifies him to serve on our board of directors.

There are no family relationships among any of our directors or executive officers.

Composition of Our Board of Directors

Our business and affairs are managed under the direction of our board of directors. Each of our current directors was elected to serve as a member of our board of directors pursuant to a stockholders agreement dated August 5, 2016, by and among us and certain of our stockholders. Pursuant to the stockholders agreement: (1) Dr. Holmlin was designated to serve on our board of directors as the then-serving chief executive officer; (2) Dr. Cai was designated by LC Fund VI, L.P., LC Parallel Fund VI, L.P. and LC HealthCare Fund I, and their affiliates, collectively referred to as LC, to serve on our board of directors as a representative of the holders of our Series C convertible preferred stock; (3) Mr. Wang was designated by LC to serve on our board of directors as a representative of the holders of our Series D-1 convertible preferred stock stockholders; and (4) Drs. Luderer and Barker were designated to serve on our board of directors as independent directors. The stockholders agreement will terminate upon the closing of this offering, and thereafter no stockholder will have any special rights regarding the election or designation of the members of our board of directors.

We currently have five directors, and our board of directors may establish the authorized number of directors from time to time by resolution.

In accordance with our amended and restated certificate of incorporation to be filed in connection with this offering, immediately after this offering, our board of directors will be divided into three classes with staggered three-year terms. At each annual general meeting of stockholders, the successors to directors whose terms then expire will be elected to serve from the time of election and qualification until the third annual meeting following election. Our directors will be divided among the three classes as follows:

- the Class I directors will be and , and their terms will expire at the annual general meeting of stockholders to be held in 2019;
- the Class II directors will be and , and their terms will expire at the annual general meeting of stockholders to be held in 2020; and
- the Class III director will be , and such director's term will expire at the annual general meeting of stockholders to be held in 2021.

Board Leadership Structure

Our board of directors is currently chaired by Dr. Barker, who has authority, among other things, to call and preside over board of directors meetings, to set meeting agendas and to determine materials to be distributed to the board of directors. Accordingly, the chairperson of our board of directors has substantial ability to shape the work of the board of directors. We believe that separation of the positions of chairperson and chief executive officer reinforces the independence of our board of directors in its oversight of our business and affairs. In addition, we have a separate chair for each committee of our board of directors. The chair of each committee is expected to report annually to our board of directors on the activities of their committee in fulfilling their responsibilities as detailed in their respective charters or specify any shortcomings should that be the case.

Role of the Board in Risk Oversight

The audit committee of our board of directors is primarily responsible for overseeing our risk management processes on behalf of our board of directors. Going forward, we expect that the audit committee will receive reports from management at least quarterly regarding our assessment of risks. In addition, the audit committee reports regularly to our board of directors, which also considers our risk profile. The audit committee and our board of directors focus on the most significant risks we face and our general risk management strategies. While our board of directors oversees our risk management, management is responsible for day-to-day risk management processes. Our board of directors expects management to consider risk and risk management in each business decision, to proactively develop and monitor risk management strategies and processes for day-to-day activities and to effectively implement risk management strategies adopted by the audit committee and our board of directors. We believe this division of responsibilities is the most effective approach for addressing the risks we face and that our board of directors' leadership structure, which also emphasizes the independence of our board of directors in its oversight of its business and affairs, supports this approach.

Director Independence

Under the listing requirements and rules of The Nasdaq Stock Market LLC, or Nasdaq, independent directors must comprise a majority of our board of directors as a listed company within one year of the listing date. Our board of directors has undertaken a review of the independence of each director. Based on information provided by each director concerning her or his background, employment and affiliations, our board of directors has determined that all of our directors, except Dr. Holmlin, are independent directors, as defined by Rule 5605(a)(2) of the Nasdaq Listing Rules.

Committees of Our Board of Directors

Our board of directors has established an Audit Committee, a Compensation Committee, and a Nominating and Corporate Governance Committee. The composition and responsibilities of each of the committees of our board of directors are described below. Members serve on these committees until their resignation or until otherwise determined by our board of directors. Our board of directors may establish other committees as it deems necessary or appropriate from time to time.

Audit Committee

Our audit committee consists of , and , each of whom our board of directors has determined satisfies the independence requirements under the Nasdaq listing standards and Rule 10A-3(b)(1) of the Exchange Act. The chair of our audit committee is , who our board of directors has determined is an "audit committee financial expert" within the meaning of SEC regulations. Each member of our audit committee can read and understand fundamental financial statements in accordance with applicable requirements. In arriving at these determinations, the board of directors has examined each audit committee member's scope of experience and the nature of their employment in the corporate finance sector.

The primary purpose of the audit committee is to discharge the responsibilities of our board of directors with respect to our corporate accounting and financial reporting processes, systems of internal control and financial-statement audits, and to oversee our independent registered accounting firm. Specific responsibilities of our audit committee include:

- helping our board of directors oversee our corporate accounting and financial reporting processes;
- managing the selection, engagement, qualifications, independence and performance of a qualified firm to serve as the independent registered public accounting firm to audit our financial statements;
- discussing the scope and results of the audit with the independent registered public accounting firm, and reviewing, with management and the independent accountants, our interim and year-end operating results;
- developing procedures for employees to submit concerns anonymously about questionable accounting or audit matters;
- reviewing related person transactions;
- obtaining and reviewing a report by the independent registered public accounting firm at least annually, that describes our internal quality control procedures, any material issues with such procedures, and any steps taken to deal with such issues when required by applicable law; and
- approving, or, as permitted, pre-approving, audit and permissible non-audit services to be performed by the independent registered public accounting firm.

Compensation Committee

Our compensation committee consists of and . The chair of our compensation committee is . Our board of directors has determined that each member of the compensation committee is independent under the Nasdaq listing standards, a "non-employee director" as defined in Rule 16b-3 promulgated under the Exchange Act and an "outside director" as that term is defined in Section 162(m) of the Code.

The primary purpose of our compensation committee is to discharge the responsibilities of our board of directors in overseeing our compensation policies, plans and programs and to review and determine the compensation to be paid to our executive officers, directors and other senior management, as appropriate. Specific responsibilities of our compensation committee include:

- reviewing and approving the compensation of our chief executive officer, other executive officers and senior management;
- reviewing and recommending to our board of directors the compensation paid to our directors;
- reviewing and approving the compensation arrangements with our executive officers and other senior management;
- administering our equity incentive plans and other benefit programs;
- reviewing, adopting, amending and terminating, incentive compensation and equity plans, severance agreements, profit sharing plans, bonus plans, change-of-control protections and any other compensatory arrangements for our executive officers and other senior management;
- reviewing, evaluating and recommending to our board of directors succession plans for our executive officers; and
- reviewing and establishing general policies relating to compensation and benefits of our employees, including our overall compensation philosophy.

Nominating and Corporate Governance Committee

Our nominating and corporate governance committee consists of and . The chair of our nominating and corporate governance committee is . Our board of directors has determined that each member of the nominating and corporate governance committee is independent under the Nasdaq listing standards, a non-employee director, and free from any relationship that would interfere with the exercise of his or her independent judgment.

Specific responsibilities of our nominating and corporate governance committee include:

- identifying and evaluating candidates, including the nomination of incumbent directors for reelection and nominees recommended by stockholders, to serve on our board of directors;
- considering and making recommendations to our board of directors regarding the composition and chairmanship of the committees of our board of directors;
- instituting plans or programs for the continuing education of our board of directors and orientation of new directors;
- developing and making recommendations to our board of directors regarding corporate governance guidelines and matters; and
- overseeing periodic evaluations of the board of directors' performance, including committees of the board of directors and management.

Code of Business Conduct and Ethics

Effective upon the completion of this offering, we will adopt a code of business conduct and ethics that applies to all our employees, officers and directors. This includes our principal executive officer, principal financial officer and principal accounting officer or controller, or persons performing similar functions. The full text of our code of business conduct and ethics will be posted on our website at www.bionanogenomics.com. We intend to disclose on our website any future amendments to our code of business conduct and ethics or waivers that exempt any principal executive officer, principal financial officer, principal accounting officer or controller, persons performing similar functions or our directors from provisions in our code of business conduct and ethics. Information contained in, or that can be accessed through, our website is not incorporated by reference into this prospectus, and you should not consider information on our website to be part of this prospectus.

Compensation Committee Interlocks and Insider Participation

None of the members of the compensation committee is currently, or has been at any time, one of our officers or employees. None of our executive officers currently serves, or has served during the last calendar year, as a member of the board of directors or compensation committee of any entity that has one or more executive officers serving as a member of our board of directors or compensation committee.

Director Compensation

Our board of directors adopted a non-employee director compensation policy in , 2018 that will become effective upon the execution and delivery of the underwriting agreement related to this offering and will be applicable to each member of our board of directors who is not also serving as an employee or consultant to the Company. This compensation policy provides that each such non-employee director will receive the following compensation for service on our board of directors:

- an annual cash retainer of $;
- an additional annual cash retainer of $ for service as chairman of the board of directors;
- an additional annual cash retainer of $, $ and $ for service as a member of the audit committee, compensation committee and the nominating and corporate governance committee, respectively;
- an additional annual cash retainer of $, $ and $ for service as chair of the audit committee, compensation committee and the nominating and corporate governance committee, respectively;
- an initial option grant to purchase common stock with an aggregate Black-Scholes option value of $ on the date of each such non-employee director's appointment to our board of directors; and
- an annual option grant to purchase common stock with an aggregate Black-Scholes option value of $ on the date of each of our annual stockholder meetings.

Each of the option grants described above will be granted under our 2018 Plan, the terms of which are described in more detail below under "— Equity Benefit Plans — 2018 Equity Incentive Plan." Each such option grant will vest and become exercisable subject to the director's continuous service to us, provided that each option will vest in full upon a change in control (as defined in the 2018 Plan). The term of each option will be 10 years, subject to earlier termination as provided in the 2018 Plan, provided that upon a termination of service other than for death, disability or cause, the post-termination exercise period will be 12 months from the date of termination. An eligible director may decline all or any portion of his or her compensation by giving notice to the Company prior to the date cash may be paid or equity awards are to be granted, as the case may be.

We have reimbursed and will continue to reimburse all of our non-employee directors for their reasonable out-of-pocket expenses incurred in attending board of directors and committee meetings. Dr. Holmlin, our President and Chief Executive Officer, is also a director but did not receive any additional compensation for his service as a director. See the section titled "Executive Compensation" for more information regarding the compensation earned by Dr. Holmlin.

The following table sets forth in summary form information concerning the compensation that was earned by each of our non-employee directors during the year ended December 31, 2017:

NAME	FEES EARNED OR PAID IN CASH	OPTION AWARDS ($)(1)	TOTAL ($)
David L. Barker, Ph.D.	$ 30,000	$ 8,066	$ 38,066
Darren Cai, Ph.D.	$ —	$ —	$ —
Brian K. Halak, Ph.D. (2)	$ —	$ 5,500	$ 5,500
Albert Luderer, Ph.D.	$ 10,000	$ 5,500	$ 15,500
Junfeng Wang	$ —	$ —	$ —

(1) The amounts reported reflect the aggregate grant date fair value of each equity award granted to our non-employee directors during the fiscal year ended December 31, 2017, as computed in accordance with Financial Accounting Standard Board Accounting Standards Codification Topic 718 for stock-based compensation transactions (ASC 718). Assumptions used in the calculation of these amounts are included in Note 2 to our financial statements for the fiscal year ended December 31, 2017. As required by SEC rules, the amounts shown exclude the impact of estimated forfeitures related to service-based vesting conditions. These amounts do not reflect the actual economic value that will be realized by our non-employee directors upon the vesting of the stock options, the exercise of the stock options, or the sale of the common stock underlying such stock options. As of December 31, 2017, the aggregate number of shares outstanding under all options to purchase our common stock held by our non-employee directors were: Dr. Barker, 573,200; Dr. Halak, 387,000; and Dr. Luderer, 393,000. None of our non-employee directors held unvested stock awards as of December 31, 2017.

(2) Dr. Halak resigned from our Board of Directors in May 2018.

EXECUTIVE COMPENSATION

Our named executive officers for the year ended December 31, 2017, consisting of our principal executive officer and the next two most highly compensated executive officers, were:

- R. Erik Holmlin, Ph.D., our Chief Executive Officer;
- Mike Ward, our Chief Financial Officer; and
- Han Cao, Ph.D., our Chief Scientific Officer.

Summary Compensation Table

The following table presents all of the compensation awarded to or earned by or paid to our named executive officers during the fiscal year ended December 31, 2017.

Name and Principal Position	Year	Salary ($)	Bonus ($)	Option Awards(1) ($)	Non-Equity Incentive Plan Compensation(2) ($)	All Other Compensation(3) ($)	Total ($)
R. Erik Holmlin, Ph.D.	2017	378,628	—	93,786	118,132	14,784	605,330
Chief Executive Officer			—				
Mike Ward	2017	289,380	—	20,841	72,056	14,198	396,475
Chief Financial Officer							
Han Cao, Ph.D.	2017	300,451	—	31,262	45,518	14,468	391,699
Chief Scientific Officer			—				

(1) In accordance with SEC rules, this column reflects the aggregate grant date fair value of stock options granted to our named executive officers during fiscal year ended December 31, 2017 under our 2006 Plan, computed in accordance with ASC 718. The valuation assumptions used in calculating the fair value of the stock options are included in Note 2 to our financial statements included elsewhere in this prospectus. These amounts do not reflect the actual economic value that may be realized by the named executive officer upon the vesting of the stock options, the exercise of the stock options, or the sale of the common stock underlying such stock options.

(2) Amounts reported represent bonuses earned for 2017 and paid in 2018 at the discretion of our board of directors.

(3) Amounts reflect the following: for Mr. Holmlin, $14,424 for 401(k) matching contributions and $360 for life insurance premiums; for Mr. Ward, $13,838 for 401(k) matching contributions and $360 for life insurance premiums; for Mr. Cao, $14,108 for 401(k) matching contributions and $360 for life insurance premiums.

Annual Base Salary

The compensation of our named executive officers is generally determined and approved by our board of directors, based on the recommendation of the compensation committee of our board of directors. The 2017 base salaries that became effective as of February 7, 2017 were as follows:

NAME	2017 BASE SALARY ($)
R. Erik Holmlin, Ph.D.	378,628
Mike Ward	289,380
Han Cao, Ph.D.	300,451

Bonus Opportunity

In addition to base salaries, our named executive officers are eligible to receive annual performance-based cash bonuses, which are designed to provide appropriate incentives to our executives to achieve defined annual performance goals and to reward our executives for individual achievement towards these goals. The annual performance-based bonus each named executive officer is eligible to receive is generally based on the extent to which we achieve the corporate goals that our compensation committee establishes each year and, for all except Dr. Holmlin, the individual's contributions to such achievements. Dr. Holmlin's payout is based entirely on Company performance, Dr. Cao's payout is based on Company performance (25% weighting) and his individual performance (75% weighting), and Mr. Ward's payout is based on Company performance (50% weighting) and his individual performance (50% weighting). At the end of the year, our board of directors reviews each executive's performance and determines the actual bonus payout to be awarded to each of our named executive officers.

For 2017, the target bonus for Dr. Holmlin was 40% of base salary, for Dr. Cao was 20% of base salary and for Mr. Ward was 30% of base salary. Our corporate performance objectives for 2017, as established by our compensation committee, included achievement of our 2017 operating plan, launch of our Saphyr instrument, accomplishment of product development milestones, entry into product development and marketing arrangements and securing additional financing. In March 2018, our board of directors approved a 78% overall achievement level of our corporate goals and awarded bonuses to our named executive officers based on Company achievements and, except for Dr. Holmlin, on individual performance in 2017.

Equity-Based Incentive Awards

We believe that our ability to grant equity-based awards is a valuable and necessary compensation tool that aligns the long-term financial interests of our employees, consultants and directors with the financial interests of our stockholders. In addition, we believe that our ability to grant equity-based awards helps us to attract, retain and motivate employees, consultants and directors, and encourages them to devote their best efforts to our business and financial success. Our board of directors is responsible for approving equity grants. Vesting of equity awards is generally tied to continuous service with us and serves as an additional retention measure. Our executives generally are awarded an initial new hire grant upon commencement of employment. Additional grants may occur periodically in order to specifically incentivize executives with respect to achieving certain corporate goals or to reward executives for exceptional performance.

Prior to this offering, we have granted all equity awards pursuant to the 2006 Plan, the terms of which are described below under "—Equity Benefit Plans." All options are granted with a per share exercise price equal to no less than the fair market value of a share of our common stock on the date of the grant of such award. Generally our stock option awards vest over a three-year period subject to the holder's continuous service to us.

In February 2017, our board of directors granted options to purchase 6,590,702 shares to Dr. Holmlin, 2,196,900 shares to Dr. Cao and 1,464,600 shares to Mr. Ward. Each option has an exercise price of $0.03 per share and vests as follows: 25% of the shares subject to the option are fully vested and 6.25% of the shares subject to the option vest at the end of each three month anniversary of vesting commencement date, subject to single trigger acceleration of vesting in connection with a change of control, provided in each case that the holder is then providing services to us in accordance with the terms of the 2006 Plan. For additional information, please see below under "—Outstanding Equity Awards at Fiscal Year-End."

Agreements with Our Named Executive Officers

Below are descriptions of our employment agreements with our named executive officers. For a discussion of the severance pay and other benefits to be provided in connection with a termination of employment and/or a change in control under the arrangements with our named executive officers, please see "—Potential Payments upon Termination or Change in Control" below.

Dr. Holmlin. We entered into an employment agreement with Dr. Holmlin in January 2011, as amended in March 2011 and in November 2017, which governs the current terms of his employment with us. Pursuant to the agreement, as amended, Dr. Holmlin was entitled to an initial annual base salary of $315,000 and is eligible to receive an annual performance bonus with a target of 40% of his base salary, with a higher amount possible if goals exceeding target are achieved, as determined by our compensation committee and subject to approval by our board of directors. In addition, Dr. Holmlin was eligible to receive an option to purchase shares of the Company's common stock representing 5.0% of the fully-diluted equity shares immediately subsequent to the closing of a Series B transaction, which were equal to 1,280,828 shares of our common stock and were granted in 2011. In addition, Dr. Holmlin's agreement provided for additional options to be granted in connection with specified events in order to maintain Dr. Holmlin's ownership percentage, pursuant to which Dr. Holmlin was granted additional options to purchase 477,500 shares in 2012 and 1,090,067 shares in 2015. No obligations to make additional grants to maintain Dr. Holmlin's ownership percentage remain under his employment agreement. Dr. Holmlin's employment is at will.

Mr. Ward. We entered into an employment agreement with Mr. Ward in July 2016, which governs the current terms of his employment with us. Pursuant to the agreement, Mr. Ward was entitled to an initial annual base salary of $278,250 and is eligible to receive an annual performance bonus with a target amount of up to 30% of his base salary, as determined by our board of directors. Mr. Ward's employment is at will.

Dr. Cao. We entered into an employment agreement with Dr. Cao in July 2011, as amended in November 2017, which governs the current terms of his employment with us. Pursuant to the agreement, Dr. Cao was entitled to an initial annual base salary of $250,000 and a one-time signing bonus of $40,000 in cash. Dr. Cao received certain benefits in connection with his relocation, which were paid in 2012.

Dr. Cao is eligible to receive an annual performance bonus with a target amount of 20% of his base salary based on the Company's performance (25% weighting) and Dr. Cao's individual performance (75% weighting), as determined by our board of directors. In addition, Dr. Cao was eligible to receive an option to purchase a number of shares of the Company's common stock that, together with shares and/or options then owned by Dr. Cao and the shares of Series B preferred stock of the Company that was to be issued to Dr. Cao as described in his employment agreement, represented no less than 7.5% of the total outstanding shares of the common stock of the Company on a fully diluted basis, which was equal to 1,003,501 shares of our common stock and was granted in 2011. No obligations to make additional grants to maintain Dr. Cao's ownership percentage remain under his employment agreement. Dr. Cao was also entitled to a bonus consisting of 240,800 shares of Series B preferred stock of the Company pursuant to the terms of a restricted stock purchase agreement entered into in August 2011. Dr. Cao's employment is at will.

Potential Payments upon Termination or Change in Control

Regardless of the manner in which a named executive officer's service terminates, each named executive officer is entitled to receive amounts earned during his term of service, including unpaid salary and unused vacation. In addition, each of our named executive officers is eligible to receive certain benefits pursuant to his employment agreement with us, as described below. For the definitions of "cause," "good reason" and "disability" referenced below, please refer to the individual employment agreements with each of our named executive officers.

Dr. Holmlin. Upon Dr. Holmlin's termination for any reason other than death, disability, cause or resignation without good reason, and subject to Dr. Holmlin's execution of a release, Dr. Holmlin shall be eligible to receive (i) a lump sum amount equal to nine months of base salary, (ii) accelerated vesting of any options or restricted shares that would have vested within 18 months after the date of termination and (iii) premiums for continued health coverage for nine months following the date of termination, or until Dr. Holmlin is no longer eligible for continuation coverage, whichever is earlier. In the event of termination due to disability, and subject to Dr. Holmlin's execution of a release, Dr. Holmlin shall be eligible to receive accelerated vesting in full for any unvested portion of the options granted pursuant to his agreement. In the event of a deemed liquidation event (as defined in Dr. Holmlin's employment agreement), the options granted to Dr. Holmlin pursuant to his agreement shall vest in full.

Mr. Ward. Upon termination without cause, and subject to Mr. Ward's execution of a release, Mr. Ward will be eligible to receive (i) six months of continued base salary payments at the rate in effect at the time of termination and (ii) premiums for continued health coverage for six months following the date of termination or until Mr. Ward is no longer eligible for continuation coverage or he becomes eligible for new healthcare eligibility available through new employment, whichever is earlier.

Dr. Cao. Upon Dr. Cao's termination without cause or resignation for good reason, and subject to Dr. Cao's execution of a release, Dr. Cao will be eligible to receive (i) six months of continued base salary, to be paid on the Company's normal pay days commencing with the first regular payroll date of the Company following the effective date of the release, and (ii) premiums for continued health coverage for a period of six months following the date of termination or until Dr. Cao is no longer eligible for such coverage, whichever is earlier. In addition, Dr. Cao's unvested options shall immediately vest as if Dr. Cao had been employed for an additional six months from the date of termination, since more than two years has passed from start of Dr. Cao's employment. Upon Dr. Cao's termination by death or disability, Dr. Cao's unvested options shall immediately vest as if Dr. Cao had been employed for an additional six months from the date of termination, since more than two years has passed from the start of Dr. Cao's employment.

Each of our named executive officers holds stock options under the 2006 Plan that were granted subject to the general terms of the 2006 Plan and the form of stock option agreement. A description of the termination and change of control provisions in the 2006 Plan and stock options granted thereunder is provided below under "—Equity Benefit Plans" and the specific vesting terms of each named executive officer's stock options are described below under "—Outstanding Equity Awards at Fiscal Year-End."

Outstanding Equity Awards at Fiscal Year-End

The following table presents information regarding outstanding equity awards held by our named executive officers as of December 31, 2017.

Name	Grant Date	Option Awards(1) Number of Securities Underlying Unexercised Options Exercisable	Number of Securities Underlying Unexercised Options Unexercisable	Option Exercise Price Per Share(2)	Option Expiration Date
R. Erik Holmlin, Ph.D.	2/7/2017(3)	2,883,432	3,707,270	$ 0.03	2/6/2027
	1/29/2015(4)	139,438	63,377	$ 1.50	1/28/2025
	1/29/2015	109,006	—	$ 1.50	1/28/2025
	6/20/2012	47,749	—	$ 1.60	6/19/2022
	9/13/2011	6	—	$ 1.00	9/12/2021
	5/16/2011	128,076	—	$ 1.00	5/15/2021
Mike Ward	2/7/2017(3)	640,763	823,837	$ 0.03	2/6/2027
	1/29/2015(4)	29,873	13,575	$ 1.50	1/28/2025
	4/21/2014(4)	22,940	3,276	$ 1.90	4/20/2024
Han Cao, Ph.D.	2/7/2017(3)	961,144	1,235,756	$ 0.03	2/6/2027
	1/29/2015(4)	75,265	34,210	$ 1.50	1/28/2025
	1/29/2015	68,452	—	$ 1.50	1/28/2025
	8/10/2011	100,350	—	$ 1.00	8/9/2021
	4/2/2010	2,000	—	$ 0.90	4/1/2020
	1/15/2009	2,000	—	$ 6.80	1/14/2019

(1) All of the option awards were granted under the 2006 Plan, the terms of which plan is described below under "—Equity Benefit Plans."
(2) All of the option awards were granted with a per share exercise price equal to the fair market value of one share of our common stock on the date of grant, as determined in good faith by our board of directors.
(3) Each option award vests as follows: 25% of the shares subject to the option are fully vested and 6.25% of the shares subject to the option vest at the end of each three month anniversary of the vesting commencement date, subject to single trigger acceleration of vesting in connection with a change of control, provided in each case that the holder is then providing services to us in accordance with the terms of the 2006 Plan.
(4) Each option award vests as follows: 25% of the shares subject to the option shall vest at the end of the first anniversary of the vesting commencement date, and 6.25% of the shares subject to the option vest at the end of each three month anniversary of the vesting commencement date, subject to single trigger acceleration of vesting in connection with a change of control, provided in each case that the holder is then providing services to us in accordance with the terms of the 2006 Plan.

Perquisites, Health, Welfare and Retirement Benefits

All of our current named executive officers are eligible to participate in our employee benefit plans, including our medical, dental, vision, life, disability and accidental death and dismemberment insurance plans, in each case on the same basis as all of our other employees. We pay the premiums for the life, disability, accidental death and dismemberment insurance for all of our employees, including our named executive officers. In addition, we provide a 401(k) plan to our employees, including our named executive officers, as discussed in the section below entitled "—401(k) Plan." We generally do not provide perquisites or personal benefits to our named executive officers.

Nonqualified Deferred Compensation

Our named executive officers did not participate in, or earn any benefits under, a nonqualified deferred compensation plan sponsored by us during the fiscal year ended December 31, 2017. Our board of directors may elect to provide our officers and other employees with nonqualified defined contribution or other nonqualified deferred compensation benefits in the future if it determines that doing so is in our best interests.

401(k) Plan

We maintain a defined contribution employee retirement plan, or 401(k) plan, for our employees. Our named executive officers are eligible to participate in the 401(k) plan on the same basis as our other employees. The 401(k) plan is intended to qualify as a tax-qualified plan under Section 401(k) of the Code. The plan permits us to make discretionary contributions, including matching contributions and discretionary profit sharing contributions. The 401(k) plan currently does not offer the ability to invest in our securities.

Equity Benefit Plans

The principal features of our equity plans are summarized below. These summaries are qualified in their entirety by reference to the actual text of the plans, which are filed as exhibits to the registration statement of which this prospectus is a part.

2018 Equity Incentive Plan

Our board of directors adopted our 2018 Plan on 2018 and our stockholders approved our 2018 Plan on 2018. Our 2018 Plan provides for the grant of incentive stock options, or ISOs, within the meaning of Section 422 of the Code, to employees, including employees of any parent or subsidiary, and for the grant of nonstatutory stock options, or NSOs, stock appreciation rights, restricted stock awards, restricted stock unit awards, performance stock awards, performance cash awards and other forms of stock awards to employees, directors and consultants, including employees and consultants of our affiliates. Our 2018 Plan is a successor to and continuation of our 2006 Plan. No stock awards may be granted under the 2018 Plan until the date of the underwriting agreement related to this offering.

Authorized Shares. Initially, the maximum number of shares of our common stock that may be issued under our 2018 Plan after it becomes effective will be shares, which is the sum of (1) new shares, plus (2) the number of shares (not to exceed shares) (i) that remain available for the issuance of awards under our 2006 Plan at the time our 2018 Plan becomes effective, and (ii) any shares subject to outstanding stock options or other stock awards that were granted under our 2006 Plan that are forfeited, terminate, expire, are reacquired, withheld (or not issued) to satisfy a tax withholding obligation or the purchase or exercise price. In addition, the number of shares of our common stock reserved for issuance under our 2018 Plan will automatically increase on January 1 of each calendar year, starting on January 1, 2019 (assuming the 2018 Plan becomes effective in 2018) through January 1, 2028, in an amount equal to % of the total number of shares of our capital stock outstanding on the last day of the calendar month before the date of each automatic increase, or a lesser number of shares determined by our board of directors. The maximum number of shares of our common stock that may be issued on the exercise of ISOs under our 2018 Plan is .

Shares subject to stock awards granted under our 2018 Plan that expire or terminate without being exercised in full, or that are paid out in cash rather than in shares, do not reduce the number of shares available for issuance under our 2018 Plan. Additionally, shares become available for future grant under our 2018 Plan if they were issued under stock awards under our 2018 Plan if we repurchase them or they are forfeited. This includes shares used to pay the exercise price of a stock award or to satisfy the tax withholding obligations related to a stock award.

The maximum number of shares of common stock subject to stock awards granted under the 2018 Plan or otherwise during a single calendar year to any non-employee director, taken together with any cash fees paid by us to such non-employee director during such calendar year for service on the board of directors, will not exceed $ in total value (calculating the value of any such stock awards based on the grant date fair value of such stock awards for financial reporting purposes), or, with respect to the calendar year in which a non-employee director is first appointed or elected to the board of directors, $.

Plan Administration. Our board of directors, or a duly authorized committee of our board of directors, will administer our 2018 Plan. Our board of directors may also delegate to one or more of our officers the authority to (1) designate employees (other than officers) to receive specified stock awards and (2) determine the number of shares subject to such stock awards. Under our 2018 Plan, our board of directors has the authority to determine and amend the terms of awards and underlying agreements, including:

- recipients;
- the exercise, purchase or strike price of stock awards, if any;
- the number of shares subject to each stock award;
- the vesting schedule applicable to the awards, together with any vesting acceleration; and
- the form of consideration, if any, payable on exercise or settlement of the award.

Under the 2018 Plan, the board of directors also generally has the authority to effect, with the consent of any adversely affected participant:

- the reduction of the exercise, purchase, or strike price of any outstanding award;
- the cancellation of any outstanding award and the grant in substitution therefore of other awards, cash, or other consideration; or
- any other action that is treated as a repricing under generally accepted accounting principles.

Stock Options. ISOs and NSOs are granted under stock option agreements adopted by the plan administrator. The plan administrator determines the exercise price for stock options, within the terms and conditions of the 2018 Plan, provided that the exercise price of a stock option generally cannot be less than 100% of the fair market value of our common stock on the date of grant. Options granted under the 2018 Plan vest at the rate specified in the stock option agreement as determined by the plan administrator.

Tax Limitations on Incentive Stock Options. The aggregate fair market value, determined at the time of grant, of our common stock with respect to ISOs that are exercisable for the first time by an award holder during any calendar year under all of our stock plans may not exceed $100,000. Options or portions thereof that exceed such limit will generally be treated as NSOs. No ISO may be granted to any person who, at the time of the grant, owns or is deemed to own stock possessing more than 10% of our total combined voting power or that of any of our affiliates unless (1) the option exercise price is at least 110% of the fair market value of the stock subject to the option on the date of grant, and (2) the term of the ISO does not exceed five years from the date of grant.

Restricted Stock Unit Awards. Restricted stock units are granted under restricted stock unit award agreements adopted by the plan administrator. Restricted stock units may be granted in consideration for any form of legal consideration that may be acceptable to our board of directors and permissible under applicable law. A restricted stock unit may be settled by cash, delivery of stock, a combination of cash and stock as deemed appropriate by the plan administrator, or in any other form of consideration set forth in the restricted stock unit agreement. Additionally, dividend equivalents may be credited in respect of shares covered by a restricted stock unit. Except as otherwise provided in the applicable award agreement, restricted stock units that have not vested will be forfeited once the participant's continuous service ends for any reason.

Restricted Stock Awards. Restricted stock awards are granted under restricted stock award agreements adopted by the plan administrator. A restricted stock award may be awarded in consideration for cash, check, bank draft or money order, past or future services to us, or any other form of legal consideration that may be acceptable to our board of directors and permissible under applicable law. The plan administrator determines the terms and conditions of restricted stock awards, including vesting and forfeiture terms. If a participant's service relationship with us ends for any reason, we may receive any or all of the shares of common stock held by the participant that have not vested as of the date the participant terminates service with us through a forfeiture condition or a repurchase right.

Stock Appreciation Rights. Stock appreciation rights are granted under stock appreciation grant agreements adopted by the plan administrator. The plan administrator determines the purchase price or strike price for a stock appreciation right, which generally cannot be less than 100% of the fair market value of our common stock on the date of grant. A stock appreciation right granted under the 2018 Plan vests at the rate specified in the stock appreciation right agreement as determined by the plan administrator.

Performance Awards. The 2018 Plan permits the grant of performance-based stock and cash awards. Our compensation committee may structure awards so that the stock or cash will be issued or paid only following the achievement of certain pre-established performance goals during a designated performance period.

The performance goals that may be selected include one or more of the following: (i) sales; (ii) revenues; (iii) assets; (iv) expenses; (v) market penetration or expansion; (vi) earnings from operations; (vii) earnings before or after deduction for all or any portion of interest, taxes, depreciation, amortization, incentives, service fees or extraordinary or special items, whether or not on a continuing operations or an aggregate or per share basis; (viii) net income or net income per common share (basic or diluted); (ix) return on equity, investment, capital or assets; (x) one or more operating ratios; (xi) borrowing levels, leverage ratios or credit rating; (xii) market share; (xiii) capital expenditures; (xiv) cash flow, free cash flow, cash flow return on investment, or net cash provided by operations; (xv) stock price, dividends or total stockholder return; (xvi) development of new technologies or products; (xvii) sales of particular products or services; (xviii) economic value created or added; (xix) operating margin or profit margin; (xx) customer acquisition or retention; (xxi) raising or refinancing of capital; (xxii) successful hiring of key individuals; (xxiii) resolution of significant litigation; (xxiv) acquisitions and divestitures (in whole or in part); (xxv) joint ventures and strategic alliances; (xxvi) spin-offs, split-ups and the like; (xxvii) reorganizations; (xxviii) recapitalizations, restructurings, financings (issuance of debt or equity) or refinancings; (xxix) or strategic business criteria, consisting of one or more objectives based on the following goals: achievement of timely development, design management or enrollment, meeting specified market penetration or value added, payor acceptance, patient adherence, peer reviewed publications, issuance of new patents, establishment of or securing of licenses to intellectual property, product development or introduction (including, without limitation, discovery of novel products, maintenance of multiple products in pipeline, product launch or other product development milestones), geographic business expansion, cost targets, cost reductions or savings, customer satisfaction, operating efficiency, acquisition or retention, employee satisfaction, information technology, corporate development (including, without limitation, licenses, innovation, research or establishment of third party collaborations), manufacturing or process development, legal compliance or risk reduction, patent application or issuance goals, or goals relating to acquisitions, divestitures or other business combinations (in whole or in part), joint ventures or strategic alliances; and (xxx) other measures of performance selected by the board of directors.

The performance goals may be based on Company-wide performance or performance of one or more business units, divisions, affiliates, or business segments, and may be either absolute or relative to the performance of one or more comparable companies or the performance of one or more relevant indices. Our board of directors is authorized at any time in its sole discretion, to adjust or modify the calculation of a performance goal for such performance period in order to prevent the dilution or enlargement of the rights of participants, (a) in the event of, or in anticipation of, any unusual or extraordinary corporate item, transaction, event or development; (b) in recognition of, or in anticipation of, any other unusual or nonrecurring events affecting the Company, or the financial statements of the Company in response to, or in anticipation of, changes in applicable laws, regulations, accounting principles, or business conditions; or (c) in view of the board of director's assessment of the business strategy of the Company, performance of comparable organizations, economic and business conditions, and any other circumstances deemed relevant. Specifically, the board of directors is authorized to make adjustment in the method of calculating attainment of performance goals and objectives for a performance period as follows: (i) to exclude the dilutive effects of acquisitions or joint ventures; (ii) to assume that any business divested by the Company achieved performance objectives at targeted levels during the balance of a performance period following such divestiture; and (iii) to exclude the effect of any change in the outstanding shares of common stock of the Company by reason of any stock dividend or split, stock repurchase, reorganization, recapitalization, merger, consolidation, spin-off, combination or exchange of shares or other similar corporate change, or any distributions to common stockholders other than regular cash dividends. In addition, the board of directors is authorized to make adjustment in the method of calculating attainment of performance goals and objectives for a performance period as follows: (i) to exclude restructuring and/or other nonrecurring charges; (ii) to exclude exchange rate effects, as applicable, for non-U.S. dollar denominated net sales and operating earnings; (iii) to exclude the effects of changes to generally accepted accounting standards required by the Financial Accounting Standards Board; (iv) to exclude the effects of any items that are "unusual" in nature or occur "infrequently" as determined under generally accepted accounting principles; (v) to exclude the effects to any statutory adjustments to corporate tax rates; and (vi) to make other appropriate adjustments selected by the board of directors.

Other Stock Awards. The plan administrator may grant other awards based in whole or in part by reference to our common stock. The plan administrator will set the number of shares under the stock award and all other terms and conditions of such awards.

Changes to Capital Structure. In the event there is a specified type of change in our capital structure, such as a stock split, reverse stock split, or recapitalization, appropriate adjustments will be made to (1) the class and maximum number of shares reserved for issuance under the 2018 Plan, (2) the class and maximum number of shares by which the share reserve may increase automatically each year, (3) the class and maximum number of shares that may be issued on the exercise of incentive stock options, (4) the class and maximum number of shares subject to stock awards that may be awarded to any non-employee director under the 2018 Plan, and (5) the class and number of shares and exercise price, strike price, or purchase price, if applicable, of all outstanding stock awards.

Corporate Transactions. Our 2018 Plan provides that in the event of certain specified significant corporate transactions (or a change in control, as defined below), unless otherwise provided in an award agreement or other written agreement between us and the award holder, the administrator may take one or more of the following actions with respect to such stock awards:

- arrange for the assumption, continuation, or substitution of a stock award by a successor corporation;
- arrange for the assignment of any reacquisition or repurchase rights held by us to a successor corporation;
- accelerate the vesting, in whole or in part, of the stock award and provide for its termination if not exercised (if applicable) at or before the effective time of the transaction;
- arrange for the lapse, in whole or in part, of any reacquisition or repurchase rights held by us;
- cancel or arrange for the cancellation of the stock award, to the extent not vested or not exercised before the effective time of the transaction, in exchange for a cash payment, if any, as determined by the board; or
- make a payment, in the form determined by our board of directors, equal to the excess, if any, of (A) the value of the property the participant would have received on exercise of the award immediately before the effective time of the transaction, over (B) any exercise price payable by the participant in connection with the exercise.

The plan administrator is not obligated to treat all stock awards or portions of stock awards, even those that are of the same type, in the same manner and is not obligated to treat all participants in the same manner.

Under the 2018 Plan, a corporate transaction is generally the consummation of: (1) a sale of all or substantially all of our assets, (2) the sale or disposition of more than 50% of our outstanding securities, (3) a merger or consolidation where we do not survive the transaction, or (4) a merger or consolidation where we do survive the transaction but the shares of our common stock outstanding immediately before such transaction are converted or exchanged into other property by virtue of the transaction.

In the event of a change in control, the board of directors may take any of the above-mentioned actions. Awards granted under the 2018 Plan will not receive automatic acceleration of vesting and exercisability in the event of a change in control, although this treatment may be provided for in an award agreement or other written agreement between the Company and the participant. Under the 2018 Plan, a change in control is generally (1) the acquisition by any person or company of more than 50% of the combined voting power of our then outstanding stock, (2) a merger, consolidation or similar transaction in which our stockholders immediately before the transaction do not own, directly or indirectly, more than 50% of the combined voting power of the surviving entity (or the parent of the surviving entity), (3) a sale, lease, exclusive license or other disposition of all or substantially all of our assets other than to an entity more than 50% of the combined voting power of which is owned by our stockholders, (4) a complete dissolution or liquidation of the Company, or (5) when a majority of our board of directors becomes comprised of individuals who were not serving on our board of directors on the date of the underwriting agreement related to this offering, or the incumbent board, or whose nomination, appointment, or election was not approved by a majority of the incumbent board still in office.

Transferability. Under the 2018 Plan, stock awards are generally not transferable other than by will or the laws of descent and distribution, or as otherwise permitted by our board of directors.

Plan Amendment or Termination. Our board of directors has the authority to amend, suspend, or terminate our 2018 Plan, provided that such action does not materially impair the existing rights of any participant without such participant's written consent. Certain material amendments also require the approval of our stockholders. No incentive stock options may be granted after the tenth anniversary of the date our board of directors adopted our 2018 Plan. No stock awards may be granted under our 2018 Plan while it is suspended or after it is terminated.

Amended and Restated 2006 Equity Compensation Plan

Our board of directors adopted and our stockholders originally approved our 2006 Plan in September 2006, and it was subsequently amended and restated in September 2008 and most recently amended in March 2016. All references herein to our 2006 Plan shall be deemed to refer to our Amended and Restated 2006 Equity Compensation Plan, as amended, unless the context otherwise requires. Our 2006 Plan allows for the grant of ISOs to employees, including employees of any subsidiary, and for the grant of NSOs, stock appreciation rights, restricted stock awards and restricted stock units and other equity awards to employees, directors and consultants, including employees and consultants of our subsidiaries. As of March 31, 2018, there remained 2,482,989 shares of common stock available for the grant of awards under the 2006 Plan, and there were options to purchase 18,649,605 shares of common stock outstanding under the 2006 Plan.

Once our 2018 Plan becomes effective, no further grants will be made under our 2006 Plan. Any outstanding awards granted under our 2006 Plan will remain subject to the terms of our 2006 Plan and applicable award agreements.

Authorized Shares. The maximum number of shares of our common stock that may be issued under our 2006 Plan is 21,879,113 shares. Shares subject to stock awards granted under our 2006 Plan that expire, are forfeited, or terminate without being exercised in full do not reduce the number of shares available for issuance under our 2006 Plan.

Plan Administration. Our board of directors or a duly authorized committee of our board of directors administers our 2006 Plan. Our board of directors shall have the sole authority to (i) determine the individuals to whom grants shall be made under the 2006 Plan, (ii) determine the type, size and terms of the grants to be made to each such individual, (iii) determine the time when the grants will be made and the duration of any applicable exercise or restriction period, including the criteria for exercisability and the acceleration of exercisability, (iv) amend the terms of any previously issued grant, and (v) deal with any other matters arising under the 2006 Plan.

Change of Control. Our 2006 Plan provides that in the event of a change of control, all awards granted under the 2006 Plan shall become fully vested and exercisable (as applicable), unless the board of directors determines otherwise. In the event of a change of control, the administrator may take any of the following actions with respect to any or all outstanding awards: (i) determine that all outstanding options and stock appreciation rights that are not exercised shall be assumed by, or replaced with comparable options by the surviving corporation (or a parent or subsidiary of the surviving corporation), and other outstanding grants that remain in effect after the change of control shall be converted to similar grants of the surviving corporation (or a parent or subsidiary of the surviving corporation), (ii) require that grantees surrender their outstanding options and stock appreciation rights in exchange for one or more payments, in cash or Company stock as determined by the board of directors, in an amount, if any, equal to the amount by which the then fair market value of the shares of Company stock subject to the grantee's unexercised options and stock appreciation rights exceeds the exercise price or base amount of the options and stock appreciation rights, on such terms as the board of directors determines, or (iii) after giving grantees an opportunity to exercise their outstanding options and stock appreciation rights, terminate any or all unexercised options and stock appreciation rights at such time as the board of directors deems appropriate.

Such assumption, surrender or termination shall take place as of the date of the change of control or such other date as the board of directors may specify.

Under the 2006 Plan, a change of control is generally (1) the acquisition by any person or company of more than 50% of the combined voting power of our then outstanding stock, (2) the consummation of a merger or consolidation with another corporation where our stockholders, immediately prior to the merger or consolidation, will not beneficially own, immediately after the merger or consolidation, shares entitling such stockholders to more than 50% of all votes to which all stockholders of the surviving corporation would be entitled in the election of directors, (3) the consummation of a sale or other disposition of all or substantially all of our assets, or (4) the consummation of a liquidation or dissolution.

Transferability. Under our 2006 Plan, awards are generally not transferable other than by will or the laws of descent and distribution or as otherwise permitted by the Board.

Plan Amendment or Termination. Our board of directors has the authority to amend, suspend, or terminate our 2006 Plan, although certain material amendments require the approval of our stockholders, and amendments that would materially impair the rights of any participant require the consent of that participant.

2018 Employee Stock Purchase Plan

Our board of directors adopted, and our stockholders approved, our 2018 ESPP in 2018. The ESPP will become effective immediately prior to and contingent upon the date of the underwriting agreement related to this offering. The purpose of the ESPP is to secure the services of new employees, to retain the services of existing employees, and to provide incentives for such individuals to exert maximum efforts toward our success and that of our affiliates. The ESPP is intended to qualify as an "employee stock purchase plan" within the meaning of Section 423 of the Code for U.S. employees.

Share Reserve. Following this offering, the ESPP authorizes the issuance of shares of our common stock under purchase rights granted to our employees or to employees of any of our designated affiliates. The number of shares of our common stock reserved for issuance will automatically increase on January 1 of each calendar year, beginning on January 1, 2019 (assuming the ESPP becomes effective in 2018) through January 1, 2028, by the lesser of (1) % of the total number of shares of our common stock outstanding on the last day of the calendar month before the date of the automatic increase, and (2) shares; provided that before the date of any such increase, our board of directors may determine that such increase will be less than the amount set forth in clauses (1) and (2). As of the date hereof, no shares of our common stock have been purchased under the ESPP.

Administration. Our board of directors administers the ESPP and may delegate its authority to administer the ESPP to our compensation committee. The ESPP is implemented through a series of offerings under which eligible employees are granted purchase rights to purchase shares of our common stock on specified dates during such offerings. Under the ESPP, we may specify offerings with durations of not more than 27 months, and may specify shorter purchase periods within each offering. Each offering will have one or more purchase dates on which shares of our common stock will be purchased for employees participating in the offering. An offering under the ESPP may be terminated under certain circumstances.

Payroll Deductions. Generally, all regular employees, including executive officers, employed by us or by any of our designated affiliates, may participate in the ESPP and may contribute, normally through payroll deductions, up to % of their earnings (as defined in the ESPP) for the purchase of our common stock under the ESPP. Unless otherwise determined by our board of directors, common stock will be purchased for the accounts of employees participating in the ESPP at a price per share that is at least the lesser of (1) 85% of the fair market value of a share of our common stock on the first date of an offering, or (2) 85% of the fair market value of a share of our common stock on the date of purchase. For the initial offering, which we expect will commence on the execution and delivery of the underwriting agreement relating to this offering, the fair market value on the first day of the offering period will be the price at which shares of common stock are first sold to the public.

Limitations. Employees may have to satisfy one or more of the following service requirements before participating in the ESPP, as determined by our board of directors, including: (1) being customarily employed for more than 20 hours per week, (2) being customarily employed for more than five months per calendar year, or (3) continuous employment with us or one of our affiliates for a period of time (not to exceed two years).

No employee may purchase shares under the ESPP at a rate in excess of $25,000 worth of our common stock based on the fair market value per share of our common stock at the beginning of an offering for each calendar year such a purchase right is outstanding. Finally, no employee will be eligible for the grant of any purchase rights under the ESPP if immediately after such rights are granted, such employee has voting power over 5% or more of our outstanding capital stock measured by vote or value under Section 424(d) of the Code.

Changes to Capital Structure. In the event that there occurs a change in our capital structure through such actions as a stock split, merger, consolidation, reorganization, recapitalization, reincorporation, stock dividend, dividend in property other than cash, large nonrecurring cash dividend, liquidating dividend, combination of shares, exchange of shares, change in corporate structure, or similar transaction, the board of directors will make appropriate adjustments to: (1) the class(es) and maximum number of shares reserved under the ESPP, (2) the class(es) and maximum number of shares by which the share reserve may increase automatically each year, (3) the class(es) and number of shares subject to and purchase price applicable to outstanding offerings and purchase rights, and (4) the class(es) and number of shares that are subject to purchase limits under ongoing offerings.

Corporate Transactions. In the event of certain significant corporate transactions, any then-outstanding rights to purchase our stock under the ESPP may be assumed, continued or substituted for by any surviving or acquiring entity (or its parent company). If the surviving or acquiring entity (or its parent company) elects not to assume, continue, or substitute for such purchase rights, then the participants' accumulated payroll contributions will be used to purchase shares of our common stock within 10 business days before such corporate transaction, and such purchase rights will terminate immediately.

Under the ESPP, a corporate transaction is generally the consummation of: (1) a sale of all or substantially all of our assets, (2) the sale or disposition of more than 50% of our outstanding securities, (3) a merger or consolidation where we do not survive the transaction, and (4) a merger or consolidation where we do survive the transaction but the shares of our common stock outstanding immediately before such transaction are converted or exchanged into other property by virtue of the transaction,

ESPP Amendment or Termination. Our board of directors has the authority to amend or terminate our ESPP, provided that except in certain circumstances such amendment or termination may not materially impair any outstanding purchase rights without the holder's consent. We will obtain stockholder approval of any amendment to our ESPP as required by applicable law or listing requirements.

Limitations on Liability and Indemnification

On the closing of this offering, our amended and restated certificate of incorporation will contain provisions that limit the liability of our current and former directors for monetary damages to the fullest extent permitted by Delaware law. Delaware law provides that directors of a corporation will not be personally liable for monetary damages for any breach of fiduciary duties as directors, except liability for:

- any breach of the director's duty of loyalty to the corporation or its stockholders;
- any act or omission not in good faith or that involves intentional misconduct or a knowing violation of law;
- unlawful payments of dividends or unlawful stock repurchases or redemptions; or
- any transaction from which the director derived an improper personal benefit.

Such limitation of liability does not apply to liabilities arising under federal securities laws and does not affect the availability of equitable remedies such as injunctive relief or rescission.

Our amended and restated certificate of incorporation will authorize us to indemnify our directors, officers, employees and other agents to the fullest extent permitted by Delaware law. Our amended and restated bylaws will provide that we are required to indemnify our directors and officers to the fullest extent permitted by Delaware law and may indemnify our other employees and agents. Our amended and restated bylaws will also provide that, on satisfaction of certain conditions, we will advance expenses incurred by a director or officer in advance of the final disposition of any action or proceeding, and permit us to secure insurance on behalf of any officer, director, employee, or other agent for any liability arising out of his or her actions in that capacity regardless of whether we would otherwise be permitted to indemnify him or her under the provisions of Delaware law. We have entered and expect to continue to enter into agreements to indemnify our directors, executive officers and other employees as determined by the board of directors. With certain exceptions, these agreements provide for indemnification for related expenses including attorneys' fees, judgments, fines and settlement amounts incurred by any of these individuals in any action or proceeding.

We believe that these amended and restated certificate of incorporation and amended and restated bylaw provisions and indemnification agreements are necessary to attract and retain qualified persons as directors and officers. We also maintain customary directors' and officers' liability insurance.

The limitation of liability and indemnification provisions in our amended and restated certificate of incorporation and amended and restated bylaws may discourage stockholders from bringing a lawsuit against our directors for breach of their fiduciary duty. They may also reduce the likelihood of derivative litigation against our directors and officers, even though an action, if successful, might benefit us and other stockholders. Further, a stockholder's investment may be adversely affected to the extent that we pay the costs of settlement and damage awards against directors and officers as required by these indemnification provisions.

Insofar as indemnification for liabilities arising under the Securities Act may be permitted for directors, executive officers, or persons controlling us, we have been informed that, in the opinion of the SEC, such indemnification is against public policy as expressed in the Securities Act and is therefore unenforceable.

Rule 10b5-1 Sales Plans

Our directors and officers may adopt written plans, known as Rule 10b5-1 plans, in which they will contract with a broker to buy or sell shares of our common stock on a periodic basis. Under a Rule 10b5-1 plan, a broker executes trades under parameters established by the director or officer when entering into the plan, without further direction from them. The director or officer may amend a Rule 10b5-1 plan in some circumstances and may terminate a plan at any time. Our directors and executive officers may also buy or sell additional shares outside of a Rule 10b5-1 plan when they do not possess of material nonpublic information, subject to compliance with the terms of our insider trading policy. During the first days from this offering, the sale of any shares under such plan would be subject to the lock-up agreement that the director or officer has entered into with the underwriters.

CERTAIN RELATIONSHIPS AND RELATED PARTY TRANSACTIONS

Other than compensation arrangements for our directors and executive officers, which are described elsewhere in this prospectus, below we describe transactions since January 1, 2015 to which we were a party or will be a party, in which:

- the amounts involved exceeded or will exceed $120,000; and
- any of our directors, executive officers or holders of more than 5% of our capital stock, or any member of the immediate family of, or person sharing the household with, the foregoing persons, had or will have a direct or indirect material interest.

Convertible Promissory Note Financing

In February 2016, we issued convertible promissory notes in the aggregate principal amount of $1.5 million with an interest rate of 8% per annum. These convertible promissory notes provided for conversion into preferred shares in our next equity financing, at a rate equal to the principal amount of the convertible promissory notes and accrued interest thereon divided by the per share purchase price of the preferred shares in that financing. As further discussed below, on March 4, 2016, these convertible promissory notes converted into an aggregate of 3,138,013 shares of our Series D convertible preferred stock.

The participants in this note financing included the following members of our board of directors and holders of more than 5% of our outstanding capital stock:

Name of Participant	Total Principal Amount
Entities affiliated with LC Fund VI, L.P.(1)	$ 750,000
Entities affiliated with Domain Partners VIII, L.P.(2)	$ 750,000

(1) Includes (i) $715,042 in cash from LC Fund VI, L.P. and (ii) $34,958 in cash from LC Healthcare Fund I, L.P.
(2) Includes (i) $744,476 in cash from Domain Partners VIII, L.P., and (ii) $5,524 in cash from DP VIII Associates, L.P.

Series D Convertible Preferred Stock and Warrant Financing

In March and April 2016, we issued and sold, in a series of closings, an aggregate of 20,652,486 shares of our Series D convertible preferred stock at a purchase price of $0.48 per share for an aggregate purchase price of approximately $9.9 million, and warrants to purchase an aggregate of 31,672,817 shares of our Series D convertible preferred stock for an aggregate purchase price of approximately $31,673. In connection with the first closing of this financing in March 2016, an aggregate of approximately $1.5 million in principal and accrued interest outstanding under the subordinated convertible promissory notes we issued in February 2016 converted into an aggregate of 3,138,013 shares of our Series D convertible preferred stock.

All purchasers of our Series D convertible preferred stock are entitled to specified registration rights. See the section titled “Description of Capital Stock—Registration Rights” for more information regarding these registration rights. The following table summarizes the Series D convertible preferred stock purchased by affiliates of our executive officers and of members of our board of directors and holders of more than 5% of our outstanding capital stock:

Name of Participant	Shares of Series D Convertible Preferred Stock	Warrants to Purchase Shares of Series D Convertible Preferred Stock	Aggregate Purchase Price
Entities affiliated with LC Fund VI, L.P. (1)	6,443,565	11,263,624	$3,104,175
Entities affiliated with Domain Partners VIII, L.P.(2)	6,443,565	7,412,740	$3,100,324
Han Cao	4,362,062	10,731,083	$2,104,521
Novartis Bioventures Ltd.	1,615,096	—	$ 775,246

(1) Includes: (i) $716,609 of unpaid principal and accrued interest and $2,242,877 in cash from LC Fund VI, L.P., and (ii) $35,035 of unpaid principal and accrued interest and $109,654 in cash from LC Parallel Fund VI, L.P.
(2) Includes: (i) $749,045 of unpaid principal and accrued interest and $2,328,444 in cash from Domain Partners VIII, L.P., and (ii) $5,558 of unpaid principal and accrued interest and $17,277 in cash from DP VIII Associates, L.P.

Series D-1 Convertible Preferred Stock Financing

In August 2016, as well as January, February, March, April, May, July, August and November 2017, we issued and sold, in a series of closings, an aggregate of 66,141,257 shares of our Series D-1 convertible preferred stock at a purchase price of $0.48 per share for an aggregate gross proceeds of approximately $31.7 million.

All purchasers of our Series D-1 convertible preferred stock are entitled to certain registration rights. See the section titled "Description of Capital Stock—Registration Rights" for more information regarding these registration rights. The following table summarizes the Series D-1 convertible preferred stock purchased by affiliates of our executive officers and of members of our board of directors and holders of more than 5% of our outstanding capital stock:

Name of Participant	Shares of Series D-1 Convertible Preferred Stock	Aggregate Purchase Price
Entities affiliated with LC Fund VI, L.P. (1)	27,305,708	$ 13,106,740
Praise Alliance International Limited	12,500,000	$ 6,000,000
Full Succeed International Limited	10,416,667	$ 5,000,000
Entities affiliated with Domain Partners VIII, L.P.(2)	3,710,247	$ 1,780,918
Novartis Bioventures Ltd.	1,070,373	$ 513,779
Han Cao	104,167	$ 50,000

(1) Includes (i) $1,883,867 in cash from LC Fund VI, L.P.; (ii) $11,106,738 in cash from LC Healthcare Fund I, L.P.; and (iii) $116,135 in cash from LC Parallel Fund VI, L.P.
(2) Includes (i) $1,767,801 in cash from Domain Partners VIII, L.P., and (ii) $13,117 in cash from DP VIII Associates, L.P.

Convertible Promissory Note Financing

In February 2018, we issued convertible promissory notes in the aggregate principal amount of approximately $13.4 million with an interest rate of 8% per annum. These convertible promissory notes provide for conversion under the following three circumstances:

Conversion at Qualifying financing – Upon the closing of an equity financing involving the sale by us of convertible preferred stock in which we receive an aggregate of at least $15,000,000 in cumulative gross proceeds, the conversion price will equal 75% of the lowest per share cash purchase price of the convertible preferred stock sold by us in such qualified financing. The original principal amount and accrued interest under each convertible promissory note shall automatically convert into convertible preferred stock.

Conversion at Initial Public Offering – Prior to the maturity date of the convertible promissory notes, if we complete our initial public offering, the convertible promissory notes will automatically convert into shares of our common stock at an amount equal to the original principal amount and accrued interest under each convertible promissory note divided by 75% of the per share cash purchase price of the common stock offered to the public in the initial public offering.

Optional Conversion at Maturity – Upon maturity, and at the election of the holder, the convertible promissory notes will convert into shares of Series D-2 convertible preferred stock as is equal to the original principal amount and accrued interest under each convertible promissory note divided by the price per share. The price per share is defined as $60,000,000 divided by the aggregate number of outstanding shares of our common stock as of the maturity date.

Accordingly, in connection with the completion of our initial public offering, the principal amount of the convertible promissory notes and accrued interest thereon will automatically convert into shares of our common stock, assuming an initial public offering price of $ per share and a conversion date of , 2018.

The participants in this note financing included the following members of our board of directors and holders of more than 5% of our outstanding capital stock:

Name of Participant	Total Principal Amount
Entities affiliated with LC Fund VI, L.P. (1)	$ 8,460,000
Entities affiliated with Domain Partners VIII, L.P.(2)	$ 1,500,000

(1) Includes (i) $3,460,000 in cash from LC Healthcare Fund I, L.P.; and (ii) $5,000,000 cash from Rosy Shine Limited.
(2) Includes (i) $1,488,952 in cash from Domain Partners VIII, L.P., and (ii) $11,048 in cash from DP VIII Associates, L.P.

One of our directors, Junfeng Wang, is affiliated with LC Fund VI, L.P. (and its affiliated entities that participated in the financings described above).

Investors' Rights Agreement

In August 2016, we entered into a fifth amended and restated investors' rights agreement, or the IRA, with certain holders of our preferred stock and common stock, including entities affiliated with LC Fund VI, L.P. and Domain Partners VIII, L.P. and including certain members of, and affiliates of, our directors and certain of our executive officers. The IRA provides the holders of our preferred stock with certain registration rights, including the right to demand that we file a registration statement or request that their shares be covered by a registration statement that we are otherwise filing. The Company has obtained a waiver of these rights in connection with the S-1. The IRA also provides these stockholders with information rights, which will terminate on the closing of this offering, and a right of first refusal with regard to certain issuances of our capital stock, which shall terminate immediately prior to, but subject to, the consummation of this firm-commitment underwritten public offering pursuant to the registration statement of which this prospectus forms a part. After 12 months following the closing of this offering, the holders of shares of our common stock issuable upon conversion of outstanding preferred stock will be entitled to rights with respect to the registration of their shares of common stock under the Securities Act under this agreement. For a description of these registration rights, see "Description of Capital Stock—Registration Rights."

Indemnification Agreements

Our amended and restated certificate of incorporation will contain provisions limiting the liability of directors, and our amended and restated bylaws will provide that we will indemnify each of our directors and officers to the fullest extent permitted under Delaware law. Our amended and restated certificate of incorporation and amended and restated bylaws will also provide our board of directors with discretion to indemnify our employees and other agents when determined appropriate by the board. In addition, we have entered into an indemnification agreement with each of our directors and executive officers, which requires us to indemnify them. For more information regarding these agreements, see "Executive Compensation—Limitations on Liability and Indemnification Matters."

Policies and Procedures for Transactions with Related Persons

Prior to completion of this offering, we intend to adopt a written policy that our executive officers, directors, nominees for election as a director, beneficial owners of more than 5% of any class of our common stock and any members of the immediate family of any of the foregoing persons are not permitted to enter into a related person transaction with us without the approval or ratification of our board of directors or our audit committee. Any request for us to enter into a transaction with an executive officer, director, nominee for election as a director, beneficial owner of more than 5% of any class of our common stock, or any member of the immediate family of any of the foregoing persons, in which the amount involved exceeds $120,000 and such person would have a direct or indirect interest, must be presented to our board of directors or our audit committee for review, consideration and approval. In approving or rejecting any such proposal, our board of directors or our audit committee is to consider the material facts of the transaction, including whether the transaction is on terms no less favorable than terms generally available to an unaffiliated third party under the same or similar circumstances and the extent of the related person's interest in the transaction.

PRINCIPAL STOCKHOLDERS

The following table sets forth information regarding beneficial ownership of our capital stock by:

- each person, or group of affiliated persons, known by us to beneficially own more than 5% of our common stock;
- each of our directors;
- each our of named executive officers; and
- all of our current executive officers and directors as a group.

We have determined beneficial ownership in accordance with the rules and regulations of the SEC, and the information is not necessarily indicative of beneficial ownership for any other purpose. Except as indicated by the footnotes below, we believe, based on information furnished to us, that the persons and entities named in the table below have sole voting and sole investment power with respect to all shares that they beneficially own, subject to applicable community property laws.

The percentage ownership information under the column entitled "Before Offering" is based on 125,310,846 shares of our common stock outstanding as of March 31, 2018, assuming the conversion of all outstanding shares of our convertible preferred stock into 121,992,497 shares of common stock.

The percentage ownership information under the column entitled "After Offering" is based on the sale of shares of common stock in this offering, assuming (i) no exercise of the underwriters' option to purchase additional shares, (ii) the net exercise of certain outstanding warrants to purchase shares of our Series B-1 convertible preferred stock for an aggregate of shares of common stock (based on an assumed initial public offering price of $ per share (the midpoint of the price range set forth on the cover page of this prospectus)), (iii) the net exercise of certain outstanding warrants to purchase shares of our Series D convertible preferred stock for an aggregate of shares of common stock (based on an assumed initial public offering price of $ per share (the midpoint of the price range set forth on the cover page of this prospectus)), and (iv) the conversion of approximately $13.4 million aggregate principal amount of outstanding convertible promissory notes plus accrued interest thereon into shares of common stock (based on an assumed initial public offering price of $ per share (the midpoint of the price range set forth on the cover page of this prospectus) and a conversation date of , 2018).

Information with respect to beneficial ownership has been furnished by each director, officer or beneficial owner of more than 5% of our common stock. We have determined beneficial ownership in accordance with the rules of the SEC. These rules generally attribute beneficial ownership of securities to persons who possess sole or shared voting power or investment power with respect to those securities. In addition, the rules include shares of our common stock issuable pursuant to the exercise of stock options or warrants that are either immediately exercisable or exercisable within 60 days after March 31, 2018. These shares are deemed to be outstanding and beneficially owned by the person holding those options or warrants for the purpose of computing the percentage ownership of that person, but they are not treated as outstanding for the purpose of computing the percentage ownership of any other person. Unless otherwise indicated, the persons or entities identified in this table have sole voting and investment power with respect to all shares shown as beneficially owned by them, subject to applicable community property laws.

Unless otherwise indicated, the address for each beneficial owner listed in the table below is c/o Bionano Genomics, Inc., 9640 Towne Centre Drive, Suite 100, San Diego, California 92121.

Name of Beneficial Owner	Number of Shares Beneficially Owned Before the Offering	Number of Shares Beneficially Owned After the Offering	Percentage of Shares Beneficially Owned	
			Before Offering	After Offering
Greater than 5% Stockholders				
Entities affiliated with LC Fund VI, L.P.(1)	53,558,081		39.2%	%
Entities affiliated with Domain Partners VIII, L.P.(2)	34,528,809		25.7%	%
Han Cao, Ph.D.(3)	17,062,314		12.4%	%
Praise Alliance International Limited(4)	12,500,000		10.0%	%
Full Succeed International Limited(5)	10,416,667		8.3%	%
Novartis Bioventures Ltd.(6)	9,806,455		7.8%	%
Directors and Named Executive Officers				
David L. Barker, Ph.D.(7)	330,325		*	%

Darren Cai, Ph.D.	—	*	%
Han Cao, Ph.D.(3)	17,062,314	12.4%	%
R. Erik Holmlin, Ph.D.(8)	4,156,896	3.2%	%
Albert Luderer, Ph.D.(9)	226,688	*	%
Junfeng Wang(1)	53,558,081	39.2%	%
Mike Ward(10)	885,357	*	%
All directors and executive officers as a group (9 persons)(11)	77,775,011	49.9%	%

* Represents beneficial ownership of less than 1%.

(1) Consists of (i) 18,271,322 shares of common stock and 10,738,615 shares of common stock issuable upon the exercise of warrants held by LC Fund VI, L.P., (ii) 884,097 shares of common stock and 525,009 shares of common stock issuable upon the exercise of warrants held by LC Parallel Fund VI, L.P. and (iii) 23,139,038 shares of common stock held by LC Healthcare Fund I, L.P. The number of shares beneficially owned after the offering includes an aggregate of shares of our common stock issuable upon the automatic conversion of (i) $3,460,000 of outstanding principal, plus accrued interest thereon, underlying a convertible promissory note held by LC Healthcare Fund I, L.P. and (ii) $5,000,000 of outstanding principal, plus accrued interest thereon, underlying a convertible promissory note held by Rosy Shine Limited, upon the completion of this offering at an assumed initial public offering price of $ per share (the midpoint of the range set forth on the cover page of this prospectus), assuming a conversion date of , 2018. Each of LC Fund VI, L.P., LC Parallel Fund VI, L.P., and LC Healthcare Fund I, L.P., collectively referred to as the LC Funds, are ultimately controlled and managed by Legend Capital, a limited liability Chinese company. Legend Capital is ultimately controlled by a management team consisting of three key individuals, Linan Zhu, Hao Chen, and Nengguang Wang. In addition, Junfeng Wang is a Managing Director of Legend Capital. Each of these individual managers of Legend Capital shares voting and investment power over the shares held by the LC Funds and each disclaims beneficial ownership of all shares held by Legend Capital, except to the extent of each such member's actual pecuniary interest therein. Rosy Shine Limited is ultimately controlled and managed by Legend Holdings, a limited liability Chinese joint stock company listed on a Stock Exchange of Hong Kong (3396), which is controlled by its board of directors. The board of directors of Legend Holdings has sole voting and investment power over the shares held by Rosy Shine Limited. None of the members of the board of directors has individual voting or investment power with respect to such shares and each disclaims beneficial ownership of such shares. The address of the each of the above entities is Legend Capital, 10F, Tower A, Raycom Infotech Park, No.2, Kexueyuan South Road, Zhongguancun, Haidian District, Beijing 100190 PRC.

(2) Consists of (i) 25,302,692 shares of common stock and 8,971,797 shares of common stock issuable upon the exercise of warrants held by Domain Partners VIII, L.P. and (ii) 187,749 shares of common stock and 66,571 shares of common stock issuable upon the exercise of the warrants held by DP VIII Associates, L.P. The number of shares beneficially owned after the offering includes an aggregate of shares of our common stock issuable upon the automatic conversion of $1,500,000 of outstanding principal plus accrued interest underlying convertible notes upon the completion of this offering at an assumed initial public offering price of $ per share (the midpoint of the range set forth on the cover page of this prospectus), and assuming the occurrence of the conversion on , 2018. James C. Blair, Brian H. Dovey, Brian K. Halak, Jesse I. Treu and Nicole Vitullo, the managing members of One Palmer Square VIII, L.L.C., share voting and investment power over the shares held by Domain Partners VIII, L.P. and DP VIII Associates, L.P. James C. Blair, Brian H. Dovey, Brian K. Halak, Nicole Vitullo, and Kim P. Kamdar, the managing members of Domain Associates, L.L.C., share voting and investment power over the shares held by Domain Associates, L.L.C. Each managing member of One Palmer Square VIII, L.L.C. and Domain Associates, L.L.C. disclaims beneficial ownership of all shares held by the Domain Entities, except to the extent of each such managing member's actual pecuniary interest therein. The address for the Domain Entities is One Palmer Square, Suite 515, Princeton, NJ 08542.

(3) Consists of 4,833,724 shares of common stock, 10,731,083 shares of common stock issuable upon the exercise of warrants and 1,497,507 shares of common stock subject to options exercisable as of May 30, 2018.

(4) Consists of 12,500,000 shares of common stock held by Praise Alliance International Limited, or Praise Alliance. Praise Alliance is a BVI Business Company incorporated in and existing under the laws of the Territory of the British Virgin Islands. Mr. Kung Hung Ka is the sole director of Praise Alliance and is the only person with voting and investment power over the shares held by Praise Alliance. Praise Alliance is wholly owned by Mr. Kung Hung Ka. Mr. Kung Hung Ka disclaims beneficial ownership of the shares held by Praise Alliance except to the extent of his pecuniary interests therein. The address of Praise Alliance is Room 1202, 12/F, Wah Hing Commercial Building, 283 Lockhart Road, Wanchai, Hong Kong.

(5) Consists of 10,416,667 shares of common stock held by Full Succeed International Limited, or Full Succeed. Full Succeed is a limited liability company registered under the laws of the British Virgin Islands. Yu Le is the director of Full Succeed and An Ke Technology Company Limited is the sole shareholder of Full Succeed. Shenzhen Ping'an Financial Technology Consulting Co., Ltd. is the sole shareholder of An Ke Technology Company Limited (HK) and the sole shareholder of Shenzhen Ping'an Financial Technology Consulting Co., Ltd. is Ping An Insurance (Group) of China, Ltd., stock code 002318. None of the board of directors of Ping An Insurance (Group) of China, Ltd. has individual voting and investment power over the shares held by Full Succeed and each disclaims beneficial ownership of such shares. Yu Le has full voting and investment power over the shares held by Full Succeed; however, he disclaims beneficial ownership of the shares held except to the extent of his pecuniary interests therein. The address of Full Succeed is Ping An Finance Centre, 1333 Lujiazui Road, Pudong New District, Shanghai, PRC.

(6) Consists of 9,806,455 shares of common stock held by Novartis Bioventures Ltd., or NBV. NBV is a corporation organized under the laws of Switzerland and is a wholly-owned subsidiary of Novartis AG. The board of directors of NBV has sole voting and investment power over the shares held by NBV. None of the members of the board of directors has individual voting or investment power with respect to such shares and each disclaims beneficial ownership of such shares. The address of NBV is Lichtstrasse 35, CH-4056 Basel, Switzerland.

(7) Consists of 330,325 shares of common stock subject to options exercisable as of May 30, 2018.

(8) Consists of 4,156,896 shares of common stock subject to options exercisable as of May 30, 2018.

(9) Consists of 226,688 shares of common stock subject to options exercisable as of May 30, 2018.

(10) Consists of 885,357 shares of common stock subject to options exercisable as of May 30, 2018.

(11) Consists of the shares identified in footnotes (1), (3), (7), (8), (9) and (10), and 1,555,350 shares of common stock subject to options exercisable as of May 30, 2018.

DESCRIPTION OF CAPITAL STOCK

General

Upon filing of our amended and restated certificate of incorporation and the completion of this offering, our authorized capital stock will consist of shares of common stock, par value $0.0001 per share, and shares of preferred stock, par value $0.0001 per share. All of our authorized preferred stock upon the completion of this offering will be undesignated. The following is a summary of the rights of our common and preferred stockholders and some of the provisions of our amended and restated certificate of incorporation and amended and restated bylaws, which will become effective immediately prior to and upon the completion of this offering, respectively, and of the Delaware General Corporation Law. This summary is not complete. For more detailed information, please see our amended and restated certificate of incorporation and amended and restated bylaws, which are filed as exhibits to the registration statement of which this prospectus is a part, as well as the relevant provisions of the Delaware General Corporation Law.

Common Stock

Outstanding Shares

As of March 31, 2018, there were 3,318,349 shares of common stock issued and outstanding held of record by 85 stockholders. This amount excludes our outstanding shares of convertible preferred stock, which will convert into 121,992,497 shares of common stock in connection with the closing of this offering. Based on the number of shares of common stock outstanding as of March 31, 2018, and assuming (i) the automatic conversion of all of our outstanding shares of convertible preferred stock into an aggregate of 121,992,497 shares of common stock, (ii) the net exercise of certain outstanding warrants to purchase shares of our Series B-1 convertible preferred stock for an aggregate of shares of common stock (based on an assumed initial public offering price of $ per share (the midpoint of the price range set forth on the cover page of this prospectus)), (iii) the net exercise of certain outstanding warrants to purchase shares of our Series D convertible preferred stock for an aggregate of shares of common stock (based on an assumed initial public offering price of $ per share (the midpoint of the price range set forth on the cover page of this prospectus)), (iv) the conversion of approximately $13.4 million aggregate principal amount of outstanding convertible promissory notes plus accrued interest thereon into shares of common stock (based on an assumed initial public offering price of $ per share (the midpoint of the price range set forth on the cover page of this prospectus) and a conversation date of , 2018), and (v) the issuance by us of shares of common stock in this offering, there will be shares of common stock outstanding upon the completion of this offering.

Voting Rights

Our common stock is entitled to one vote for each share held of record on all matters submitted to a vote of the stockholders, including the election of directors, and does not have cumulative voting rights. Our amended and restated certificate of incorporation establishes a classified board of directors that is divided into three classes with staggered three-year terms. Only the directors in one class will be subject to election by a plurality of the votes cast at each annual meeting of our stockholders, with the directors in the other classes continuing for the remainder of their respective three-year terms.

Economic Rights

Except as otherwise expressly provided in our eighth amended and restated certificate of incorporation or required by applicable law, all shares of common stock will have the same rights and privileges and rank equally, share ratably, and be identical in all respects for all matters, including those described below.

Dividends. Subject to preferences that may be applicable to any then-outstanding preferred stock, the holders of common stock are entitled to receive dividends, if any, as may be declared from time to time by our board of directors out of legally available funds.

Liquidation Rights. In the event of our liquidation, dissolution or winding-up, holders of our common stock will be entitled to share ratably in the net assets legally available for distribution to stockholders after the payment of all of our debts and other liabilities, subject to the satisfaction of any liquidation preference granted to the holders of any outstanding shares of preferred stock.

No Preemptive or Similar Rights

The holders of our shares of common stock are not entitled to preemptive rights, and are not subject to conversion, redemption or sinking fund provisions. The rights, preferences and privileges of the holders of our common stock are subject to, and may be adversely affected by, the rights of the holders of shares of any series of our preferred stock that we may designate and issue in the future.

Fully Paid and Non-Assessable

All of our outstanding shares of common stock are, and the shares of common stock to be issued in this offering will be, fully paid and nonassessable.

Convertible Preferred Stock

As of March 31, 2018, there were 121,992,497 shares of our convertible preferred stock outstanding, held of record by 22 holders. Immediately prior to the closing of this offering, each outstanding share of our preferred stock will convert into one share of our common stock. In addition, immediately prior to the completion of this offering, our certificate of incorporation will be amended and restated to delete all references to such shares of convertible preferred stock. Under this amended and restated certificate of incorporation, our board of directors will have the authority, without further action by our stockholders, to issue up to shares of convertible preferred stock in one or more series, to establish from time to time the number of shares to be included in each such series, to fix the rights, preferences and privileges of the shares of each wholly unissued series and any qualifications, limitations or restrictions thereon and to increase or decrease the number of shares of any such series, but not below the number of shares of such series then outstanding.

Our board of directors may authorize the issuance of preferred stock with voting or conversion rights that could adversely affect the voting power or other rights of the holders of the common stock. The issuance of preferred stock, while providing flexibility in connection with possible acquisitions and other corporate purposes, could, among other things, have the effect of delaying, deferring or preventing a change in our control that may otherwise benefit holders of our common stock and may adversely affect the market price of the common stock and the voting and other rights of the holders of common stock. We have no current plans to issue any shares of preferred stock.

Stock Options

As of March 31, 2018, there were 18,649,605 shares of common stock were issuable upon the exercise of outstanding stock options, at a weighted-average exercise price of $0.12 per share.

Warrants

As of March 31, 2018, the following shares of our convertible preferred stock were issuable upon the exercise of outstanding warrants:

- A warrant to purchase 42,872 shares of Series B convertible preferred stock for an exercise price of $1.3995 per share, which we issued to Square 1 Bank.
- Warrants to purchase an aggregate of 75,027 shares of Series B-1 convertible preferred stock for an exercise price of $1.3995 per share, which we issued to Square 1 Bank.
- Warrants to purchase an aggregate of 4,010,757 shares of Series B-1 convertible preferred stock for an exercise price of $1.3995 per share, which we issued to investors in connection with a series of financing transactions.
- A warrant to purchase 510,417 shares of Series D convertible preferred stock for an exercise price of $0.41 per share, which we issued to Western Alliance Bank.
- Warrants to purchase an aggregate of 31,672,817 shares of Series D convertible preferred stock for an exercise price of $0.48 per share, which we issued to investors in connection with a financing transaction.
- A warrant to purchase 291,667 shares of Series D-1 convertible preferred stock for an exercise price of $0.48 per share, which we issued to Western Alliance Bank.

Each of the foregoing warrants provide for the adjustment of the number of shares issuable upon the exercise thereof in the event of stock splits, recapitalizations, reclassifications and consolidations. In addition, the warrants to purchase shares of Series B-1 convertible preferred stock and Series D convertible preferred stock that we issued in connection with our financing transactions contain provisions that provide for the automatic net exercise of such warrants upon the closing of this offering.

Registration Rights

We are party to a fifth amended and restated investors' rights agreement, dated August 5, 2016, pursuant to which certain holders of our capital stock, or their transferees, are entitled to certain registration rights, as set forth below.

The registration of shares of our common stock by the exercise of registration rights described below would enable the holders to sell these shares without restriction under the Securities Act when the applicable registration statement is declared effective. We are obligated to pay the registration expenses, other than underwriting discounts and selling commissions, of the shares registered by the demand, piggyback and Form S-3 registrations described below. Generally, in an underwritten offering, the managing underwriter, if any, has the right, subject to specified conditions, to limit the number of shares such holders may include. The demand, piggyback and Form S-3 registration rights described below will expire on the fifth anniversary of the date of a qualified public offering, a deemed liquidation event, or with respect to any particular holder of registrable securities, such time after this offering that the holder can sell all of its registrable securities without restriction under Rule 144 of the Securities Act during any three month period.

Demand Registration Rights

Any time after the earlier of (i) 12 months following the effective date of a qualified public offering and (ii) August 5, 2020, the holders of at least 66-2/3% of the shares of our outstanding preferred stock (or shares of our common stock issued upon conversion of the shares of such preferred stock, or a combination thereof) may request that we file a registration statement covering all or any portion of the registrable securities held by them, subject to the requirement that the registration must cover at least 20% of the registrable securities then held by them, or a lesser percentage if the anticipated gross receipts from the offering would exceed $40,000,000. The holders of our convertible preferred stock may not request more than two registration statements which are declared effective. We are not obligated to effect a demand registration (i) during the period within 90 days after the effective date of a registration statement filed pursuant to a demand registration, (ii) if the registrable securities can be immediately registered on Form S-3, (iii) or during the 12 month period after the effective date of this registration statement.

In addition, the warrants to purchase our Series B and B-1 convertible preferred stock that we issued to Square 1 Bank provide for the same demand registration rights as described above.

Piggyback Registration Rights

If we register any securities for public sale, holders of registration rights have the right to include their shares in the registration statement. As a result, whenever we propose to file a registration statement under the Securities Act, other than with respect to registration statements on Forms S-4, S-8, or another form not available for registering the registrable securities for sale to the public, the holders of these shares are entitled to notice of the registration and have the right to include their shares in the registration, subject to limitations that the underwriters may impose on the number of shares included in the offering.

In addition, the warrants to purchase our Series B, B-1, D and D-1 convertible preferred stock that we issued to Square 1 Bank and Western Alliance Bank provide for the same piggyback registration rights as described above.

Form S-3 Registration Rights

If we are eligible to file a registration statement on Form S-3, holders of registrable securities will have the right to demand that we file a registration statement on Form S-3 so long as the aggregate price to the public of the securities to be sold under the registration statement on Form S-3 is at least $3.0 million, subject to specified exceptions, conditions and limitations. There is no limitation on the number of Form S-3 demand registrations that may be requested.

In addition, the warrants to purchase our Series B and B-1 convertible preferred stock that we issued to Square 1 Bank provide for the same Form S-3 registration rights as described above.

Anti-Takeover Provisions

The provisions of Delaware law, our eighth amended and restated certificate of incorporation and our amended and restated bylaws, which are summarized below, may have the effect of delaying, deferring or discouraging another person from acquiring control of our company. They are also designed, in part, to encourage persons seeking to acquire control of us to negotiate first with our board of directors. We believe that the benefits of increased protection of our potential ability to negotiate with an unfriendly or unsolicited acquirer outweigh the disadvantages of discouraging a proposal to acquire us because negotiation of these proposals could result in an improvement of their terms.

Certificate of Incorporation and Bylaws to be in Effect upon the Closing of this Offering

Because our stockholders do not have cumulative voting rights, stockholders holding a majority of the voting power of our shares of common stock will be able to elect all of our directors. Our amended and restated certificate of incorporation and amended and restated bylaws to be effective upon the closing of this offering will provide for stockholder actions at a duly called meeting of stockholders or, before the date on which all shares of common stock convert into a single class, by written consent. A special meeting of stockholders may be called by a majority of our board of directors, the chair of our board of directors, our chief executive officer or, the holders of at least % of the total voting power of our common stock. Our amended and restated bylaws will establish an advance notice procedure for stockholder proposals to be brought before an annual meeting of our stockholders, including proposed nominations of persons for election to our board of directors.

As described above in "Management— Composition of Our Board of Directors," in accordance with our amended and restated certificate of incorporation to be filed in connection with this offering, immediately after this offering, our board of directors will be divided into three classes with staggered three-year terms.

The foregoing provisions will make it more difficult for another party to obtain control of us by replacing our board of directors. Since our board of directors has the power to retain and discharge our officers, these provisions could also make it more difficult for existing stockholders or another party to effect a change in management. In addition, the authorization of undesignated preferred stock makes it possible for our board of directors to issue preferred stock with voting or other rights or preferences that could impede the success of any attempt to change our control.

These provisions are designed to reduce our vulnerability to an unsolicited acquisition proposal and to discourage certain tactics that may be used in proxy fights. However, such provisions could have the effect of discouraging others from making tender offers for our shares and may have the effect of deterring hostile takeovers or delaying changes in our control or management. As a consequence, these provisions may also inhibit fluctuations in the market price of our stock that could result from actual or rumored takeover attempts.

Section 203 of the Delaware General Corporation Law

When we have a class of voting stock that is either listed on a national securities exchange or held of record by more than 2,000 stockholders, we will be subject to Section 203 of the Delaware General Corporation Law, which prohibits a Delaware corporation from engaging in any business combination with any interested stockholder for a period of three years after the date that such stockholder became an interested stockholder, subject to certain exceptions.

Choice of Forum

Our amended and restated certificate of incorporation provides that the Court of Chancery of the State of Delaware will be the exclusive forum for: (i) any derivative action or proceeding brought on our behalf; (ii) any action asserting a breach of fiduciary duty; (iii) any action asserting a claim against us arising under the Delaware General Corporation Law; (iv) any action regarding our amended and restated certificate of incorporation or our amended and restated bylaws; or (v) any action asserting a claim against us that is governed by the internal affairs doctrine. Our amended and restated certificate of incorporation further provides that U.S. federal district courts will be the exclusive forum for resolving any complaint asserting a cause of action arising under the Securities Act.

Limitations on Liability and Indemnification

See "Executive Compensation—Limitations on Liability and Indemnification."

Exchange Listing

Our common stock is currently not listed on any securities exchange. We intend to apply to have common stock approved for listing on The Nasdaq Global Market under the symbol "BNGO."

Transfer Agent and Registrar

On the closing of this offering, the transfer agent and registrar for our common stock will be . The transfer agent and registrar's address is .

SHARES ELIGIBLE FOR FUTURE SALE

Before the completion of this offering, there has been no public market for our common stock. Future sales of substantial amounts of our common stock, including shares issued on the exercise of outstanding options, in the public market after this offering, or the possibility of these sales or issuances occurring, could adversely affect the prevailing market price for our common stock or impair our ability to raise equity capital.

Based on our shares outstanding as of March 31, 2018, upon the completion of this offering, a total of shares of common stock will be outstanding. Of these shares, all of the common stock sold in this offering by us, plus any shares sold by us on exercise of the underwriters' option to purchase additional common stock, will be freely tradable in the public market without restriction or further registration under the Securities Act, unless these shares are held by "affiliates," as that term is defined in Rule 144 under the Securities Act.

The remaining shares of common stock will be, and shares of common stock subject to stock options will be on issuance, "restricted securities," as that term is defined in Rule 144 under the Securities Act. These restricted securities are eligible for public sale only if they are registered under the Securities Act or if they qualify for an exemption from registration under Rules 144 or 701 under the Securities Act, which are summarized below. Restricted securities may also be sold outside of the U.S. to non-U.S. persons in accordance with Rule 904 of Regulation S.

Subject to the lock-up agreements described below and the provisions of Rule 144 or Regulation S under the Securities Act, as well as our insider trading policy, these restricted securities will be available for sale in the public market after the date of this prospectus.

Rule 144

In general, under Rule 144 as currently in effect, once we have been subject to public company reporting requirements of Section 13 or Section 15(d) of the Exchange Act for at least 90 days, an eligible stockholder is entitled to sell such shares without complying with the manner of sale, volume limitation, or notice provisions of Rule 144, subject to compliance with the public information requirements of Rule 144. To be an eligible stockholder under Rule 144, such stockholder must not be deemed to have been one of our affiliates for purposes of the Securities Act at any time during the 90 days preceding a sale and must have beneficially owned the shares proposed to be sold for at least six months, including the holding period of any prior owner other than our affiliates. If such a person has beneficially owned the shares proposed to be sold for at least one year, including the holding period of any prior owner other than our affiliates, then such person is entitled to sell such shares without complying with any of the requirements of Rule 144, subject to the expiration of the lock-up agreements described below.

In general, under Rule 144, as currently in effect, our affiliates or persons selling shares on behalf of our affiliates are entitled to sell shares on expiration of the lock-up agreements described below. Beginning 90 days after the date of this prospectus, within any three-month period, such stockholders may sell a number of shares that does not exceed the greater of:

- 1% of the number of shares of common stock then outstanding, which will equal approximately shares immediately after this offering, assuming no exercise of the underwriters' option to purchase additional shares of common stock from us; or
- the average weekly trading volume of our common stock on The Nasdaq Global Market during the four calendar weeks preceding the filing of a notice on Form 144 with respect to such sale.

Sales under Rule 144 by our affiliates or persons selling shares on behalf of our affiliates are also subject to certain manner of sale provisions and notice requirements and to the availability of current public information about us.

Rule 701

Rule 701 generally allows a stockholder who was issued shares under a written compensatory plan or contract and who is not deemed to have been an affiliate of our company during the immediately preceding 90 days, to sell these shares in reliance on Rule 144, but without being required to comply with the public information, holding period, volume limitation, or notice provisions of Rule 144. Rule 701 also permits affiliates of our company to sell their Rule 701 shares under Rule 144 without complying with the holding period requirements of Rule 144. All holders of Rule 701 shares, however, are required by that rule to wait until 90 days after the date of this prospectus before selling those shares under Rule 701, subject to the expiration of the lock-up agreements described below.

Form S-8 Registration Statements

We intend to file one or more registration statements on Form S-8 under the Securities Act with the SEC to register the offer and sale of shares of our common stock that are issuable under our 2006 Plan, 2018 Plan and ESPP. These registration statements will become effective immediately on filing. Shares covered by these registration statements will then be eligible for sale in the public markets, subject to vesting restrictions, any applicable lock-up agreements described below, and Rule 144 limitations applicable to affiliates.

Lock-up Arrangements

We, and all of our directors, executive officers and the holders of substantially all of our common stock and securities exercisable for or convertible into our common stock outstanding immediately on the closing of this offering, have agreed with the underwriters that, until 180 days after the date of the underwriting agreement related to this offering, we and they will not, without the prior written consent of Roth Capital Partners, directly or indirectly, offer, pledge, sell, contract to sell, sell any option or contract to purchase, purchase any option or contract to sell, grant any option, right or warrant to purchase or otherwise transfer or dispose of any of our shares of common stock, or any securities convertible into or exercisable or exchangeable for shares of our common stock, or enter into any swap or any other agreement or any transaction that transfers, in whole or in part, directly or indirectly, the economic consequence of ownership of the securities, whether any such swap or transaction is to be settled by delivery of our common stock or other securities, in cash or otherwise. These agreements are described in “Underwriting.” Roth Capital Partners may, in its sole discretion, release any of the securities subject to these lock-up agreements at any time.

Registration Rights

Upon the closing of this offering, pursuant to our fifth amended and restated investors’ rights agreement, the holders of shares of our common stock, or their transferees, will be entitled to certain rights with respect to the registration of the offer and sale of their shares under the Securities Act, subject to the terms of the lock-up agreements described under “—Lock-Up Agreements” above. Registration of these shares under the Securities Act would result in the shares becoming freely tradable without restriction under the Securities Act immediately on the effectiveness of the registration. Any sales of securities by these stockholders could have a material adverse effect on the trading price of our common stock. See “Description of Capital Stock—Registration Rights” for additional information.

MATERIAL U.S. FEDERAL INCOME TAX CONSEQUENCES TO NON-U.S. HOLDERS OF THE OWNERSHIP AND DISPOSITION OF OUR COMMON STOCK

The following is a general discussion of the material U.S. federal income tax consequences to Non-U.S. Holders (as defined below) with respect to their ownership and disposition of our common stock purchased in this offering. This discussion is for general information only, is not tax advice and does not purport to be a complete analysis of all the potential tax considerations. This discussion is based upon the provisions of the U.S. Internal Revenue Code existing and proposed U.S. Treasury Regulations promulgated thereunder, current administrative rulings and judicial decisions, in effect as of the date hereof. These authorities may be changed, possibly retroactively, so as to result in U.S. federal income tax consequences different from those set forth below.

This discussion does not address the tax considerations arising under the laws of any non-U.S., state or local jurisdiction, or under U.S. federal gift and estate tax laws, except to the limited extent set forth below. In addition, this discussion does not address tax considerations applicable to a Non-U.S. Holder's particular circumstances or to Non-U.S. Holders that may be subject to special tax rules, including, without limitation:

- banks, insurance companies or other financial institutions;
- tax-exempt organizations or governmental organizations;
- controlled foreign corporations, passive foreign investment companies and corporations that accumulate earnings to avoid U.S. federal income tax;
- brokers or dealers in securities or currencies;
- traders in securities that elect to use a mark-to-market method of accounting for their securities holdings;
- persons that own, or are deemed to own, more than five percent of our capital stock (except to the extent specifically set forth below);
- U.S. expatriates and certain former citizens or long-term residents of the U.S.;
- partnerships or entities classified as partnerships for U.S. federal income tax purposes or other pass-through entities (and investors therein);
- persons who hold our common stock as a position in a hedging transaction, "straddle," "conversion transaction" or other risk reduction transaction or integrated investment;
- persons who hold or receive our common stock pursuant to the exercise of any employee stock option or otherwise as compensation;
- persons who do not hold our common stock as a capital asset within the meaning of Section 1221 of the Internal Revenue Code; or
- persons deemed to sell our common stock under the constructive sale provisions of the Internal Revenue Code.

There can be no assurance that the Internal Revenue Service, or IRS, will not challenge one or more of the tax consequences described herein, and we have not obtained, and do not intend to obtain, an opinion of counsel or ruling from the IRS with respect to the U.S. federal income tax consequences to a Non-U.S. Holder of the purchase, ownership or disposition of our common stock.

You are urged to consult your tax advisor with respect to the application of the U.S. federal income tax laws to your particular situation, as well as any tax consequences of the purchase, ownership and disposition of our common stock arising under the U.S. federal estate or gift tax rules or under the laws of any state, local, non-U.S., or other taxing jurisdiction or under any applicable tax treaty.

Non-U.S. Holder Defined

For purposes of this discussion, you are a "Non-U.S. Holder" if you are a beneficial owner of common stock who has not been excluded from this discussion and who is not a U.S. Holder. A "U.S. Holder" means a beneficial owner of our common stock that is for U.S. federal income tax purposes:

- an individual who is a citizen or resident of the U.S.;

- a corporation or other entity taxable as a corporation created or organized in the U.S. or under the laws of the U.S. or any political subdivision thereof or other entity treated as such for U.S. federal income tax purposes;
- an estate whose income is subject to U.S. federal income tax regardless of its source; or
- a trust (x) whose administration is subject to the primary supervision of a U.S. court and which has one or more U.S. persons who have the authority to control all substantial decisions of the trust or (y) which has made a valid election to be treated as a U.S. person.

Distributions

As described in the section titled "Dividend Policy," we have never declared or paid cash dividends on our capital stock and do not anticipate paying any dividends on our capital stock in the foreseeable future. However, if we do make distributions on our common stock, those payments will constitute dividends for U.S. tax purposes to the extent paid from our current or accumulated earnings and profits, as determined under U.S. federal income tax principles. To the extent those distributions exceed both our current and our accumulated earnings and profits, they will constitute a return of capital and will first reduce your basis in our common stock, but not below zero, and then will be treated as gain from the sale of stock as described below under "—Gain on Disposition of Our Common Stock."

Subject to the discussion below on effectively connected income, backup withholding and foreign accounts, any dividend paid to you generally will be subject to U.S. withholding tax either at a rate of 30% of the gross amount of the dividend or such lower rate as may be specified by an applicable income tax treaty. In order to receive a reduced treaty rate, you must provide us with an IRS Form W-8BEN, IRS Form W-8BEN-E or other appropriate version of IRS Form W-8 certifying qualification for the reduced rate. A Non-U.S. Holder eligible for a reduced rate of U.S. withholding tax pursuant to an income tax treaty may obtain a refund of any excess amounts withheld by timely filing an appropriate claim for refund with the IRS. If the Non-U.S. Holder holds the stock through a financial institution or other agent acting on the Non-U.S. Holder's behalf, the Non-U.S. Holder will be required to provide appropriate documentation to the agent, which then will be required to provide certification to us or our paying agent, either directly or through other intermediaries.

Dividends received by you that are effectively connected with your conduct of a U.S. trade or business (and, if required by an applicable income tax treaty, attributable to a permanent establishment maintained by you in the U.S.) are generally exempt from such withholding tax. In order to obtain this exemption, you must provide us with an IRS Form W-8ECI properly certifying such exemption. Such effectively connected dividends, although not subject to withholding tax, are taxed at the same graduated rates applicable to U.S. persons, net of certain deductions and credits. In addition, if you are a corporate Non-U.S. Holder, dividends you receive that are effectively connected with your conduct of a U.S. trade or business may also be subject to a branch profits tax at a rate of 30% or such lower rate as may be specified by an applicable income tax treaty. You should consult your tax advisor regarding any applicable tax treaties that may provide for different rules.

If you hold our common stock through a financial institution or other agent acting on your behalf, you will be required to provide appropriate documentation to the agent, which then will be required to provide certification to us or our paying agent, either directly or through other intermediaries. You may be eligible to obtain a refund of any excess amounts withheld by timely filing an appropriate claim for refund with the IRS.

Gain on Disposition of Our Common Stock

Subject to the discussion below regarding backup withholding and foreign accounts, you generally will not be required to pay U.S. federal income tax on any gain realized upon the sale or other disposition of our common stock unless:

- the gain is effectively connected with your conduct of a U.S. trade or business (and, if required by an applicable income tax treaty, the gain is attributable to a permanent establishment maintained by you in the U.S.);
- you are a non-resident alien individual who is present in the U.S. for a period or periods aggregating 183 days or more during the calendar year in which the sale or disposition occurs and certain other conditions are met; or
- our common stock constitutes a U.S. real property interest by reason of our status as a "U.S. real property holding corporation," or USRPHC, for U.S. federal income tax purposes at any time within the shorter of the five-year period preceding your disposition of, or your holding period for, our common stock.

We believe that we are not currently and will not become a USRPHC for U.S. federal income tax purposes, and the remainder of this discussion so assumes. However, because the determination of whether we are a USRPHC depends on the fair market value of our U.S. real property relative to the fair market value of our other business assets, there can be no assurance that we will not become a USRPHC in the future. Even if we become a USRPHC, however, as long as our common stock is regularly traded on an established securities market, such common stock will be treated as U.S. real property interests only if you actually or constructively hold more than five percent of such regularly traded common stock at any time during the shorter of the five-year period preceding your disposition of, or your holding period for, our common stock.

If you are a Non-U.S. Holder described in the first bullet above, you will be required to pay tax on the net gain derived from the sale under regular graduated U.S. federal income tax rates, and a corporate Non-U.S. Holder described in the first bullet above also may be subject to the branch profits tax at a 30% rate, or such lower rate as may be specified by an applicable income tax treaty. If you are an individual Non-U.S. Holder described in the second bullet above, you will be required to pay a flat 30% tax (or such lower rate specified by an applicable income tax treaty) on the gain derived from the sale, which tax may be offset by U.S. source capital losses for the year (provided you have timely filed U.S. federal income tax returns with respect to such losses). You should consult any applicable income tax or other treaties that may provide for different rules.

Backup Withholding and Information Reporting

Generally, we must report annually to the IRS the amount of dividends paid to you, your name and address and the amount of tax withheld, if any. A similar report will be sent to you. Pursuant to applicable income tax treaties or other agreements, the IRS may make these reports available to tax authorities in your country of residence.

Payments of dividends or of proceeds on the disposition of stock made to you may be subject to information reporting and backup withholding at a current rate of 24% unless you establish an exemption, for example, by properly certifying your non-U.S. status on an IRS Form W-8BEN, IRS Form W-8BEN-E or another appropriate version of IRS Form W-8. Notwithstanding the foregoing, backup withholding and information reporting may apply if either we or a paying agent has actual knowledge, or reason to know, that such holder is a U.S. person.

Backup withholding is not an additional tax; rather, the U.S. federal income tax liability of persons subject to backup withholding will be reduced by the amount of tax withheld. If withholding results in an overpayment of taxes, a refund or credit may generally be obtained from the IRS, provided that the required information is furnished to the IRS in a timely manner.

Foreign Account Tax Compliance

The Foreign Account Tax Compliance Act, or FATCA, imposes withholding tax at a rate of 30% on dividends on and gross proceeds from the sale or other disposition of our common stock paid to “foreign financial institutions” (as specially defined under these rules), unless such institution enters into an agreement with the U.S. government to withhold on certain payments and to collect and provide to the U.S. tax authorities substantial information regarding the U.S. account holders of such institution (which includes certain equity and debt holders of such institution, as well as certain account holders that are foreign entities with U.S. owners) or otherwise establishes an exemption. FATCA also generally imposes a U.S. federal withholding tax of 30% on dividends on and gross proceeds from the sale or other disposition of our common stock paid to a “non-financial foreign entities” (as specially defined for purposes of these rules) unless such entity provides the withholding agent with a certification identifying certain substantial direct and indirect U.S. owners of the entity, certifies that there are none or otherwise establishes an exemption. The withholding provisions under FATCA generally apply to dividends on our common stock, and under current transition rules, are expected to apply with respect to the gross proceeds from the sale or other disposition of our common stock on or after January 1, 2019. Under certain circumstances, a Non-U.S. Holder might be eligible for refunds or credits of such taxes. An intergovernmental agreement between the U.S. and an applicable foreign country may modify the requirements described in this paragraph. Non-U.S. Holders should consult their tax advisors regarding the possible implications of this legislation on their investment in our common stock.

EACH PROSPECTIVE INVESTOR SHOULD CONSULT ITS TAX ADVISOR REGARDING THE PARTICULAR U.S. FEDERAL, STATE AND LOCAL AND NON-U.S. TAX CONSEQUENCES OF PURCHASING, HOLDING AND DISPOSING OF OUR COMMON STOCK, INCLUDING THE CONSEQUENCES OF ANY PROPOSED CHANGE IN APPLICABLE LAWS.

UNDERWRITING

We have entered into an underwriting agreement with Roth Capital Partners, LLC, acting as the representative of the underwriters named below, with respect to the shares of common stock subject to this offering. Subject to certain conditions, we have agreed to sell to the underwriters, and the underwriters have agreed to purchase, the number of shares of common stock provided below opposite their respective names.

Underwriter	Number of Shares
Roth Capital Partners, LLC	
Maxim Group LLC	
Total	

The underwriters are offering the shares of common stock, subject to their acceptance of the shares from us and subject to prior sale. The underwriting agreement provides that the obligations of the several underwriters to pay for and accept delivery of the securities offered by this prospectus are subject to the approval of certain legal matters by their counsel and to certain other conditions. The underwriters are obligated to take and pay for all of the securities if any such securities are taken. However, the underwriters are not required to take or pay for the securities covered by the underwriters' over-allotment option described below.

Over-Allotment Option

We have granted the underwriters an option, exercisable for 30 days from the date of this prospectus, to purchase up to additional shares of common stock to cover over-allotments, if any, at the public offering price set forth on the cover page of this prospectus, less underwriting discounts and commissions. The underwriters may exercise this option solely for the purpose of covering over-allotments, if any, made in connection with the offering of the securities offered by this prospectus. If the underwriters exercise this option, each underwriter will be obligated, subject to certain conditions, to purchase a number of additional shares of common stock proportionate to that underwriter's initial purchase commitment as indicated in the table above.

Commission and Expenses

The underwriters have advised us that they propose to offer the shares of common stock to the public at the initial public offering price set forth on the cover page of this prospectus and to certain dealers at that price less a concession not in excess of $ per share. The underwriters may allow, and certain dealers may re-allow, a discount from the concession not in excess of $ per share to certain brokers and dealers. After this offering, the initial public offering price, concession and reallowance to dealers may be reduced by the representatives. No such reduction shall change the amount of proceeds to be received by us as set forth on the cover page of this prospectus. The shares of common stock are offered by the underwriters as stated herein, subject to receipt and acceptance by them and subject to their right to reject any order in whole or in part. The underwriters have informed us that they do not intend to confirm sales to any accounts over which they exercise discretionary authority.

The following table shows the underwriting discounts and commissions payable to the underwriters by us in connection with this offering. Such amounts are shown assuming both no exercise and full exercise of the underwriters' over-allotment option to purchase securities.

	Without Exercise of Over-Allotment(1)	With Full Exercise of Over-Allotment(1)
Public offering price per share	$	$
Total	$	$

(1) The fees do not include the Underwriter's Warrants or expense reimbursement provisions described below.

We have also agreed to issue to Roth Capital Partners, LLC and Maxim Group LLC warrants to purchase shares of common stock collectively equal to an aggregate of 3% of the shares of common stock issued in the offering. The warrants will have an exercise price equal to 150% of the offering price of the shares sold in this offering and may be exercised on a cashless basis. The warrants are exercisable commencing one year after the effective date of the registration statement related to this offering, and will be exercisable for four years thereafter. The warrants are not redeemable by us. The warrants and the shares of common stock underlying the warrants, have been deemed compensation by FINRA and are therefore subject to a 180-day lock-up pursuant to Rule 5110(g)(1) of FINRA. The underwriters (or permitted assignees under the Rule) may not sell, transfer, assign, pledge, or hypothecate the warrants or the shares of common stock underlying the warrants, nor will they engage in any hedging, short sale, derivative, put, or call transaction that would result in the effective economic disposition of the warrants or the underlying shares of common stock for a period of 180 days from the date of this prospectus. Additionally, the warrants may not be sold transferred, assigned, pledged or hypothecated for a 180 day period following the effective date of the registration statement except to any underwriter and selected dealer participating in the offering and their bona fide officers or partners. The warrants will provide for adjustment in the number and price of such warrants and the shares of common stock underlying such warrants in the event of recapitalization, merger or other structural transaction to prevent mechanical dilution.

We have also agreed to reimburse Roth Capital Partners, LLC and Maxim Group LLC for certain out-of-pocket expenses incurred by them, including fees and disbursements of their counsel up to an aggregate of $150,000, with respect to this offering.

We estimate that expenses payable by us in connection with the offering of our common stock, other than the underwriting discounts and commissions and the counsel fees and disbursement reimbursement provisions referred to above, will be approximately $.

Indemnification

We have agreed to indemnify the underwriters against certain liabilities, including liabilities under the Securities Act and liabilities arising from breaches of representations and warranties contained in the underwriting agreement, or to contribute to payments that the underwriters may be required to make in respect of those liabilities.

Lock-Up Agreements

Our executive officers, directors and certain of our stockholders, which represent in aggregate % of our currently outstanding shares of common stock, have agreed to a 180-day "lock-up" from the effective date of this prospectus of shares of our common stock that they beneficially own, including the issuance of common stock upon the exercise of currently outstanding convertible securities and options and options which may be issued. This means that, for a period of 180 days following the effective date of this prospectus, such persons may not offer, sell, pledge or otherwise dispose of these securities without the prior written consent of the representative of the underwriters. The lock-up period described in the preceding paragraph will be extended if the Company ceases to be an "emerging growth company" at any time prior to the expiration of the lock-up period and if (1) during the last 17 days of the lock-up period we issue an earnings release or material news or a material event relating to us occurs or (2) prior to the expiration of the lock-up period we announce that we will release earnings results during the 16-day period beginning on the last day of the lock-up period, in which case the lock-up period will be extended until the expiration of the 18-day period beginning on the date of issuance of the earnings release or the occurrence of the material news or material event.

The representative of the underwriters has no present intention to waive or shorten the lock-up period; however, the terms of the lock-up agreements may be waived at its discretion. In determining whether to waive the terms of the lockup agreements, the representative of the underwriters may base its decision on its assessment of the relative strengths of the securities markets and companies similar to ours in general, and the trading pattern of, and demand for, our securities in general.

In addition, the underwriting agreement provides that we will not, for a period of 180 days following the effective date of this prospectus, offer, sell or distribute any of our securities, without the prior written consent of the representative of the underwriters.

Listing

We intend to apply to have our shares of common stock approved for listing on The Nasdaq Global Market, subject to notice of issuance, under the symbol "BNGO."

Electronic Distribution

A prospectus in electronic format may be made available on websites or through other online services maintained by one or more of the underwriters of this offering, or by their affiliates. Other than the prospectus in electronic format, the information on any underwriter's website and any information contained in any other website maintained by an underwriter is not part of this prospectus or the registration statement of which this prospectus forms a part, has not been approved and/or endorsed by us or any underwriter in its capacity as underwriter, and should not be relied upon by investors.

Price Stabilization, Short Positions and Penalty Bids

In connection with the offering the underwriters may engage in stabilizing transactions, over-allotment transactions, syndicate covering transactions and penalty bids in accordance with Regulation M under the Exchange Act:

- Stabilizing transactions permit bids to purchase the underlying security so long as the stabilizing bids do not exceed a specified maximum.
- Over-allotment involves sales by the underwriters of shares in excess of the number of shares the underwriters are obligated to purchase, which creates a syndicate short position. The short position may be either a covered short position or a naked short position. In a covered short position, the number of shares over-allotted by the underwriter is not greater than the number of shares that it may purchase in the over-allotment option. In a naked short position, the number of shares involved is greater than the number of shares in the over-allotment option. The underwriter may close out any covered short position by either exercising its over-allotment option and/or purchasing shares in the open market.
- Syndicate covering transactions involve purchases of shares of the common stock in the open market after the distribution has been completed in order to cover syndicate short positions. In determining the source of shares to close out the short position, the underwriters will consider, among other things, the price of shares available for purchase in the open market as compared to the price at which it may purchase shares through the over-allotment option. If the underwriters sell more shares than could be covered by the over-allotment option, a naked short position, the position can only be closed out by buying shares in the open market. A naked short position is more likely to be created if the underwriters are concerned that there could be downward pressure on the price of the shares in the open market after pricing that could adversely affect investors who purchase in the offering.
- Penalty bids permit the representative to reclaim a selling concession from a syndicate member when the common stock originally sold by the syndicate member is purchased in a stabilizing or syndicate covering transaction to cover syndicate short positions.

These stabilizing transactions, syndicate covering transactions and penalty bids may have the effect of raising or maintaining the market price of our securities or preventing or retarding a decline in the market price of our securities. As a result, the price of our securities may be higher than the price that might otherwise exist in the open market. Neither we nor the underwriters makes any representation or prediction as to the direction or magnitude of any effect that the transactions described above may have on the price of our securities. In addition, neither we nor the underwriters makes any representations that the underwriters will engage in these stabilizing transactions or that any transaction, once commenced, will not be discontinued without notice.

No Public Market

Prior to this offering, there has not been a public market for our securities in the U.S. and the public offering price for our securities will be determined through negotiations between us and the underwriters. Among the factors to be considered in these negotiations will be prevailing market conditions, our financial information, market valuations of other companies that we and the underwriters believe to be comparable to us, estimates of our business potential, the present state of our development and other factors deemed relevant.

We offer no assurances that the initial public offering price will correspond to the price at which our common stock will trade in the public market subsequent to this offering or that an active trading market for our common stock will develop and continue after this offering.

Notice to Prospective Investors in the European Economic Area

In relation to each Member State of the European Economic Area (“EEA”) which has implemented the Prospectus Directive (each, a “Relevant Member State”) an offer to the public of any shares which are the subject of the offering contemplated by this prospectus may not be made in that Relevant Member State, except that an offer to the public in that Relevant Member State of any shares may be made at any time under the following exemptions under the Prospectus Directive, if they have been implemented in that Relevant Member State:

(a) to legal entities which are authorized or regulated to operate in the financial markets or, if not so authorized or regulated, whose corporate purpose is solely to invest in securities;

(b) to any legal entity which has two or more of (1) an average of at least 250 employees during the last financial year; (2) a total balance sheet of more than €43,000,000 and (3) an annual net turnover of more than €50,000,000, as shown in its last annual or consolidated accounts;

(c) by the underwriters to fewer than 100 or, if the Relevant Member State has implemented the relevant provision of the 2010 PD Amending Directive, 150, natural or legal persons (other than "qualified investors" as defined in the Prospectus Directive) subject to obtaining the prior consent of the representatives for any such offer; or

(d) in any other circumstances falling within Article 3(2) of the Prospectus Directive;

provided that no such offer of shares shall result in a requirement for the publication by us or any representative of a prospectus pursuant to Article 3 of the Prospectus Directive.

Any person making or intending to make any offer of shares within the EEA should only do so in circumstances in which no obligation arises for us or any of the underwriters to produce a prospectus for such offer. Neither we nor the underwriters have authorized, nor do they authorize, the making of any offer of shares through any financial intermediary, other than offers made by the underwriters which constitute the final offering of shares contemplated in this prospectus.

For the purposes of this provision, and your representation below, the expression an "offer to the public" in relation to any shares in any Relevant Member State means the communication in any form and by any means of sufficient information on the terms of the offer and any shares to be offered so as to enable an investor to decide to purchase any shares, as the same may be varied in that Relevant Member State by any measure implementing the Prospectus Directive in that Relevant Member State and the expression "Prospectus Directive" means Directive 2003/71/EC and includes any relevant implementing measure in each Relevant Member State, including the 2010 PD Amending Directive, to the extent implemented in the Relevant Member State. The expression "2010 PD Amending Directive" means Directive 2010/73/EU.

Each person in a Relevant Member State who receives any communication in respect of, or who acquires any shares under, the offer of shares contemplated by this prospectus will be deemed to have represented, warranted and agreed to and with us and each underwriter that:

(A) it is a "qualified investor" within the meaning of the law in that Relevant Member State implementing Article 2(1)(e) of the Prospectus Directive; and

(B) in the case of any shares acquired by it as a financial intermediary, as that term is used in Article 3(2) of the Prospectus Directive, (i) the shares acquired by it in the offering have not been acquired on behalf of, nor have they been acquired with a view to their offer or resale to, persons in any Relevant Member State other than "qualified investors", as defined in the Prospectus Directive, or in circumstances in which the prior consent of the representatives has been given to the offer or resale; or (ii) where shares have been acquired by it on behalf of persons in any Relevant Member State other than qualified investors, the offer of those shares to it is not treated under the Prospectus Directive as having been made to such persons.

In addition, in the United Kingdom, this document is being distributed only to, and is directed only at, and any offer subsequently made may only be directed at persons who are "qualified investors", as defined in the Prospectus Directive, (i) who have professional experience in matters relating to investments falling within Article 19 (5) of the Financial Services and Markets Act 2000 (Financial Promotion) Order 2005, as amended, or the order, and/or (ii) who are high net worth companies (or persons to whom it may otherwise be lawfully communicated) falling within Article 49(2)(a) to (d) of the Order (all such persons together being referred to as "relevant persons"). This document must not be acted on or relied on in the United Kingdom by persons who are not relevant persons. In the United Kingdom, any investment or investment activity to which this document relates is only available to, and will be engaged in with, relevant persons.

Other Relationships

Some of the underwriters and their affiliates have engaged in, and may in the future engage in, investment banking and other commercial dealings in the ordinary course of business with us or our affiliates. They have received, or may in the future receive, customary fees and commissions for these transactions.

LEGAL MATTERS

Cooley LLP, San Diego, California, which has acted as our counsel in connection with this offering, will pass on certain legal matters with respect to U.S. federal law in connection with this offering. Loeb & Loeb LLP, New York, New York, has acted as counsel to the underwriters in connection with this offering.

EXPERTS

The consolidated financial statements included in this Prospectus have been audited by Deloitte & Touche LLP, an independent registered public accounting firm, as stated in their report appearing herein (which report expresses an unqualified opinion on the consolidated financial statements and includes an explanatory paragraph referring to the Company's ability to continue as a going concern). Such consolidated financial statements have been so included in reliance upon the report of such firm given upon their authority as experts in accounting and auditing.

WHERE YOU CAN FIND ADDITIONAL INFORMATION

We have filed with the SEC a registration statement on Form S-1 under the Securities Act with respect to the shares of common stock offered by this prospectus. This prospectus, which constitutes a part of the registration statement, does not contain all the information set forth in the registration statement, some of which is contained in exhibits to the registration statement as permitted by the rules and regulations of the SEC. For further information with respect to us and our common stock, we refer you to the registration statement, including the exhibits filed as a part of the registration statement. Statements contained in this prospectus concerning the contents of any contract or any other document are not necessarily complete. If a contract or document has been filed as an exhibit to the registration statement, please see the copy of the contract or document that has been filed. Each statement in this prospectus relating to a contract or document filed as an exhibit is qualified in all respects by the filed exhibit. You may obtain copies of this information by mail from the Public Reference Section of the SEC, 100 F Street, N.E., Room 1580, Washington, D.C. 20549, at prescribed rates. You may obtain information on the operation of the public reference rooms by calling the SEC at 1-800-SEC-0330. The SEC also maintains an internet website that contains reports and other information about issuers, like us, that file electronically with the SEC. The address of that website is www.sec.gov.

On the closing of this offering, we will be subject to the information reporting requirements of the Exchange Act, and we will file reports, proxy statements and other information with the SEC. These reports, proxy statements and other information will be available for inspection and copying at the public reference room and website of the SEC referred to above.

We also maintain a website at www.amplyx.com. Information contained in, or accessible through, our website is not a part of this prospectus, and the inclusion of our website address in this prospectus is only as an inactive textual reference.

Bionano Genomics, Inc.

Index to Consolidated Financial Statements

REPORT OF INDEPENDENT REGISTERED PUBLIC ACCOUNTING FIRM

To the stockholders and Board of Directors of Bionano Genomics, Inc.

Opinion on the Financial Statements

We have audited the accompanying consolidated balance sheets of Bionano Genomics, Inc. and its subsidiaries (the "Company"), as of December 31, 2016 and 2017 and the related consolidated statements of operations, consolidated statements of convertible preferred stock and stockholders' deficit, and consolidated statements of cash flows for each of the two years in the period ended December 31, 2017 and the related notes (collectively referred to as the "financial statements"). In our opinion, the financial statements present fairly, in all material respects, the financial position of the Company as of December 31, 2016 and 2017, and the results of its operations and its cash flows for each of the two years in the period ended December 31, 2017, in conformity with accounting principles generally accepted in the United States of America.

Going Concern

The accompanying financial statements have been prepared assuming that the Company will continue as a going concern. As discussed in Note 1 to the financial statements, the Company has suffered recurring losses from operations and has a net capital deficiency that raises substantial doubt about its ability to continue as a going concern. Management's plans in regard to these matters are also described in Note 1. The financial statements do not include any adjustments that might result from the outcome of this uncertainty.

Basis for Opinion

These financial statements are the responsibility of the Company's management. Our responsibility is to express an opinion on the Company's financial statements based on our audits. We are a public accounting firm registered with the Public Company Accounting Oversight Board (United States) (PCAOB) and are required to be independent with respect to the Company in accordance with the U.S. federal securities laws and the applicable rules and regulations of the Securities and Exchange Commission and the PCAOB.

We conducted our audits in accordance with the standards of the PCAOB and in accordance with auditing standards generally accepted in the United States of America. Those standards require that we plan and perform the audit to obtain reasonable assurance about whether the financial statements are free of material misstatement, whether due to error or fraud. The Company is not required to have, nor were we engaged to perform, an audit of its internal control over financial reporting. As part of our audits, we are required to obtain an understanding of internal control over financial reporting but not for the purpose of expressing an opinion on the effectiveness of the Company's internal control over financial reporting. Accordingly, we express no such opinion.

Our audits included performing procedures to assess the risks of material misstatement of the financial statements, whether due to error or fraud, and performing procedures that respond to those risks. Such procedures included examining, on a test basis, evidence regarding the amounts and disclosures in the financial statements. Our audits also included evaluating the accounting principles used and significant estimates made by management, as well as evaluating the overall presentation of the financial statements. We believe that our audits provide a reasonable basis for our opinion.

/s/ Deloitte & Touche, LLP

San Diego, California
May 11, 2018

We have served as the Company's auditor since 2017.

Bionano Genomics, Inc.
Consolidated Balance Sheets

	December 31, 2016	December 31, 2017	March 31, 2018 (unaudited)	Pro Forma Stockholders' Deficit March 31, 2018 (unaudited)
Assets				
Current assets:				
Cash and cash equivalents	$ 5,249,620	$ 1,021,897	$ 7,552,716	
Accounts receivable, net	1,846,567	3,352,214	2,535,895	
Inventory	1,797,401	1,693,742	2,014,101	
Prepaid expenses and other current assets	1,842,066	1,071,512	1,745,271	
Total current assets	10,735,654	7,139,365	13,847,983	
Property and equipment, net	4,052,083	3,005,788	2,614,337	
Total assets	$ 14,787,737	$ 10,145,153	$ 16,462,320	
Liabilities, convertible preferred stock, and stockholders' deficit				
Current liabilities:				
Accounts payable	$ 792,332	$ 2,302,964	$ 935,562	
Accrued expenses	2,886,726	3,508,894	2,794,855	
Deferred revenue	446,769	211,697	167,409	
Preferred stock warrant liability	4,650,877	3,898,944	2,945,746	
Current portion of long-term debt	587,131	6,729,752	6,681,082	
Convertible note	—	—	13,329,843	
Total current liabilities	9,363,835	16,652,251	26,854,497	
Long-term debt, net of current portion	6,046,045	—	—	
Long-term deferred revenue	244,884	142,929	117,080	
Other non-current liabilities	975,418	567,047	500,430	
Total liabilities	16,630,182	17,362,227	27,472,007	
Commitments and contingencies (Note 9)				
Series A convertible preferred stock, $0.0001 par value; 418,767 shares authorized as of December 31, 2016 and 2017 and March 31, 2018 (unaudited); 345,587 shares issued and outstanding as of December 31, 2016 and 2017 and March 31, 2018 (unaudited); $483,649 liquidation preference at December 31, 2017 and March 31, 2018 (unaudited); no shares authorized, issued or outstanding pro forma at March 31, 2018 (unaudited)	61,847	61,847	61,847	
Series B convertible preferred stock, $0.0001 par value; 8,101,042 shares authorized as of December 31, 2016 and 2017 and March 31, 2018 (unaudited); 8,058,170 shares issued and outstanding as of December 31, 2016 and 2017 and March 31, 2018 (unaudited); $11,277,409 liquidation preference at December 31, 2017 and March 31, 2018 (unaudited); no shares authorized, issued or outstanding pro forma at March 31, 2018 (unaudited)	842,845	842,845	842,845	
Series B-1 convertible preferred stock, $0.0001 par value; 7,523,734 shares authorized as of December 31, 2016 and 2017 and March 31, 2018 (unaudited); 3,437,950 shares issued and outstanding as of December 31, 2016 and 2017 and March 31, 2018 (unaudited); $4,811,411 liquidation preference at December 31, 2017 and March 31, 2018 (unaudited); no shares authorized, issued or outstanding pro forma at March 31, 2018 (unaudited)	359,593	359,593	359,593	
Series C convertible preferred stock, $0.0001 par value; 23,357,047 shares authorized as of December 31, 2016 and 2017 and March 31, 2018 (unaudited); 23,357,047 shares issued and outstanding as of December 31, 2016 and 2017 and March 31, 2018 (unaudited); $32,800,301 liquidation preference at December 31, 2017 and March 31, 2018 (unaudited); no shares authorized, issued or outstanding pro forma at March 31, 2018 (unaudited)	5,547,841	5,547,841	5,547,841	
Series D convertible preferred stock, $0.0001 par value; 52,835,720 shares authorized as of December 31, 2016 and 2017 and March 31, 2018 (unaudited), respectively; 20,652,486 shares issued and outstanding as of December 31, 2016 and 2017 and March 31, 2018 (unaudited), respectively; $9,913,193 liquidation preference at December 31, 2017 and March 31, 2018 (unaudited), respectively; no shares authorized, issued or outstanding pro forma at March 31, 2018 (unaudited)	4,838,379	4,838,379	4,838,379	
Series D-1 convertible preferred stock, $0.0001 par value; 73,208,367, 125,808,667 and 125,808,667 shares authorized as of December 31, 2016 and 2017 and March 31, 2018 (unaudited), respectively; 29,166,671, 66,141,257 and 66,141,257 shares issued and outstanding as of December 31, 2016 and 2017, and March 31, 2018 (unaudited) respectively; $31,747,803 liquidation preference at December 31, 2017 and March 31, 2018 (unaudited); no shares authorized, issued or outstanding pro forma at March 31, 2018 (unaudited)	13,766,022	31,359,632	31,359,632	
Stockholders' deficit:				
Common stock, $0.0001 par value; 190,559,820, 243,160,120 and 243,160,120 shares authorized at December 31, 2016 and 2017 and March 31, 2018 (unaudited), respectively; 3,004,912, 3,308,193 and 3,318,349 shares issued and outstanding as of December 31, 2016 and 2017 and March 31, 2018 (unaudited), respectively; shares issued and outstanding proforma at March 31, 2018	302	332	333	
Additional paid-in capital	3,641,398	4,038,493	4,093,241	
Accumulated deficit	(30,900,672)	(54,266,036)	(58,113,398)	
Total stockholders' deficit	(27,258,972)	(50,227,211)	(54,019,824)	
Total liabilities, convertible preferred stock, and stockholders' deficit	$ 14,787,737	$ 10,145,153	$ 16,462,320	

See accompanying notes

Bionano Genomics, Inc.

Consolidated Statements of Operations

	Year Ended December 31,		Three Months Ended March 31,	
	2016	2017	2017	2018
			(unaudited)	
Revenue:				
Product revenue	$ 6,153,355	$ 8,769,704	$ 1,593,848	$ 1,662,222
Other revenue	639,434	735,339	126,906	106,263
Total revenue	6,792,789	9,505,043	1,720,754	1,768,485
Operating expenses:				
Cost of product revenue	3,459,771	5,958,537	1,204,683	840,582
Cost of other revenue	118,921	71,975	581	867
Research and development	11,431,941	12,009,170	3,190,416	2,367,093
Selling, general and administrative	12,950,572	14,079,658	3,513,059	2,895,404
Impairment of property and equipment	—	604,511	—	—
Total operating expenses	27,961,205	32,723,851	7,908,739	6,103,946
Loss from operations	(21,168,416)	(23,218,808)	(6,187,985)	(4,335,461)
Other income (expense)				
Interest expense	(470,072)	(590,927)	(142,294)	(301,981)
Change in fair value of preferred stock warrants and expirations	3,006,082	751,933	679,180	953,198
Other expense	(203,285)	(289,010)	(21,073)	(159,342)
Total other income (expenses)	2,332,725	(128,004)	515,813	491,875
Loss before income taxes	(18,835,691)	(23,346,812)	(5,672,172)	(3,843,586)
Provision for income taxes	(12,924)	(18,552)	(13,358)	(3,776)
Net loss	$ (18,848,615)	$ (23,365,364)	$ (5,685,530)	$ (3,847,362)
Net loss per share, basic and diluted:	$ (7.30)	$ (7.66)	$ (1.89)	$ (1.16)
Weighted-average common shares outstanding, basic and diluted	2,583,083	3,052,246	3,004,912	3,315,754
Pro forma net loss per share, basic and diluted (unaudited)				
Pro forma weighted-average common shares outstanding, basic and diluted (unaudited)				

See accompanying notes

Bionano Genomics, Inc.

Consolidated Statements of Convertible Preferred Stock and Stockholders' Deficit

	Series A Convertible Preferred Stock		Series B Convertible Preferred Stock		Series B-1 Convertible Preferred Stock		Series C Convertible Preferred Stock		Series D Convertible Preferred Stock		Series D-1 Convertible Preferred Stock		Common Stock		Additional Paid-in Capital	Accumulated Deficit
	Shares	Amount	Shares	Amount	Shares	Amount	Shares	Amount	Shares	Amount	Shares	Amount	Shares	Amount		
Balance at January 1, 2016	1,908,757	$ 4,989,018	17,195,333	$ 23,909,095	7,441,599	$10,359,042	37,752,481	$ 48,930,547					4,440,907	$ 440	$3,508,759	$(93,428,10
Mandatory conversion of Series A, B and C preferred stock	(1,563,170)	(4,927,171)	(9,137,163)	(23,066,250)	(4,003,649)	(9,999,449)	(14,395,434)	(43,382,706)					29,099,416	2,917	—	81,376,04
10-to-1 reverse stock split	—	—	—	—	—	—	—	—	—	—	—	—	(30,199,406)	(3,020)	—	—
Common stock share cancellations	—	—	—	—	—	—	—	—	—	—	—	—	(350,551)	(35)	35	—
Issuance of Series D convertible preferred stock, net of issuance cost and warrant fair value of $5,140,463	—	—	—	—	—	—	—	—	20,652,486	4,838,379	—	—	—	—	—	—
Issuance of Series D-1 convertible preferred stock, net of issuance cost of $200,002	—	—	—	—	—	—	—	—	—	—	29,166,671	13,766,022	—	—	—	—
Issuance of common stock	—	—	—	—	—	—	—	—	—	—	—	—	14,546	—	1,961	—
Stock-based compensation expense	—	—	—	—	—	—	—	—	—	—	—	—	—	—	130,643	—
Net loss	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	(18,848,61
Balance at December 31, 2016	345,587	61,847	8,058,170	842,845	3,437,950	359,593	23,357,047	5,547,841	20,652,486	4,838,379	29,166,671	13,766,022	3,004,912	302	3,641,398	(30,900,67
Issuance of Series D-1 convertible preferred stock, net of issuance cost of $154,191	—	—	—	—	—	—	—	—	—	—	36,974,586	17,593,610	—	—	—	—
Issuance of common stock	—	—	—	—	—	—	—	—	—	—	—	—	303,281	30	14,265	—
Stock-based compensation expense	—	—	—	—	—	—	—	—	—	—	—	—	—	—	382,830	—
Net loss	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	(23,365,36
Balance at December 31, 2017	345,587	$ 61,847	8,058,170	$ 842,845	3,437,950	$ 359,593	23,357,047	$ 5,547,841	20,652,486	$4,838,379	66,141,257	$31,359,632	3,308,193	$ 332	$4,038,493	$(54,266,03
Issuance of common stock (unaudited)													10,156	1	304	
Stock-based compensation expense (unaudited)															54,444	
Net loss (unaudited)																(3,847,36
Balance at March 31, 2018 (unaudited)	345,587	$ 61,847	8,058,170	$ 842,845	3,437,950	$ 359,593	23,357,047	$ 5,547,841	20,652,486	$4,838,379	66,141,257	$31,359,632	3,318,349	$ 333	$4,093,241	$(58,113,39

See accompanying notes

Bionano Genomics, Inc.

Consolidated Statements of Cash Flows

	Year Ended December 31,		Three Months Ended March 31,	
	2016	2017	2017	2018
			(unaudited)	
Operating activities:				
Net loss	$ (18,848,615)	$ (23,365,364)	$ (5,685,530)	$ (3,847,362)
Adjustments to reconcile net loss to cash used in operating activities:				
Depreciation and amortization expense	1,115,027	1,504,042	352,838	391,451
Change in fair value of preferred stock warrants and expirations	(3,006,082)	(751,933)	(679,180)	(953,198)
Stock-based compensation	130,643	382,830	122,580	54,444
Provision for bad debt expense	—	262,000	—	—
Inventory write-off	—	364,437	—	—
Impairment of property and equipment	—	604,511	—	—
Accretion of debt discount	73,902	96,576	21,558	21,330
Changes in operating assets and liabilities:				
Accounts receivable	(856,098)	(1,767,647)	144,429	816,319
Inventory	(726,138)	(336,046)	(351,008)	(320,359)
Prepaid expenses and other current assets	(782,217)	770,553	(462,124)	(673,759)
Accounts payable	(608,653)	1,541,472	(65,955)	(1,355,572)
Accrued expenses and other liabilities	11,873	(123,229)	(763,193)	(920,793)
Net cash used in operating activities	(23,496,358)	(20,817,798)	(7,365,585)	(6,787,499)
Investing activities:				
Purchases of property and equipment	(1,349,853)	(1,017,830)	(71,528)	(11,830)
Net cash used in investing activities	(1,349,853)	(1,017,830)	(71,528)	(11,830)
Financing activities:				
Repayment of notes payable	(5,000,000)	—	—	—
Proceeds from long-term debt and convertible notes	6,886,458	—	—	13,329,843
Proceeds from issuance of preferred stock and warrants, net of offering costs	23,542,642	17,593,610	6,975,074	—
Proceeds from option exercises	1,961	14,295	—	305
Net cash provided by financing activities	25,431,061	17,607,905	6,975,074	13,330,148
Net increase (decrease) in cash and cash equivalents	584,850	(4,227,723)	(462,039)	6,530,819
Cash and cash equivalents at beginning of period	4,664,770	5,249,620	5,249,620	1,021,897
Cash and cash equivalents at end of period	$ 5,249,620	$ 1,021,897	$ 4,787,581	$ 7,552,716
Supplementary schedule on non-cash transactions:				
Transfer of Irys instruments to property and equipment from inventory	$ 40,347	$ 75,268	$ —	$ —
Property and equipment costs incurred but not paid included in accounts payable and and accrued expenses	$ 42,670	$ 11,830	$ 36,454	$ —
Leasehold improvements financed by landlord through lease incentives	$ 1,050,244	$ —	$ —	$ —
Fair value of warrants issued with equity classified as a liability	$ 4,938,241	$ —	$ —	$ —
Fair value of warrants issued with debt classified as a liability	$ 99,684	$ —	$ —	$ —
Final payment fee due in connection with the repayment of debt classified within other long-term liabilities	$ 227,500	$ —	$ —	$ —
Loan amendment fee due in connection with the repayment of debt classified within current liabilities	$ —	$ —	$ —	$ 70,000
Supplementary disclosure of cash flow information				
Interest paid	$ 446,525	$ 534,858	$ 126,779	$ 140,392

See accompanying notes

Bionano Genomics, Inc.

Notes to Consolidated Financial Statements
(Information as of March 31, 2018 and for the three months ended March 31, 2017 and 2018 is unaudited)

1. Organization and Basis of Presentation

Description of Business

Bionano Genomics, Inc. (the "Company") was incorporated in Delaware on August 16, 2007, under the name BioNanomatrix, Inc. On October 11, 2011, the Company changed its name to BioNano Genomics, Inc. Upon the filing of the Company's amended and restated certificate of incorporation immediately prior to the closing of its public offering, the Company's name will be changed to Bionano Genomics, Inc. The Company is developing and commercializing genomic mapping instruments and technology to enable researchers to analyze DNA through unique studies to gain a comprehensive picture of genome biology, including structural variation of DNA and chromosomes.

The accompanying consolidated financial statements (the "financial statements") have been prepared assuming the Company will continue as a going concern, which contemplates continuity of operations, the realization of assets and the satisfaction of liabilities in the normal course of business. The financial statements do not reflect any adjustments that might result if the Company is unable to continue as a going concern. Since inception, the Company has been engaged in organizational activities, including raising capital and research and development activities. The Company has not generated substantial revenues and has not yet achieved profitable operations, nor has it ever generated positive cash flows from operations. There is no assurance that profitable operations, if achieved, could be sustained on a continuing basis. Further, the Company's future operations are dependent on the success of the Company's efforts to raise additional capital and the market acceptance of the Company's products. There can be no assurance that these efforts will be successful.

Going Concern

In accordance with ASU 2014-15, *Presentation of Financial Statements – Going Concern (Subtopic 205-40): Disclosure of Uncertainties About an Entity's Ability to Continue as a Going Concern*, management is required to perform a two-step analysis over its ability to continue as a going concern. Management must first evaluate whether there are conditions and events that raise substantial doubt about the Company's ability to continue as a going concern and to meet its obligations as they become due within one year after the date that the financial statements are issued (step 1). If management concludes that substantial doubt is raised, management is also required to consider whether its plans alleviate that doubt (step 2).

The Company has experienced net losses and negative cash flows from operating activities since its inception and expects to continue to incur net losses into the foreseeable future. The Company had an accumulated deficit of $54,266,036 and $58,113,398 as of December 31, 2017 and March 31, 2018, respectively. The Company used $20,817,798 cash in operations in 2017 and has used $6,787,499 for the three months ended March 31, 2018. The Company had cash and cash equivalents of $1,021,897 and $7,552,716 as of December 31, 2017 and March 31, 2018, respectively. Management expects operating losses and negative cash flows to continue for at least the next year as the Company continues to incur costs related to research and commercialization efforts. Management has prepared cash flow forecasts which indicate that based on the Company's expected operating losses and negative cash flows, there is substantial doubt about the Company's ability to continue as a going concern within twelve months after the date that the financial statements for the year ended December 31, 2017 and the three months ended March 31, 2018, are issued.

Further, on March 8, 2016, the Company entered into a new term Loan and Security Agreement with Western Alliance Bank (the "Western Alliance LSA"). The provisions of the Western Alliance LSA allow for Western Alliance Bank to exercise a material adverse effect clause should the Company incur a material adverse effect within the meaning provided by the Western Alliance LSA, which could include the going concern matters described herein. Should Western Alliance Bank invoke the material adverse effect clause, the outstanding loan balance may be declared immediately due and payable. The Company believes that it is a remote probability that the material adverse effect clause associated with the Western Alliance LSA will be exercised.

Management's ability to continue as a going concern is dependent upon its ability to raise additional funding. Management has plans to raise additional capital through equity offerings or debt financings to fulfill its operating and capital requirements for at least 12 months and to maintain compliance with the Western Alliance LSA covenants (see Note 7). The Company's plans include continuing to fund its operating losses and capital funding needs through public or private equity or debt financings, strategic collaborations, licensing arrangements, asset sales, or other arrangements. However, the Company may not be able to secure such financing in a timely manner or on favorable terms, if at all. Furthermore, if the Company issues equity securities to raise additional funds, its existing stockholders may experience dilution, and the new equity securities may have rights, preferences and privileges senior to those of the Company's existing stockholders. If the Company raises additional funds through collaboration, licensing or other similar arrangements, it may be necessary to relinquish valuable rights to its products or proprietary technologies or grant licenses on terms that are not favorable to the Company.

If the Company does not have or is not able to obtain sufficient funds, it may have to reduce commercialization efforts or delay its development of new products. The Company also may have to reduce marketing, customer support or other resources devoted to its products or cease operations.

2. Summary of Significant Accounting Policies

Use of Estimates

The financial statements are prepared in accordance with accounting principles generally accepted in the United States ("GAAP") and all intercompany transactions and balances have been eliminated in consolidation. The preparation of the Company's financial statements require the Company to make estimates and assumptions that impact the reported amounts of assets, liabilities and expenses and the disclosure of contingent assets and liabilities in the financial statements and accompanying notes. Management evaluates its estimates on an ongoing basis. Although estimates are based on the Company's historical experience, knowledge of current events and actions it may undertake in the future, actual results may ultimately materially differ from these estimates and assumptions.

Unaudited Interim Financial Information

The accompanying consolidated balance sheet as of March 31, 2018, the related consolidated statements of operations and consolidated statements of cash flows for the three months ended March 31, 2017 and 2018 and the consolidated statements of convertible preferred stock and stockholders' deficit for the three months ended March 31, 2018 are unaudited. The interim unaudited consolidated financial statements have been prepared on the same basis as the annual audited consolidated financial statements and in the opinion of management, reflect all adjustments, which include only normal recurring adjustments necessary for the fair statement of the Company's financial position as of March 31, 2018 and the results of its operations and its cash flows for the three months ended March 31, 2017 and 2018. The financial data and other information disclosed in these notes related to the three months ended March 31, 2017 and 2018 are unaudited. The results for the three months ended March 31, 2018 are not necessarily indicative of results to be expected for the year ending December 31, 2018, any other interim periods or any future year or period.

Unaudited Pro Forma Balance Sheet Information

The unaudited pro forma consolidated balance sheet information as of March 31, 2018 assumes the conversion of all outstanding shares of convertible preferred stock into 121,992,497 shares of the Company's common stock and the resulting reclassification of the carrying value of the convertible preferred stock to stockholders' deficit upon the completion of the Company's proposed initial public offering (the "IPO"). The unaudited pro forma consolidated balance sheet information as of March 31, 2018 also assumes the conversion of all convertible notes into shares of the Company's common stock and the resulting reclassification of the carrying value of the convertible notes to stockholders' deficit upon the completion of the Company's proposed IPO. The unaudited pro forma consolidated balance sheet assumes that the completion of the IPO had occurred as of March 31, 2018 and excludes shares of common stock issued in the IPO and any related net proceeds.

Reclassifications

Certain amounts presented in the prior year financial statements have been reclassified to conform to current year presentation. Product revenue has been separated into product revenue and other revenue and cost of revenue has been separated into cost of product revenue and cost of other revenue on the consolidated statements of operations. For the year ended December 31, 2016, $631,539 has been reclassified out of product revenue into other revenue and $118,921 has been reclassified out of cost of product revenue into cost of other revenue.

Cash and Cash Equivalents

The Company considers all highly liquid investments with an original maturity of three months or less at the date of purchase to be cash equivalents. Cash equivalents primarily represent funds invested in readily available checking and money market accounts.

The Company has not experienced any losses in such accounts. The Company believes that it is not exposed to any significant credit risk on cash and cash equivalents. Included in cash and cash equivalents is $201,623, $252,594 and $252,594 in restricted cash as of December 31, 2016 and 2017 and March 31, 2018, respectively, related to amounts held for leases and credit cards.

Fair Value of Financial Instruments

The carrying amounts of all cash equivalents, accounts receivable, prepaid expenses and other current assets, accounts payable and accrued liabilities are reasonable estimates of their fair value because of the short-term nature of these items. Company issued convertible preferred stock warrants are recorded at fair value on a recurring basis.

Concentration of Credit Risk

Financial instruments, which potentially subject the Company to significant concentration of credit risk, consist primarily of cash and cash equivalents and accounts receivable. The Company maintains deposits in federally insured major financial institutions in excess of federally insured limits. The Company has not experienced any losses in such accounts and management believes that the Company is not exposed to significant credit risk due to the financial position of the depository institution in which those deposits are held.

The Company's customers are located throughout the world. The Company generally does not require collateral from its customers, but it performs credit evaluations of their financial condition. More information on accounts receivable is contained in the paragraph titled "Accounts Receivable" below.

Accounts Receivable

The Company extends credit to its customers in the normal course of business based upon an evaluation of each customer's credit history, financial condition, and other factors. Estimates of allowances for doubtful accounts are determined by evaluating individual customer circumstances, historical payment patterns, length of time past due, and economic and other factors. Bad debt expense is recorded as necessary to maintain an appropriate level of allowance for doubtful accounts in selling, general and administrative expense.

The following table reflects the activity related to the Company's allowance for doubtful accounts:

	December 31, 2016	December 31, 2017	March 31, 2018 (unaudited)
Accounts receivable	$ 1,846,567	$ 3,614,214	$ 2,797,895
Provision	—	(262,000)	(262,000)
Accounts receivable, net	$ 1,846,567	$ 3,352,214	$ 2,535,895

For the years ended December 31, 2016 and 2017 and the three months ended March 31, 2017 and 2018, Ultravision Technology Ltd. represented 14%, 21%, 29% and 24%, BioStar Company represented 0%, 15%, 0% and 19%, Berry Genomics Corporation represented 11%, 2%, 13% and 3%, Star Research Technology LTD represented 12%, 0%, 11% and 0%, University of Oxford represented 20%, 0%, 0% and 0%, University of Connecticut represented 12%, 0%, 0% and 0%, Calico LLC represented 0%, 0%, 14% and 0%, Dupont Pioneer represented 0%, 0%, 10%, and 0%, Accela s.r.o. represented 0%, 0%, 0%, and 12%, and University of North Carolina represented 0%, 0%, 0%, and 10%, respectively, of the Company's accounts receivable balance.

Inventory

Inventory is stated at the lower of cost or net realizable value, on a first-in, first-out basis. Inventory includes raw materials and finished goods that may be used in the research and development process and such items are expensed as consumed or expired. Provisions for slow-moving, excess, and obsolete inventories are estimated based on product life cycles, historical experience, and usage forecasts.

The components of inventories are as follows:

	December 31, 2016	December 31, 2017	March 31, 2018 (unaudited)
Materials and supplies	$ 119,329	$ 203,085	$ 241,047
Finished Goods	1,678,072	1,490,657	1,773,054
	$ 1,797,401	$ 1,693,742	$ 2,014,101

Inventories are net of write-downs of approximately $0, $364,437 and $364,437 as of December 31, 2016 and 2017 and March 31, 2018, respectively. During the year ended December 31, 2017, in connection with the market launch of the Company's next generation product, the Saphyr system, the Company determined that its first generation Irys instruments on hand had net realizable values below carrying value. Accordingly, the Company recorded a charge of $364,437 included in cost of revenue to write-down these instruments to net realizable value. As of December 31, 2017, and March 31, 2018, the Company's finished goods inventory included approximately $1,287,000 of Irys instruments.

Property and Equipment

Property and equipment are recorded at cost and depreciated or amortized using the straight-line method over the estimated useful lives of the assets (generally three to five years, or the remaining term of the lease for leasehold improvements, whichever is shorter) and generally consist of laboratory equipment, computer and office equipment, furniture and fixtures, and leasehold improvements. Repairs and maintenance costs are charged to expense as incurred.

Long-Lived Assets

The Company regularly reviews the carrying value and estimated lives of all of its long-lived assets, including property and equipment, to determine whether indicators of impairment may exist which warrant adjustments to carrying values or estimated useful lives. Should an impairment exist, the impairment loss would be measured based on the excess over the carrying amount of the asset's fair value. The Company has not recognized any impairment losses from inception through December 31, 2016. During the year ended December 31, 2017, the Company recognized an impairment loss of $604,511 related to equipment at customer sites. No impairment losses were recognized during the three months ended March 31, 2017 and 2018.

Deferred Rent

Deferred rent consists of the difference between cash payments and the recognition of rent expense on a straight-line basis for the facilities the Company leases. The Company's leases for its facilities provide for fixed increases in minimum annual rental payments. The total amount of rental payments due over the lease terms are being charged to rent expense ratably over the life of the leases. The current portion of deferred rent is included in accrued expenses and the non-current portion in other non-current liabilities on the consolidated balance sheets.

Revenue Recognition

Product Revenue

Product revenue represents the sale of the Company's instruments and consumables to third parties. Timing of revenue recognition on instrument sales is based upon when delivery has occurred, the price is fixed or determinable, and collectability is reasonably assured.

The majority of our instruments contain embedded operating systems and other software which is included in the purchase price of the instrument. The software is deemed incidental to the system as a whole as it is not sold or marketed separately and its production costs are minor compared to those of the hardware system. Hardware and software elements are both delivered when ownership is transferred to the customer. Hardware upgrades, which are made available to customers for purchase, are recognized as revenue when delivered and all revenue recognition criteria noted above have been met.

Installation services for direct sale customers are performed at the same time or shortly after the product is delivered and require only a minimal effort to complete. We believe installation is a perfunctory service and is not material to our obligations in the contract.

Other Revenue

Other revenue includes revenue from extended service contracts and other services that may be performed. Revenue for extended warranty contracts is recognized ratably over the service period. Revenue for other services is generally recognized based on proportional performance of the contract, when the Company's ability to complete project requirements is reasonably assured. Deferred revenue represents amounts received in advance for on-going service arrangements. Most of these services are completed in a short period of time from the receipt of the customer's order. When significant risk exists in the Company's ability to fulfill project requirements, revenue is recognized upon completion of the contract.

Multiple Element Arrangements

The Company regularly enters into contracts where revenue is derived from multiple deliverables, including products or services. These contracts typically include an instrument, consumables, and extended service contracts. Revenue recognition for contracts with multiple deliverables is based on the individual units of accounting determined to exist in the contract. A delivered item is considered a separate unit of accounting when the delivered item has value to the customer on a stand-alone basis. Items are considered to have stand-alone value when they are sold separately by any vendor or when the customer could resell the item on a stand-alone basis.

For transactions with multiple deliverables, consideration is allocated at the inception of the contract to all deliverables based on their relative selling price. The relative selling price for each deliverable is determined using vendor-specific objective evidence ("VSOE") of selling price or third-party evidence of selling price if VSOE does not exist. If neither VSOE nor third-party evidence exists, the Company uses its best estimate of the selling price using average selling prices over an appropriate period coupled with an assessment of current market conditions. If the product or service has no history of sales or if the sales volume is not sufficient, the Company considers its approved standard prices adjusted for applicable discounts.

In order to establish VSOE of selling price, the Company must regularly sell the product or service on a standalone basis with a substantial majority priced within a relatively narrow range. In cases where there is not a sufficient number of standalone sales and VSOE of selling price cannot be determined, then the Company utilizes third-party evidence to establish selling price.

Distributor Transactions

In certain markets, the Company sells products and provides services to customers through distributors that specialize in life sciences products. In cases where the product is delivered to a distributor, revenue recognition generally occurs when title transfers to the distributor. The terms of sales transactions through distributors are generally consistent with the terms of direct sales to customers and do not contain return rights. Distributor sales transactions typically differ from direct customer sales as they do not require the Company's services to install the instrument at the end customer or perform the services for the customer that are beyond the standard warranty in the first year following the sale. These transactions are accounted for in accordance with the Company's revenue recognition policy described herein.

The Company derives a significant portion of product revenue from a limited distributor base. For the years ended December 31, 2016 and 2017, and the three months ended March 31, 2017 and 2018, Berry Genomics Corp. represented 15%, 4%, 17% and 10%, Ultravision Technology Ltd. represented 11%, 15%, 18% and 17%, and AS One Corp. represented 10%, 0%, 1% and 1%, respectively, of the Company's total revenues. No other distributor represented more than 10% of total Company revenues during these periods.

Cost of Revenue

Cost of revenue for products consists of the Company's instrument cost from the manufacturer, raw material parts costs and associated freight, shipping and handling costs, contract manufacturer costs, royalties due to third parties, salaries and other personnel costs, overhead and other direct costs related to those sales recognized as product revenue in the period.

Cost of other revenue consists of salaries and other personnel costs, and facility costs associated with costs related to warranties and other costs of servicing equipment at customer sites.

Research and Development Costs

Costs incurred for research and product development, including acquired technology and costs incurred for technology in the development stage, are expensed as incurred.

Patent Costs

Costs related to filing and pursuing patent applications are recorded as selling, general and administrative expense and expensed as incurred since recoverability of such expenditures is uncertain.

Deferred Offering Costs

Deferred public offering costs primarily consist of legal, accounting and filing fees relating to the IPO. The deferred offering costs will be offset against the IPO proceeds upon the consummation of the offering. In the event the offering is delayed or aborted, incurred offering costs will be expensed. The Company had not incurred any IPO costs as of March 31, 2018.

Stock-Based Compensation

Stock-based compensation expense represents the cost of the grant date fair value of employee stock option grants recognized over the requisite service period of the awards (usually the vesting period) on a straight-line basis, net of actual forfeitures during the period. The Company estimates the fair value of stock option grants using the Black-Scholes option pricing model. The exercise price for all stock options granted was at the estimated fair value of the underlying common stock as determined on the date of grant by the Board of Directors. The Board of Directors determined the value of the underlying stock by considering a number of factors, including historical and projected financial results, the risks the Company faced at the time, the preferences of the Company's convertible preferred stockholders, and the lack of liquidity of the Company's common stock.

Convertible Preferred Stock Warrants

The Company accounts for freestanding warrants to purchase shares of convertible preferred stock as liabilities in the balance sheets under preferred stock warrant liability. The convertible preferred stock warrants are subject to remeasurement at each reporting period, with changes in fair value recorded as change in fair value of warrants and expirations in the consolidated statements of operations.

Income Taxes

The Company accounts for income taxes under the asset and liability method, which requires the recognition of deferred tax assets and liabilities for the expected future tax consequences of events that have been included in the financial statements. Under this method, deferred tax assets and liabilities are determined on the basis of the differences between the financial statements and tax basis of assets and liabilities using enacted tax rates in effect for the year in which the differences are expected to reverse. The effect of a change in tax rates on deferred tax assets and liabilities is recognized in income in the period that includes the enactment date.

The Company recognizes deferred tax assets to the extent that the Company believes these assets are more likely than not to be realized. In making such a determination, management considers all available positive and negative evidence, including future reversals of existing taxable temporary differences, projected future taxable income, tax-planning strategies, and results of recent operations. If management determines that the Company would be able to realize its deferred tax assets in the future in excess of their recorded amount, management would make an adjustment to the deferred tax asset valuation allowance, which would reduce the provision for income taxes.

As of December 31, 2016, and 2017, the Company maintained valuation allowances against its deferred tax assets as the Company concluded it had not met the "more likely than not" to be realized threshold. Changes in the valuation allowance when they are recognized in the provision for income taxes may result in a change in the estimated annual effective tax rate.

The Company recognizes the impact of uncertain tax positions at the largest amount that is "more likely than not" to be sustained upon audit by the relevant taxing authority. An uncertain tax position will not be recognized if it has less than a 50% likelihood of being sustained. The Company recognizes interest and penalties related to unrecognized tax benefits within income tax expense. Any accrued interest and penalties are included within the related tax liability.

Comprehensive Loss

Net loss and comprehensive loss were the same for all periods presented; therefore, a separate statement of comprehensive loss is not included in the financial statements.

Segment Reporting

Operating segments are identified as components of an enterprise about which separate discrete financial information is available for evaluation by the chief operating decision-maker in making decisions regarding resource allocation and assessing performance. The Company and its chief operating decision-maker, the Chief Executive Officer, views the Company's operations and manages its business in one operating segment.

The following table reflects total revenue by geography and as a percentage of total revenue, based on the billing address of the Company's customers. North America consists of the United States and Canada. EMEA consists of Europe, the Middle East and Africa. Asia Pacific includes China, Japan, South Korea, Singapore and Australia.

	Year Ended December 31,				Three Months Ended March 31,			
	2016		2017		2017		2018	
	$	%	$	%	$	%	$	%
					(unaudited)			
North America	$ 2,078,987	31%	$ 3,801,481	40%	$ 972,006	57%	$ 648,551	37%
EMEA	1,666,188	24%	1,282,897	13%	74,054	4%	89,191	5%
Asia Pacific	3,047,614	45%	4,420,665	47%	674,694	39%	1,030,743	58%
Total	$ 6,792,789	100%	$ 9,505,043	100%	$ 1,720,754	100%	$ 1,768,485	100%

For the years ended December 31, 2016 and 2017, and the three months ended March 31, 2017 and 2018, the United States represented 30%, 37%, 56% and 60% and China represented 34%, 28%, 35% and 27%, respectively of total revenue.

Net Loss Per Share

Basic net loss per share is calculated by dividing the net loss by the weighted-average number of common shares outstanding for the period. Diluted net loss per share is computed by dividing the net loss by the weighted average number of common shares and common share equivalents outstanding for the period. Common stock equivalents are only included when their effect is dilutive. The Company's potentially dilutive securities which include convertible preferred stock and outstanding stock options under the Company's equity incentive plan have been excluded from the computation of diluted net loss per share as they would be anti-dilutive to the net loss per share. For all periods presented, there is no difference in the number of shares used to calculate basic and diluted shares outstanding due to the Company's net loss position.

Potentially dilutive securities not included in the calculation of diluted net loss per share attributable to common stockholders because to do so would be anti-dilutive are as follows (in common stock equivalent shares):

	Year Ended December 31,		Three Months Ended March 31,	
	2016	2017	2017	2018
			(unaudited)	
Series A convertible preferred stock	345,587	345,587	345,587	345,587
Series B convertible preferred stock	8,058,170	8,058,170	8,058,170	8,058,170
Series B-1 convertible preferred stock	3,437,950	3,437,950	3,437,950	3,437,950
Series C convertible preferred stock	23,357,047	23,357,047	23,357,047	23,357,047
Series D convertible preferred stock	20,652,486	20,652,486	20,652,486	20,652,486
Series D-1 convertible preferred stock	29,166,671	66,141,257	43,750,004	66,141,257
Common stock options	1,869,821	18,679,643	14,828,404	18,649,605
Preferred warrants	36,676,737	36,603,557	36,676,737	36,603,557
Total	123,564,469	177,275,697	151,106,385	177,245,659

Unaudited Pro Forma Net Loss Per Share

	Year Ended December 31, 2017	Three Months Ended March 31, 2018
		(unaudited)
Net loss and pro forma net loss attributable to common stockholders	$ (23,365,364)	$ (3,847,362)
Weighted-average common shares outstanding, basic and diluted	3,052,246	3,315,754
Add:		
Pro forma adjustments to reflect assumed conversion of convertible preferred stock		
Pro forma weighted-average common shares outstanding, basic and diluted		
Pro forma net loss per share attributable to common stockholders, basic and diluted		

Recent Accounting Pronouncements

On April 5, 2012, President Obama signed the Jump-Start Our Business Startups Act (the "JOBS Act") into law. The JOBS Act contains provisions that, among other things, reduce certain reporting requirements for an emerging growth company. As an emerging growth company, the Company may elect to adopt new or revised accounting standards when they become effective for non-public companies, which typically is later than when public companies must adopt the standards. The Company has elected to take advantage of the extended transition period afforded by the JOBS Act and, as a result, will comply with new or revised accounting standards on the relevant dates on which adoption of such standards is required for emerging growth companies, which are the dates included below.

In May 2014, the FASB issued ASU 2014-09, *Revenue from Contracts with Customers (Topic 606)*. ASU 2014-09 completes the joint effort by the FASB and International Accounting Standards Board to improve financial reporting by creating common revenue recognition guidance for GAAP and International Financial Reporting Standards. ASU 2014-09 applies to all companies that enter into contracts with customers to transfer goods or services. Under the standard, revenue is recognized when a customer obtains control of promised goods or services in an amount that reflects the consideration the entity expects to receive in exchange for those goods or services. In addition, the standard requires disclosure of the nature, amount, timing, and uncertainty of revenue and cash flows arising from contracts with customers. The guidance permits two methods of adoption: retrospectively to each prior reporting period presented (full retrospective method), or retrospectively with the cumulative effect of initially applying the guidance recognized at the date of initial application (modified retrospective method). The guidance is effective for reporting periods beginning after December 15, 2018, and interim periods beginning after December 15, 2019. The Company has evaluated this new guidance and does not expect the adoption to have a material impact on the financial statements.

In February 2015, the FASB issued ASU 2016-02, *Leases (Topic 842)*, which amends the FASB Accounting Standards Codification and creates Topic 842, "Leases." The new topic supersedes Topic 840, "Leases," and increases transparency and comparability among organizations by recognizing lease assets and lease liabilities on the balance sheet and requires disclosures of key information about leasing arrangements. The guidance is effective for reporting periods beginning after December 15, 2019, and interim periods within fiscal years beginning after December 15, 2020. ASU 2016-02 mandates a modified retrospective transition method. The Company is in the process of evaluating the impact of adoption of the ASU on the financial statements.

In January 2016, the FASB issued ASU No. 2016-01, *Financial Instruments—Overall (Subtopic 825-10): Recognition and Measurement of Financial Assets and Financial Liabilities (ASU 2016-01)*. This guidance changes how entities measure equity investments that do not result in consolidation and are not accounted for under the equity method. Entities will be required to measure these investments at fair value at the end of each reporting period and recognize changes in fair value in net income. A practicability exception will be available for equity investments that do not have readily determinable fair values, however; the exception requires the Company to consider relevant transactions that can be reasonably known to identify any observable price changes that would impact the fair value. This guidance also changes certain disclosure requirements and other aspects of current GAAP. This guidance is effective for the Company for the year ending December 31, 2019 and for interim periods effective the three months ending March 31, 2020. Early adoption is permitted. The Company is currently evaluating the requirements of ASU 2016-01 and has not yet determined whether the adoption of the standard will have a material impact on the financial statements.

In August 2016, the FASB issued ASU 2016-15, *Classification of Certain Cash Receipts and Cash Payments (Topic 230)*. ASU 2016-15 addresses eight specific cash flow issues with the objective of reducing the existing diversity in practice for certain cash receipts and cash payments. The standard is effective for annual reporting periods beginning after December 15, 2018 and interim periods reporting within fiscal years beginning after December 15, 2019, with early adoption permitted. The Company does not believe the adoption of this guidance will have a material impact on the financial statements.

3. Fair Value Measurements

The accounting guidance defines fair value, establishes a consistent framework for measuring fair value and expands disclosure for each major asset and liability category measured at fair value on either a recurring or nonrecurring basis. Fair value is defined as an exit price, representing the amount that would be received to sell an asset or paid to transfer a liability in an orderly transaction between market participants. As such, fair value is a market-based measurement that should be determined based on assumptions that market participants would use in pricing an asset or liability. As a basis for considering such assumptions, the accounting guidance establishes a three-tier fair value hierarchy, which prioritizes the inputs used in measuring fair value as follows:

Level 1: Unadjusted quoted prices in active markets that are accessible at the measurement date for identical, unrestricted assets or liabilities.

Level 2: Quoted prices for similar assets and liabilities in active markets, quoted prices in markets that are not active, or inputs which are observable, either directly or indirectly, for substantially the full term of the asset or liability.

Level 3: Prices or valuation techniques that require inputs that are both significant to the fair value measurement and unobservable (i.e. supported by little or no market activity).

		Fair Value Measurement Using		
	December 31, 2016	Quoted Prices in Active Markets for Identical Assets Level 1	Significant Other Observable Inputs Level 2	Significant Unobservable Inputs Level 3
Assets				
Money market funds	$ 5,249,620	$ 5,249,620	$ —	$ —
Total assets	$ 5,249,620	$ 5,249,620	$ —	$ —
Liabilities				
Preferred stock warrant liability	$ 4,650,877	$ —	$ —	$ 4,650,877
Total liabilities	$ 4,650,877	$ —	$ —	$ 4,650,877

		Fair Value Measurements Using		
	December 31, 2017	Quoted Prices in Active Markets for Identical Assets Level 1	Significant Other Observable Inputs Level 2	Significant Unobservable Inputs Level 3
Assets				
Money market funds	$ 1,021,897	$ 1,021,897	$ —	$ —
Total assets	$ 1,021,897	$ 1,021,897	$ —	$ —
Liabilities				
Preferred stock warrant liability	$ 3,898,944	$ —	$ —	$ 3,898,944
Total liabilities	$ 3,898,944	$ —	$ —	$ 3,898,944

		Fair Value Measurements Using		
	March 31, 2018	Quoted Prices in Active Markets for Identical Assets Level 1	Significant Other Observable Inputs Level 2	Significant Unobservable Inputs Level 3
		(unaudited)		
Assets				
Money market funds	$ 7,552,716	$ 7,552,716	$ —	$ —
Total assets	$ 7,552,716	$ 7,552,716	$ —	$ —
Liabilities				
Preferred stock warrant liability	$ 2,945,746	$ —	$ —	$ 2,945,746
Total liabilities	$ 2,945,746	$ —	$ —	$ 2,945,746

The following table summarizes the changes in fair value of the Company's Level 3 liabilities for the years ended December 31, 2016 and 2017, and the three months ended March 31, 2018:

	Warrant Liability
Balance at January 1, 2016	$ 2,619,034
Issuance of warrants in connection with debt	99,684
Issuance of warrants in connection with equity	4,938,241
Expiration of Series C warrants	(1,113,633)
Change in fair value of preferred stock warrants	(1,892,449)
Balance at December 31, 2016	4,650,877
Expiration of Series A warrants	(1,424)
Change in fair value of preferred stock warrants	(750,509)
Balance at December 31, 2017	3,898,944
Change in fair value of preferred stock warrants (unaudited)	(953,198)
Balance at March 31, 2018 (unaudited)	$ 2,945,746

As of December 31, 2013, the Company classified certain warrants to purchase Series A convertible preferred stock that contain down-round protection provisions as a liability. In connection with the Series C Convertible Participating Preferred Stock and Warrant Purchase Agreement in 2014, the composition of the Company's Board of Directors changed such that the holders of the Series A, B, B-1 and C convertible preferred stock controlled the Board of Directors. Accordingly, upon certain change in control events that are outside of the Company's control, including liquidation, sale, or transfer of control of the Company, holders of the convertible preferred stock can cause its redemption. As such, the then outstanding warrants to purchase shares of Series B and B-1 convertible preferred stock that were previously classified in equity at the time of the Series C Convertible Participating Preferred Stock and Warrant Purchase Agreement were reclassified to a liability at fair value. As of March 31, 2018, holders of the convertible preferred stock continue to control the Board of Directors.

The warrants to purchase shares of Series C convertible preferred stock issued in 2014 expired during the year ending December 31, 2016. In connection with the Series D Convertible Participating Preferred Stock and Warrant Purchase Agreement in 2016 (see Note 8), the Company issued warrants to purchase Series D convertible preferred stock which are classified as a liability. In connection with the Western Alliance LSA and subsequent amendment, the Company issued warrants to purchase Series D and D-1 convertible preferred stock which are classified as a liability (see Note 7).

The warrants to purchase convertible preferred stock are valued at each reporting period using the Black-Scholes-Merton model. This valuation includes observable inputs such as risk-free rate, as well as unobservable inputs for assumed volatility, the expected life of the warrants, and the fair value of the underlying convertible preferred stock. Quantitative information relating to unobservable inputs is disclosed below:

	December 31,		March 31, 2018 (unaudited)
	2016	2017	
Risk-free interest rate	0.90%	1.75%	2.08%
Volatility	54.40%	54.60%	48.00%
Expected life (in years)	0.7-1.2	0.6	0.4
Dividend Yield	—	—	—
Fair value of Series A preferred stock	$ 0.67	$ 0.66	$ 0.58
Fair value of Series B-1 preferred stock	$ 0.37	$ 0.36	$ 0.37
Fair value of Series D preferred stock	$ 0.48	$ 0.48	$ 0.45
Fair value of Series D-1 preferred stock	$ 0.48	$ 0.48	$ 0.45

At December 31, 2016 and 2017, the fair value of the underlying convertible preferred stock was determined using an Option Pricing Method ("OPM"). Under the OPM, once the fair market value of the enterprise is established, shares are valued by creating a series of call options with exercise prices based on the liquidation preference and conversion behavior of the different classes of equity. Accordingly, the aggregate equity value is allocated to each of the classes of equity shares outstanding. At March 31, 2018, the fair value of the underlying convertible preferred stock was determined using a probability-weighted expected return model (the "PWERM") that incorporated two allocation methods: an initial public offering (the "IPO Scenario") and an OPM to project future outcomes of the Company should the Company remain private in the near term (the "Private Scenario"). In the PWERM IPO Scenario, the probability weighting was 30%, and in the Private Scenario, the probability weighting was 70%. The Company utilizes both the market and income approach to establish the fair market value of the enterprise.

Significant increases or decreases in any of these inputs in isolation (including those inputs utilized in the OPM or those in weighted the scenarios in the PWERM) would result in a significantly different fair value measurement. An increase in the risk-free interest rate, and/or an increase in the remaining contractual term or expected volatility, and/or an increase in the fair value of the convertible preferred stock would result in an increase in the fair value of the warrants.

During the year ended December 31, 2016, the Company modified the provisions of its outstanding Series A, B and C convertible preferred stock resulting in the shares outstanding being remeasured at fair value (see Note 8). The Company utilized the OPM to determine the value of each class of convertible preferred stock at the time of remeasurement.

4. Prepaid Expenses and Other Current Assets

Prepaid expenses and other current assets consist of the following:

	December 31, 2016	December 31, 2017	March 31, 2018 (unaudited)
Prepayment to supplier	$ 1,039,565	$ 492,330	$ 1,209,245
Other current assets	802,501	579,182	536,026
Total	$ 1,842,066	$ 1,071,512	$ 1,745,271

5. Property and Equipment, net

Property and equipment, net consist of the following:

	December 31, 2016	December 31, 2017	March 31, 2018 (unaudited)
Computer and office equipment	$ 476,402	$ 476,402	$ 476,402
Lab equipment	3,252,020	3,995,731	3,995,731
Service equipment placed at customer sites	946,006	594,553	594,553
Leasehold improvements	1,795,178	1,860,667	1,860,667
	6,469,606	6,927,353	6,927,353
Less accumulated depreciation and amortization	(2,417,523)	(3,921,565)	(4,313,016)
	$ 4,052,083	$ 3,005,788	$ 2,614,337

The Company recorded depreciation and amortization expense of $1,115,027, $1,504,042, $352,838 and $391,451 for the years ended December 31, 2016 and 2017 and the three months ended March 31, 2017 and 2018, respectively in operating expenses.

6. Accrued Expenses

Accrued expenses consist of the following:

	December 31, 2016	December 31, 2017	March 31, 2018 (unaudited)
Accrued expenses	$ 2,246,071	$ 2,596,137	$ 2,591,969
Accrued bonus	640,655	912,757	202,886
	$ 2,886,726	$ 3,508,894	$ 2,794,855

7. Long-Term Debt

Square 1 LSA

In 2012, the Company amended the Loan and Security Agreement with Square 1 Bank (the "Square 1 LSA") for a $5,000,000 term loan in two tranches (Tranche I and Tranche II, up to $2,000,000 and $3,000,000, respectively) with interest at the prime rate plus 2.50%. The Company drew on Tranche I and Tranche II on June 24, 2013, and July 30, 2013, respectively, after which interest-only payments were due through December 11, 2014, as amended in August 2014, followed by principal payments of $277,778 plus interest per month due in 18 installments beginning in January 14, 2015. The Company began to make principal payments, as required, starting January 2015. In March 2016, the Company repaid the Square 1 LSA as part of entering into the Western Alliance LSA as discussed below.

Western Alliance LSA

On March 8, 2016, the Company entered into the Western Alliance LSA for $7,000,000. The loan proceeds were used to repay the outstanding $5,000,000 loan with Square 1 Bank, as required by the 12th amendment to the Square 1 LSA.

The Western Alliance LSA bears a floating interest rate at the 30-day LIBOR Rate plus 6.52% and will amortize in 30 equal monthly installments beginning on the amortization date described below. The Western Alliance LSA is secured by substantially all assets of the Company and matures on April 1, 2020. The Western Alliance LSA is interest-only until July 8, 2018, which may be extended to October 8, 2018 if the Company is able to secure $21,000,000 in funding prior to June 30, 2018. As of March 31, 2018, the Company has raised $13,400,000 of the $21,000,000 financing milestone.

The Company paid debt issuance costs and a facility fee totaling $113,542 at the inception of the loan, which was recorded as a debt discount and is being recognized as additional interest expense over the term of the loan. Subject to certain limited exceptions, amounts prepaid in relation to the Western Alliance LSA are subject to a prepayment fee based on the then outstanding balance equal to 3% in the first year, 2% in the second year, and 1% thereafter. In addition, upon repayment of the total amounts borrowed, the Company will be required to pay an end of term charge equal to 3.25% of the total amount borrowed. Accordingly, an end of term charge of $227,500 was recorded as debt discount and is included in other long-term liabilities on the balance sheet as of December 31, 2016 and under current liabilities as of December 31, 2017 and March 31, 2018. The end of term charge is being recognized as additional interest expense over the term of the loan.

Additionally, in conjunction with the entry into Western Alliance LSA, the Company issued to Western Alliance Bank a warrant to purchase 510,417 shares of Series D convertible preferred stock at an exercise price of $0.48 per share that was immediately exercisable and expires March 8, 2026. The Company valued the warrant to purchase Series D convertible preferred stock using the Black-Scholes-Merton model, and the initial fair value of the warrant to purchase Series D convertible preferred stock of $65,384 was recorded as a debt discount and is being amortized to interest expense over the term of the loan. The assumptions used in the model were: the fair value of the Series D convertible preferred stock, which was determined using an OPM analysis (see Note 3), an expected life of 2 years, a risk-free interest rate of 0.88% and an expected volatility of 47%.

On December 9, 2016, the Western Alliance LSA was amended, requiring the Company to secure $5,000,000 in funding prior to April 30, 2017 and to secure $15,000,000 in funding between December 1, 2016 and October 8, 2017. In conjunction with this amendment, the Company issued to Western Alliance Bank a warrant to purchase 291,667 shares of Series D-1 convertible preferred stock that were immediately exercisable, expiring December 9, 2026. The Company valued the warrant to purchase Series D-1 convertible preferred stock using the Black-Scholes-Merton model, and the initial fair value of the warrant to purchase Series D-1 convertible preferred stock of $34,300 was recorded as a debt discount and is being amortized to interest expense over the term of the loan. The assumptions used in the model were: the fair value of the Series D-1 convertible preferred stock, which was determined using an OPM analysis (see Note 3), an expected life of 1.2 years, a risk-free interest rate of 0.85% and an expected volatility of 55%.

On November 20, 2017, the Western Alliance LSA was amended requiring the Company to secure $1,500,000 in funding prior to November 20, 2017 and to secure $15,000,000 in funding prior to December 31, 2017. In conjunction with this amendment, the Company agreed to pay an amendment fee of $17,500, which is payable on the earliest to occur of the loan maturity date or the prepayment date. The amount was recorded as a debt discount on the balance sheet and is being recognized as additional interest expense over the remaining term of the loan.

Under the terms of the amended Western Alliance LSA, the Company is subject to operational covenants, including limitations on the Company's ability to incur liens or additional debt, pay dividends, and redeem stock, among other restrictions. The Company is subject to a performance to plan and minimum liquidity financial covenants. The performance to plan restriction requires that the Company's actual trailing six-month revenues, as of any date of determination, shall be no less than seventy-five percent (75%) of projected revenues (the "Revenue Covenant"), as set forth in the Western Alliance LSA. However, the Company is not required to comply with the Revenue Covenant as long as the Company at all times maintains a ratio of its minimum unrestricted cash balance with Western Alliance Bank to its indebtedness with Western Alliance Bank of at least 0.75 to 1.00. As of December 31, 2016, and 2017, and March 31, 2018, the Company was in compliance with its operational covenants.

The Company received a notice of default from Western Alliance Bank notifying the Company that it was in default as of December 31, 2017, as it had failed to secure at least $15,000,000 from the sale or issuance of its equity securities or subordinated debt as set forth in the amended Western Alliance LSA. Based on the notice of default the Company reclassified the total loan balance of $6,729,752 to current liabilities on the consolidated balance sheet as of December 31, 2017, as the loan could be called at any time by Western Alliance Bank.

In February 2018, the Western Alliance LSA was amended requiring the Company to secure $21,000,000 in funding prior to June 30, 2018. As part of the amendment, Western Alliance Bank agreed to forbear from exercising any of its default remedies set forth in the Western Alliance LSA as a result of the Company's loan default.

In June 2018, subsequent to the original issuance of our March 31, 2018 financial statements, the Western Alliance LSA was amended, replacing previously amended funding requirements and requiring the Company to secure $5,000,000 in funding prior to August 3, 2018. Additionally, the amendment restricts Company use of all cash collected from customers, received on and after amendment date, until a total of $2,500,000 is collected. Through June 28, 2018, the Company has collected approximately $900,000 of the $2,500,000 requirement. As part of the amendment, Western Alliance Back waived the existing default.

Convertible Notes

On February 9, 2018, the Company entered into a Note Purchase Agreement (the "Note Purchase Agreement") with various investors, which included related parties (the "Investors"), pursuant to which the Company agreed to sell to the Investors convertible promissory notes (the "Convertible Notes") in the original principal amount of up to $15,960,000. On April 2, 2018, the Company amended the Note Purchase Agreement to, among other things, increase the principal amount available for issuance under the Note Purchase Agreement to $18,372,132. The Convertible Notes have a maturity date of September 30, 2018 and are convertible either into the Company's common stock or convertible preferred stock, dependent on the conversion events as described below.

As of March 31, 2018, the Company had received proceeds of approximately $13,400,000 from the issuance of the Convertible Notes.

Conversion and Liquidity Events

Conversion at Qualifying financing – Upon the closing of an equity financing following the date of the Note Purchase Agreement involving the sale by the Company of its convertible preferred stock in which the Company receives an aggregate of at least $15,000,000 in cumulative gross proceeds the conversion price will equal 75% of the lowest per share cash purchase price of the convertible preferred stock sold by the Company in such qualified financing. The original principal amount and accrued interest under each Convertible Note (the "Conversion Amount") shall automatically convert into convertible preferred stock.

Conversion at Initial Public Offering – Prior to the maturity date if the Company completes an IPO the Conversion Amount will automatically convert into shares of the Company's common stock at an amount equal to the Conversion Amount divided by 75% of the per share cash purchase price of the common stock offered to the public in the IPO.

Optional Conversion at Maturity – Upon maturity, and at the election of the Convertible Note holder, the Conversion Amount will convert into shares of Series D-2 convertible preferred stock as is equal to the Conversion Amount divided by the price per share. The price per share is defined as $60,000,000 divided by the aggregate number of outstanding shares of the Company's common stock as of the maturity date.

Liquidity Event – Upon a liquidation event or deemed liquidation event, the holders of the Convertible Notes will be entitled to receive repayment in an amount equal to 250% of the outstanding principal amount underlying the Convertible Notes and any unpaid interest accrued and outstanding.

The Company evaluated the embedded conversion features within the above convertible notes under ASC 815-10 and ASC 815-15 to determine if they required bifurcation as a derivative instrument. The Company determined the embedded conversion features do not meet the definition of a derivative, and therefore, do not require bifurcation from the host instrument. Since the embedded conversion features were not considered derivatives, the convertible notes were accounted for accordance with ASC 470-20, Debt with Conversion and Other Options.

Debt and unamortized discount balances relating to the Western Alliance LSA are as follows:

	December 31, 2016	December 31, 2017	March 31, 2018 (unaudited)
Term loan face value	$ 7,000,000	$ 7,000,000	$ 7,000,000
Fair value of warrant	(99,684)	(99,684)	(99,684)
End of term charge	(227,500)	(227,500)	(227,500)
Capitalized debt issuance costs	(113,542)	(131,042)	(216,297)
Accretion of debt issuance costs and end of term charge	60,785	148,225	178,151
Accretion of warrant fair value	13,117	39,753	46,412
Balance	6,633,176	6,729,752	6,681,082
Less current portion	587,131	6,729,752	6,681,082
Long-term debt	$ 6,046,045	$ —	$ —

Debt and unamortized discount balances relating to the convertible notes are as follows:

	December 31, 2016	December 31, 2017	March 31, 2018 (unaudited)
Convertible notes face value	$ —	$ —	$13,372,132
Capitalized debt issuance costs	—	—	(42,289)
Balance	—	—	13,329,843
Less current portion	—	—	13,329,843
Long-term debt	$ —	$ —	$ —

Non-cash interest expense related to debt discount amortization and accretion of end of term fees was $73,902, $96,576, $21,558 and $36,586 for the years ended December 31, 2016 and 2017 and three months ended March 31, 2017 and 2018, respectively.

Future minimum payments including interest under the loan and security agreement are as follows as of December 31, 2017:

Total minimum loan payments	$ 8,426,862
Unamortized interest	(1,199,362)
End of term charge	(227,500)
Warrant fair value	(59,931)
Capitalized debt issuance costs and end of term charge	(210,317)
Term loan	$ 6,729,752

8. Convertible Preferred Stock and Stockholders' Deficit

Convertible Preferred Stock

The Company's convertible preferred stock has been classified as temporary equity on the accompanying balance sheets in accordance with authoritative guidance for the classification and measurement of redeemable securities. Upon certain change in control events that are outside of the Company's control, including liquidation, sale or transfer of control of the Company, holders of the convertible preferred stock can cause its redemption. There were 121,992,497 shares of convertible preferred stock outstanding as of December 31, 2017 and March 31, 2018, respectively.

The following sets forth information regarding all convertible preferred stock securities sold since January 1, 2016:

Series D Convertible Preferred Stock Financing

Between March 4, 2016 and April 4, 2016, the Company issued an aggregate of 20,652,486 shares of Series D convertible preferred stock at a purchase price of $0.48 per share, raising approximately $9,700,000, net of share issuance costs of $202,222, excluding the warrant liability discussed below. In conjunction with the Series D convertible preferred stock offering, the Company issued warrants to purchase an aggregate of 31,672,817 of Series D convertible preferred stock. The Company determined that the warrants met the definition of freestanding financial instruments. Accordingly, the fair value of the warrants was recognized as a liability with an offsetting net deduction to convertible preferred stock. The Company valued the Series D convertible preferred stock warrants using the Black-Scholes-Merton model, and the initial fair value was determined to be $4,938,241. The assumptions used in the model included the fair value of the Series D convertible preferred stock of $0.48, an expected life of 1.9 to 2 years, a risk-free interest rate of 0.74% to 0.88% and an expected volatility of 47%.

Series D-1 Convertible Preferred Stock Financing

Between August 5, 2016 and August 29,2016, the Company issued an aggregate of 29,166,671 shares of Series D-1 convertible preferred stock at $0.48 per share, raising approximately $13,800,000, net of share issuance costs of $200,002.

From February through November 2017, the Company sold and issued 36,974,586 shares of Series D-1 convertible preferred stock at $0.48 per share, raising approximately $17,590,000, net of issuance costs of $154,191.

At any time after December 31, 2021, the holders of a majority of the then outstanding Series D-1 convertible preferred stock may redeem any unconverted or unredeemed Series D-1 convertible preferred stock in cash at the greater of the original convertible preferred stock purchase price plus all declared but unpaid dividends or the fair market value. The Company has determined not to adjust the carrying values of the Series D-1 convertible preferred stock to the liquidation preferences of such shares because of the uncertainty over whether or when such an event would occur. The Company has determined that it is not probable that such redemption will occur as a mandatory conversion event, as described below, is expected in advance of the redemption triggers.

Convertible Preferred Stock

The Series A, B, B-1, C, D and D-1 convertible preferred stock (collectively, the "Series Preferred") have the following rights and privileges:

Voting rights

Series Preferred stockholders are entitled to cast the number of votes equal to the number of whole shares of common stock into which the convertible preferred stock is convertible.

Conversion

Each share of Series Preferred is convertible, at any time, into one share of common stock at the then-applicable Conversion Price (as defined below). The Series Preferred is automatically converted into common stock, at the then-applicable Conversion Price, upon (a) the vote or consent of 66-2/3% of the outstanding shares of Series Preferred or (b) upon the closing of a firm-commitment underwritten public offering of shares of common stock of the Company in which (i) the valuation of the Company is at least $150,000,000 (calculated by price per share paid by the public multiplied by the fully-diluted shares of the Company immediately prior to such closing) and (ii) gross proceeds to the Company are at least $30,000,000 (prior to the deduction of underwriting discounts and registration expenses). The Conversion Price shall initially be $1.3995 for each share of Series A, B and B-1 convertible preferred stock, $1.4043 for each share of Series C convertible preferred stock and $0.48 for each share of Series D and D-1 convertible preferred stock. The Conversion Price is subject to adjustment in certain circumstances.

Dividends

Holders of the Series Preferred are entitled to receive cash dividends at the rate of 8% of the applicable Original Issue Price (as defined below) per annum, on a non-cumulative basis, on each outstanding share of Series Preferred. The Company shall not declare any dividends on any shares of Series Preferred other than shares of Series D-1 convertible preferred stock unless the holders of the Series D-1 convertible preferred stock then outstanding first receive, or simultaneously receive, full payment of a dividend. The Original Issue Price is $2.733 per share for the Series A convertible preferred stock, $1.3995 per share for the Series B convertible preferred stock, $1.3995 per share for the Series B-1 convertible preferred stock, $1.4043 per share for the Series C convertible preferred stock, $0.48 per share for the Series D convertible preferred stock and $0.48 per share for the Series D-1 convertible preferred stock, each subject to adjustment in the event of any reorganization, stock split, recapitalization or other similar event involving or affecting a change in the Company's capital structure.

Liquidation Preferences

In the event of liquidation or winding up of the Company, (i) the holders of the Series D and D-1 convertible preferred stock, on a pari passu basis, shall be entitled to receive, prior to and in preference to any payment or distribution to the holders of, Series C convertible preferred stock, Series B and B-1 convertible preferred stock, Series A convertible preferred stock and common stock, a per-share amount equal to the applicable Liquidation Preference (as defined below); (ii) the holders of the Series C convertible preferred stock, on a pari passu basis, shall be entitled to receive, prior to and in preference to any payment or distribution to the holders of Series B and B-1 convertible preferred stock, Series A convertible preferred stock, and common stock, a per-share amount equal to the applicable Liquidation Preference; and (iii) the holders of Series B and B-1 convertible preferred stock and the holders of Series A convertible preferred stock, on a pari passu basis, shall be entitled to receive, prior to and in preference to any payment or distribution to the holders of common stock, a per-share amount equal to the applicable Liquidation Preference. The Liquidation Preference is calculated as follows: (i) when the Company is valued at $91 million or below, the Liquidation Preference is equal to the applicable Original Issue Price for such shares plus the amount of any declared but unpaid dividends and (ii) when the company is valued greater than $91 million, the Liquidation Preference is equal to the applicable Original Issue Price for such shares plus the amount of any declared but unpaid dividends, with the first $10 million of proceeds above $91 million distributed to the holders of the Series D and D-1 convertible preferred stock on a pro rata basis ((i) and (ii) together, "Liquidation Preference").

The authorized shares, purchase price, outstanding shares and Liquidation Preference for each series of convertible preferred stock as of December 31, 2017 and March 31, 2018 (unaudited), are as follows:

	Shares Authorized	Purchase Price Per Share	Shares Outstanding	Liquidation Preference
Convertible preferred stock:				
Series A	418,767	$ 1.39950	345,587	$ 483,649
Series B	8,101,042	$ 1.39950	8,058,170	$ 11,277,409
Series B-1	7,523,734	$ 1.39950	3,437,950	$ 4,811,411
Series C	23,357,047	$ 1.40430	23,357,047	$ 32,800,301
Series D	52,835,720	$ 0.48000	20,652,486	$ 9,913,193
Series D-1	125,808,667	$ 0.48000	66,141,257	$ 31,747,803
Total	218,044,977		121,992,497	$ 91,033,767

Series A, B and C Convertible Preferred Stock Modification

On March 6, 2016 (the "Series A-C Modification Date"), the Company notified existing holders of Series A, B, B-1 and C convertible preferred stock that they would be required to participate in the Series D convertible preferred stock financing at a specified pro rata amount (which equated to their existing applicable ownership percentage of the company).

As of the Series A-C Modification Date, the conversion ratio of Series A, B, B-1 and C convertible preferred stock was adjusted from 1:1 to 1:10 (i.e., 1 share of convertible preferred stock was convertible to 10 shares of common stock) for holders of the Series A, B, B-1 and C convertible preferred stock that elected to participate in the second issuance of the Series D convertible preferred stock financing at or above their pro rata amounts. If the holders of Series A, B, B-1 and C convertible preferred stock did not participate at or above their pro rata amounts, any existing shares of Series A, B, B-1 and C convertible preferred stock were automatically and mandatorily converted into common stock on a 1:1 basis (which represented the existing conversion ratio in effect prior to such modification). Such an automatic conversion would result in the loss of all rights and privileges associated with being a holder of convertible preferred stock (i.e. liquidation preference, board representation and dividend rights).

If the holders of Series A, B, B-1 and C convertible preferred stock elected to participate in the Series D convertible preferred stock financing in excess of their pro rata amount, any additional investment would result in the issuance of warrants to purchase Series D convertible preferred stock. The effective price of the warrants to purchase Series D convertible preferred stock at the date of issuance was a 15% discount from the selling price of the Series D convertible preferred stock.

The Company follows the qualitative approach to assessing changes in terms of convertible preferred stock. Based on its qualitative assessment, the Company determined that the revision of the terms of the Series A, B, B-1 and C convertible preferred stock resulted in both the extinguishment of the Series A, B, B-1 and C convertible preferred stock and the reissuance of the Series A, B, B-1 and C convertible preferred stock. Accordingly, the Company concluded that the difference between the fair value of the post-modification Series A, B, B-1 and C convertible preferred stock and the carrying value of the pre-modification Series A, B, B-1 and C convertible preferred stock should be recognized as an adjustment recorded through accumulated deficit.

The impact of the special mandatory conversion of convertible preferred stock to common stock, as well as the fair value adjustment is as follows:

	Pre-Modification		Post Modification	
	Book Value	Outstanding Shares	Fair Value	Outstanding Shares
Series A preferred stock	$ 4,989,018	1,908,757	$ 61,847	345,587
Series B preferred stock	23,909,095	17,195,333	842,845	8,058,170
Series B-1 preferred stock	10,359,042	7,441,559	359,593	3,437,950
Series C preferred stock	48,930,547	37,752,481	5,547,841	23,357,047
	$ 88,187,702	64,298,130	$ 6,812,126	35,198,754

On August 4, 2016, in connection with the Reverse Stock Split (as defined below), the conversion ratio of the existing Series A, B, B-1 and C convertible preferred stock was adjusted back to 1:1 (i.e., 1 share of convertible preferred stock was convertible to 1 share of common stock).

Warrants

On July 3, 2012, in conjunction with the Square 1 LSA, the Company issued a warrant to purchase 64,309 shares of Series B-1 convertible preferred stock to Square 1 Bank at an exercise price of $1.3995 per-share. The warrant expires in July 2019.

On December 11, 2013, in conjunction with an amendment to the Square 1 LSA, the Company issued a warrant to purchase 10,718 shares of Series B-1 convertible preferred stock to Square 1 Bank at an exercise price of $1.3995 per-share. The warrant expires in December 2020.

On September 17, 2013, in conjunction with the subordinated convertible promissory notes that were issued in connection with the September 2013 Note and Warrant Purchase Agreement, the Company issued warrants to purchase 1,480,988 shares of Series B-1 convertible preferred stock. Per the terms of the September 2013 Note and Warrant Purchase Agreement, the number of shares of Series B-1 convertible preferred stock purchasable under these warrants was increased to 2,123,528 shares as the Company did not complete a qualified financing prior to January 1, 2014. The warrants allow the investors to purchase Series B-1 convertible preferred stock at an exercise price of $1.3995 per-share. The warrants expire in 2023.

On June 12, 2014, in conjunction with the subordinated convertible promissory notes that were issued in connection with the June 2014 Note and Warrant Purchase Agreement, the Company issued warrants to purchase 715,766 shares of Series B-1 convertible preferred stock at an exercise price of $1.3995 per- share. The warrants expire in 2024.

On September 9, 2014 and November 11, 2014, in conjunction with the issuance of Series C convertible preferred stock, the Company issued warrants to purchase 4,450,616 shares and 6,527,568 shares of Series C convertible preferred stock, respectively, at an exercise price of $1.4043 per-share. On March 31, 2016, all warrants to purchase Series C convertible preferred stock issued in conjunction with the Series C convertible preferred stock offering expired under the terms of their issue with no investor electing to exercise their warrants. As such, these warrants have been retired by the Company.

On March 4, 2016, in conjunction with the Series D convertible preferred stock offering, the Company issued warrants to purchase 31,672,817 shares of Series D convertible preferred stock at an exercise price of $0.41 per-share. The warrants expire in 2026.

On March 8, 2016, in conjunction with the Western Alliance LSA, the Company issued a warrant to purchase 510,417 shares of Series D convertible preferred stock to Western Alliance Bank at an exercise price of $0.48 per-share. Additionally, in conjunction with the first amendment to the Western Alliance LSA, on December 9 2016, the Company issued a warrant to purchase 291,667 shares of Series D-1 convertible preferred stock to Western Alliance Bank at an exercise price of $0.48 per-share. Both of these warrants expire in 2026.

All the outstanding warrants to purchase convertible preferred stock are classified as liabilities in the financial statements and are valued at each reporting period using the Black-Scholes-Merton model as discussed in Note 3, “Fair Value Measurements”.

Common Stock

On August 4, 2016, the Company filed a Certificate of Amendment of the Company’s Certificate of Incorporation with the Secretary of State of the State of Delaware to effect a reverse split of common stock at a ratio of one-for-ten, which became effective at the close of business on that day (the “Reverse Stock Split”). As a result, each share of the Company’s common stock outstanding as of August 4, 2016 was automatically changed into one-tenth of a share of common stock, which resulted in a reduction of 30,199,406 shares of common stock issued and outstanding. No fractional shares were issued in connection with the Reverse Stock Split and cash paid to stockholders for potential fractional shares was insignificant. The authorized number of shares and the par value per share of the Company’s common stock were not affected by the Reverse Stock Split.

During 2016, the Company issued 14,546 shares of common stock in connection with the exercise of stock options, for net proceeds of $1,961.

During 2017, the Company issued 303,281 shares of common stock in connection with the exercise of stock options, for net proceeds of $14,265.

During the three months ended March 31, 2018, the Company issued 10,156 shares of common stock in connection with the exercise of stock options, for net proceeds of $305.

Stock Options

The Company’s Amended and Restated 2006 Equity Compensation Plan, as amended (the “Plan”), is to provide designated employees of the Company, its subsidiaries, consultants, advisors and non-employee members of the Board with the opportunity to receive grants of incentive stock options and nonqualified stock options. The Company believes that the Plan will encourage the participants to contribute materially to the growth of the Company, thereby benefiting the Company’s stockholders, and will align the economic interests of the participants with those of the stockholders. As of December 31, 2016, and 2017, and March 31, 2018, the number of shares reserved under the Plan was 21,879,113.

There were 19,889,647, 2,473,263 and 2,482,989 shares available for grant under the Plan as of December 31, 2016 and 2017, and March 31, 2018, respectively. Options granted under the Plan are exercisable at various dates as determined upon grant and will expire no more than ten years from the date of grant, or in the case of certain non-statutory options, exactly ten years from the date of grant. The exercise price of each option shall be determined by the Board of Directors although generally options have an exercise price equal to the fair market value of the Company's stock on the date of the option grant. In the case of incentive stock options, the exercise price shall not be less than 100% of the fair market value of the Company's common stock at the time the option is granted. For holders of more than 10% of the Company's total combined voting power of all classes of stock, incentive stock options may not be granted at less than 110% of the fair market value of the Company's stock at the date of grant and for a term not to exceed five years. Most option grants generally vest 25% on the first anniversary of the original vesting commencement date, with the balance vesting monthly in equal installments over the remaining three years.

A summary of the Company's stock option activity under the Plan is as follows:

	Shares	Weighted-Average Exercise Price	Weighted-Average Remaining Contractual Term	Aggregate Intrinsic Value
Outstanding at December 31, 2016	1,869,821	$ 1.00	8.0	$ —
Granted	19,774,905	0.03		—
Exercised	(303,281)	0.05		$ 80,959
Cancelled	(2,661,802)	0.08		—
Outstanding at December 31, 2017	18,679,643	$ 0.12	9.0	$ —
Granted (unaudited)	16,500	0.03		—
Exercised (unaudited)	(10,156)	0.03		$ 305
Cancelled/Expired (unaudited)	(36,382)	1.65		—
Outstanding at March 31, 2018 (unaudited)	18,649,605	$ 0.12	8.8	$ —
Vested and expected to vest at December 31, 2016	1,664,215	$ 1.08	7.5	$ —
Vested and exerciseable at December 31, 2016	834,785	$ 1.47	5.9	$ —
Vested and expected to vest at December 31, 2017	17,143,899	$ 0.13	9.0	$ —
Vested and exercisable at December 31, 2017	8,283,283	$ 0.20	8.8	$ —
Vested and expected to vest at March 31, 2018 (unaudited)	17,405,910	$ 0.12	8.7	$ —
Vested and exercisable at March 31, 2018 (unaudited)	9,358,506	$ 0.18	8.6	$ —

For the three months ended March 31, 2018, the Company granted to its employee's options to purchase 16,500 shares of its common stock with an exercise price of $0.03 per share.

From February through May 2017, the Company granted to its employee's options to purchase 17,333,212 shares of its common stock with an exercise price of $0.03 per share.

For the years ended December 31, 2016 and 2017, the total grant date fair value of vested options was $246,378 and $365,154, respectively. The weighted-average grant date fair value of employee option grants during the years ended December 31, 2016 and 2017 was $0.03.

For the three months ended March 31, 2017 and 2018, the total grant date fair value of vested options was $111,512 and $56,193, respectively. The weighted-average grant date fair value of employee option grants during the three months ended March 31, 2017 and 2018 was $0.03.

Stock-Based Compensation Expense

The Company recognized stock-based compensation expense of $130,643, $382,830, $122,580 and $54,444 for the years ended December 31, 2016 and 2017 and the three months ended March 31, 2017 and 2018, respectively.

The weighted-average assumptions used in the Black-Scholes option pricing model to determine the fair value of the employee stock option grants were as follows:

	Year Ended December 31,		Three Months Ended March 31,	
	2016	2017	2017	2018
			(unaudited)	
Risk-free interest rate	1.1 - 1.4%	1.8 - 2.0%	1.9%	2.5%
Expected volatility	77 - 83%	58 - 67%	59%	63%
Expected term (in years)	5.3 - 5.4	5.1 - 5.3	5.1	4.0
Expected dividend yield	0%	0%	0%	0%

Risk-free interest rate. The risk-free rate assumption is based on the U.S. Treasury instruments, the terms of which were consistent with the expected term of the Company's stock options.

Expected volatility. Due to the Company's limited operating history and lack of company-specific historical or implied volatility as a private company, the expected volatility assumption was determined by examining the historical volatilities of a group of industry peers whose share prices are publicly available.

Expected term. The expected term of stock options represents the weighted-average period the stock options are expected to be outstanding. The Company uses the simplified method for estimating the expected term as provided by the Securities and Exchange Commission. The simplified method calculates the expected term as the average of the time-to-vesting and the contractual life of the options.

Expected dividend yield. The expected dividend assumption is based on the Company's history and expectation of dividend payouts. The Company has not paid and does not intend to pay dividends.

Forfeitures. The Company reduces stock-based compensation expense for actual forfeitures during the period.

As of December 31, 2016 and 2017 and March 31, 2018, the unrecognized compensation cost related to outstanding employee options was $393,213, $282,642 and $237,503, respectively, and is expected to be recognized as expense over approximately 2.6 years, 1.6 years and 1.4 years, respectively.

Common Stock Reserved for Future Issuance

Common stock reserved for future issuance consist of the following:

	Year Ended December 31,		Three Months Ended March 31, 2018
	2016	2017	(unaudited)
Convertible preferred stock	85,017,911	121,992,497	121,992,497
Stock options issued and outstanding	1,869,821	18,679,643	18,649,605
Authorized for future stock awards or option grants	19,889,647	2,473,263	2,482,989
Preferred warrants	36,676,737	36,603,557	36,603,557
Total	143,454,116	179,748,960	179,728,648

9. Commitments and Contingencies

Leases

The Company leases certain office and lab space in San Diego, California under a non-cancelable operating lease, which was amended July 1, 2015 to add laboratory space and office space and extend its terms through December 2020. Rent expense was $495,475, $590,089, $147,522, and $147,522 for the years ended December 31, 2016 and 2017 and three months ended March 31, 2017 and 2018, respectively, including the offset for amortization of the leasehold incentive obligation of $150,035, $225,052, $34,311 and $59,199 for the years ended December 31, 2016 and 2017 and the three months ended March 31, 2017 and 2018, respectively.

The future minimum lease payments required under non-cancelable leases as of December 31, 2017, are summarized as follows:

Year Ending December 31,	
2018	$ 826,884
2019	862,656
2020	902,412
Total minimum lease payments	$ 2,591,952

Royalty Agreements

The Company has entered into agreements to market and distribute chips and kits used in its instruments. Pursuant to these agreements, the Company is obligated to pay royalties based on sales during each annual license period and is obligated to make minimum payments regardless of the level of sales achieved. The Company has paid $221,688, $233,128, $44,654 and $86,517 for the years ended December 31, 2016 and 2017 and the three months ended March 31, 2017 and 2018, respectively.

Such royalty agreements extend through the life of underlying intellectual property which is affected by patent filing date and jurisdiction. As of December 31, 2017, annual future minimum royalty payments under the Company's royalty agreements total $70,000, on a continuing basis, and extend through November 29, 2026.

Purchase Commitments

The Company has a contractual commitment with a supplier to purchase $100,000 of products each quarter until the first quarter of 2019. The Company is not able to determine the aggregate amount of other such purchase orders that represent contractual obligations, as purchase orders may represent authorizations to purchase rather than binding agreements. The Company's purchase orders are based on its current procurement or development needs and are fulfilled by the Company's vendors within short time horizons.

Litigation

The Company is subject to potential liabilities under various claims and legal actions that are pending or may be asserted. These matters arise in the ordinary course and conduct of the business. The Company intends to continue to defend itself vigorously in such matters. The Company regularly assesses contingencies to determine the degree of probability and range of possible loss for potential accrual in the financial statements. An estimated loss contingency is accrued in the financial statements if it is probable that a liability has been incurred and the amount of the loss can be reasonably estimated. Based on the Company's assessment, it currently does not have any amount accrued as it is not a defendant in any claims or legal actions.

10. Income Taxes

	December 31,	
	2016	2017
Deferred tax assets:		
Net operating loss carryforwards	$ 39,333,135	$ 30,528,420
Research and development credits	3,057,595	4,078,522
Other	884,910	1,163,659
Total gross	43,275,640	35,770,601
Valuation allowance	(43,275,640)	(35,770,601)
Net deferred tax assets	$ —	$ —

The provision for domestic and foreign income taxes is as follows:

	Years Ended December 31,	
	2016	2017
Current:		
Foreign	$ 12,060	$ 16,996
State and local	864	1,556
Income tax provision	$ 12,924	$ 18,552

The domestic and foreign components of income (loss) from continuing operations are as follows:

	Years Ended December 31,	
	2016	2017
Domestic	$ (18,892,417)	$ (23,455,215)
Foreign	56,726	108,403
Loss before provision for income taxes	$ (18,835,691)	$ (23,346,812)

A reconciliation of the income tax computed at the federal statutory tax rate to the expense for income taxes for the years ended December 31, 2016 and 2017 is as follows:

	December 31,	
	2016	2017
Tax at statutory rate	$ (6,404,287)	$ (7,939,075)
State income taxes, net of federal benefits	(195,417)	(376,232)
Change in valuation allowance	7,278,255	(7,523,665)
Tax Cuts and Jobs Act	—	16,552,989
Other permanent differences	394,784	542,487
Credits	(1,060,411)	(1,237,952)
Income tax expense	$ 12,924	$ 18,552

On December 22, 2017, the President of the United States signed into law the Tax Cuts and Jobs Act (the "Act"). The Act amends the Internal Revenue Code to reduce tax rates and modify policies, credits, and deductions for individuals and businesses. For businesses, the Act reduces the corporate tax rate from a maximum of 35% to a flat 21% rate. The rate reduction is effective on January 1, 2018. The Company has calculated its best estimate of the impact of the Act and as a result of the rate reduction, the Company has recorded a reduction to the deferred tax asset balance as of December 31, 2017 by $16.6 million, offset by a full valuation allowance. The Company has reduced its valuation allowance by $7.5 million due to the full valuation allowance position. The reduction in the valuation allowance includes the revaluation of the deferred tax assets, current year losses, and other timing items.

On December 22, 2017, Staff Accounting Bulletin No. 118 ("SAB 118") was issued to address the application of GAAP in situations when a registrant does not have the necessary information available, prepared, or analyzed (including computations) in reasonable detail to complete the accounting for certain income tax effects of the Act. In accordance with SAB 118, the Company's provisional determination is that there is no deferred tax benefit or expense with respect to the remeasurement of certain deferred tax assets and liabilities due to the full valuation allowance against net deferred tax assets. Additional analysis of the law and the impact to the Company will be performed and any impact will be recorded in the respective quarter in 2018. The Company did not record any adjustments to this provisional amount during the three months ended March 31, 2018 and will continue to analyze and refine its calculations related to the remeasurement as the impact of the Act is finalized.

As of December 31, 2017, the Company has federal and state tax net operating loss carryforwards of $128.3 million and $51.0 million, respectively. The federal and state tax loss carryforwards begin to expire in 2027 and 2031, respectively, unless previously utilized. The Company also has federal and California research credit carryforwards of $4.0 million and $3.6 million, respectively. The federal research credit carryforwards and state credit carryforwards begin to expire in 2027 unless previously utilized. The California research credits carry forward indefinitely.

Management assesses all available evidence to estimate if sufficient future taxable income will be generated to use the existing deferred tax assets. The Company has experienced net losses since inception, and the revenue and income potential of the Company's business and market are unproven. Due to the Company's continuing research and development activities, the Company expects to continue to incur net losses into the foreseeable future. As such, the Company cannot conclude that it is more likely than not that its deferred tax assets will be realized. A valuation allowance of $43.3 million and $35.8 million as of December 31, 2016 and 2017, respectively, has been established to offset the deferred tax assets, as realization of such assets is uncertain.

Utilization of the net operating losses and research and development ("R&D") credit carryforwards are subject to annual limitations due to ownership change limitations that have occurred or that could occur in the future, as required by Section 382 of the Internal Revenue Code of 1986, as amended (the "Code"), as well as similar state and foreign provisions. These ownership changes may limit the amount of net operating losses and R&D credit carryforwards that can be utilized annually to offset future taxable income and tax, respectively. In general, an "ownership change" as defined by Section 382 of the Code results from a transaction or series of transactions over a three-year period resulting in an ownership change of more than 50 percentage points of the outstanding stock of a company by certain stockholders.

During 2013, the Company completed a Section 382/383 analysis, from inception through December 31, 2012, regarding the limitation of the net operating losses and R&D credits. Based upon the analysis, the Company determined that no ownership changes occurred during that period. However, there may have been ownership changes subsequent to December 31, 2012, that could limit the Company's ability to utilize the net operating loss and R&D credit carryforwards. The Company plans to complete an analysis prior to using any of the net operating losses and R&D credits.

The Company is subject to taxation in the United States and the United Kingdom. The Company's tax years from 2007 (inception) are subject to examination by the United States and state authorities due to the carry forward of unutilized net operating losses and R&D credits.

A reconciliation of the beginning and ending amount of unrecognized tax benefits for 2016 and 2017, excluding interest and penalties, is as follows:

	December 31,	
	2016	2017
Balance at beginning of the year	$ 1,903,164	$ 2,451,121
Additions/(reductions) for tax positions - prior year	34,365	—
Increase related to prior year positions - current year	513,592	567,442
Increase related to current year positions	—	—
Balance at the end of the year	$ 2,451,121	$ 3,018,563

The Company recognizes the impact of uncertain tax positions at the largest amount that is “more likely than not” to be sustained upon audit by the relevant taxing authority. An uncertain tax position will not be recognized if it has less than a 50% likelihood of being sustained. Due to the valuation allowance position, none of the unrecognized tax benefits, if recognized, will impact the Company’s effective tax rate. The Company does not anticipate a significant change in the unrecognized tax benefits during the next twelve months.

11. Employee Benefits

The Company has a defined contribution 401(k) plan available to eligible employees. Under the terms of the plan, employees may make voluntary contributions as a percent of compensation, limited to the maximum amount allowable under federal tax regulations. The Company, at its discretion, may make certain contributions to the 401(k) plan. The Company made matching contributions of $408,675 and $395,360, and, $130,760 and $93,769, for the years ended December 31, 2016 and 2017 and the three months ended March 31, 2017 and 2018, respectively.

12. Subsequent Events

For the purposes of the financial statements as of December 31, 2017 and the year then ended, the Company identified subsequent events through May 11, 2018, the date on which the financial statements were issued. These events are discussed in Note 7, Long-Term Debt.

For the purposes of the financial statements as of March 31, 2018 and the three months then ended, the Company has evaluated subsequent events through June 11, 2018, the date on which the financial statements were originally issued, and, with respect to the waiver of the debt default discussed in Note 7, Long-Term Debt, through June 28, 2018. Such subsequent events are unaudited.

Shares

Common Stock

Sole Book-Running Manager
Roth Capital Partners

Lead Manager
Maxim Group LLC

Through and including , 2018 (the 25th day after the date of this prospectus), all dealers that effect transactions in these securities, whether or not participating in this offering, may be required to deliver a prospectus. This is in addition to a dealer's obligation to deliver a prospectus when acting as an underwriter and with respect to an unsold allotment or subscription.

PART II

INFORMATION NOT REQUIRED IN PROSPECTUS

Unless otherwise indicated, all references to "Bionano," the "company," "we," "our," "us" or similar terms refer to Bionano Genomics, Inc. and its subsidiaries.

Item 13. Other Expenses of Issuance and Distribution.

The following table sets forth all expenses to be paid by us, other than underwriting discounts and commissions, in connection with this offering. All amounts shown are estimates except for the SEC registration fee, the FINRA filing fee and the exchange listing fee.

SEC registration fee	$ 4,295.25
FINRA filing fee	5,625
Exchange listing fee	*
Printing and engraving expenses	*
Legal fees and expenses	*
Accounting fees and expenses	*
Custodian transfer agent and registrar fees	*
Miscellaneous expenses	*
Total	$ *

* To be provided by amendment.

Item 14. Indemnification of Directors and Officers.

Section 145 of the Delaware General Corporation Law authorizes a court to award, or a corporation's board of directors to grant, indemnity to directors and officers in terms sufficiently broad to permit such indemnification under certain circumstances for liabilities, including reimbursement for expenses incurred, arising under the Securities Act. Our amended and restated certificate of incorporation that will be in effect on the closing of this offering permits indemnification of our directors, officers, employees and other agents to the maximum extent permitted by the Delaware General Corporation Law, and our amended and restated bylaws that will be in effect on the closing of this offering provide that we will indemnify our directors and officers and permit us to indemnify our employees and other agents, in each case to the maximum extent permitted by the Delaware General Corporation Law.

We have entered into indemnification agreements with our directors and officers, whereby we have agreed to indemnify our directors and officers to the fullest extent permitted by law, including indemnification against expenses and liabilities incurred in legal proceedings to which the director or officer was, or is threatened to be made, a party by reason of the fact that such director or officer is or was a director, officer, employee, or agent of Bionano Genomics, Inc., provided that such director or officer acted in good faith and in a manner that the director or officer reasonably believed to be in, or not opposed to, the best interest of Bionano Genomics, Inc.

At present, there is no pending litigation or proceeding involving a director or officer of Bionano Genomics, Inc. regarding which indemnification is sought, nor is the registrant aware of any threatened litigation that may result in claims for indemnification.

We maintain insurance policies that indemnify our directors and officers against various liabilities arising under the Securities Act and the Securities Exchange Act of 1934, as amended, that might be incurred by any director or officer in his capacity as such.

The underwriters are obligated, under certain circumstances, under the underwriting agreement to be filed as Exhibit 1.1 to this Registration Statement, to indemnify us and our officers and directors against liabilities under the Securities Act.

Item 15. Recent Sales of Unregistered Securities.

The following sets forth information regarding all unregistered securities sold since January 1, 2015:

(1) In February 2016, we issued convertible promissory notes in the aggregate principal amount of $1.5 million with an interest rate of 8% per annum. These notes converted into an aggregate of 3,138,013 shares of our Series D convertible preferred stock in March 2016, as described in paragraph (2) below.

(2) In March 2016, we sold and issued an aggregate of 16,224,422 shares of our Series D convertible preferred stock and warrants to purchase an aggregate of 20,941,734 shares of our Series D convertible preferred stock to accredited investors in the first closing of our Series D financing. In this closing, we sold and issued an aggregate of 16,224,422 shares of our Series D convertible preferred stock at a purchase price of $0.48 per share for gross proceeds of approximately $7.8 million, which included the conversion of an aggregate of approximately $1.5 million in principal and accrued interest outstanding under the subordinated convertible promissory notes described in paragraph (1) above into an aggregate of 3,138,013 shares of our Series D convertible preferred stock at a conversion price equal to the purchase price in the financing. The warrants to purchase our Series D convertible preferred stock were sold and issued at a purchase price of $0.001 per share for an aggregate purchase price of approximately $20,941.

(3) In March 2016, we issued a warrant to purchase an aggregate of 510,417 shares of our Series D convertible preferred stock to Western Alliance Bank in connection with the entry into our Loan and Security Agreement with Western Alliance Bank.

(4) In April 2016, we held a second closing of our Series D financing, pursuant to which we sold and issued 4,428,064 shares of our Series D convertible preferred stock to accredited investors at a purchase price of $0.48 per share, for gross proceeds of approximately $2.1 million, and warrants to purchase 10,731,083 shares of our Series D convertible preferred stock at a purchase price of $0.001 per share for an aggregate purchase price of approximately $10,731.

(5) In August 2016, we sold and issued an aggregate of 2,083,335 shares of our Series D-1 convertible preferred stock to accredited investors in the first closing of our Series D-1 financing, at a purchase price of $0.48 per share, for gross proceeds of approximately $1.0 million.

(6) In August 2016, we held a second closing of our Series D-1 financing, pursuant to which we sold and issued 20,833,336 shares of our Series D-1 convertible preferred stock to accredited investors, at a purchase price of $0.48 per share, for gross proceeds of approximately $10.0 million.

(7) In August 2016, we held a third closing of our Series D-1 financing, pursuant to which we sold and issued 6,250,000 shares of our Series D-1 convertible preferred stock to accredited investors, at a purchase price of $0.48 per share, for gross proceeds of approximately $3.0 million.

(8) In December 2016, we issued a warrant to purchase 291,667 shares of our Series D-1 convertible preferred stock to Western Alliance Bank in connection with an amendment to our loan facility with Western Alliance Bank.

(9) In February 2017, we held a fourth closing of our Series D-1 financing, pursuant to which we sold and issued 10,416,667 shares of our Series D-1 convertible preferred stock to accredited investors, at a purchase price of $0.48 per share, for gross proceeds of approximately $5.0 million.

(10) In March 2017, we held a fifth closing of our Series D-1 financing, pursuant to which we sold and issued 2,083,334 shares of our Series D-1 convertible preferred stock to accredited investors, at a purchase price of $0.48 per share, for gross proceeds of approximately $1.0 million.

(11) In March 2017, we held a sixth closing of our Series D-1 financing, pursuant to which we sold and issued 2,083,334 shares of our Series D-1 convertible preferred stock to accredited investors, at a purchase price of $0.48 per share, for gross proceeds of approximately $1.0 million.

(12) In April 2017, we held a seventh closing of our Series D-1 financing, pursuant to which we sold and issued 1,041,667 shares of our Series D-1 convertible preferred stock to accredited investors, at a purchase price of $0.48 per share, for gross proceeds of approximately $0.5 million.

(13) In May 2017, we held an eighth closing of our Series D-1 financing, pursuant to which we sold and issued 1,145,834 shares of our Series D-1 convertible preferred stock to accredited investors, at a purchase price of $0.48 per share, for gross proceeds of approximately $0.6 million.

(14) In May 2017, we held a ninth closing of our Series D-1 financing, pursuant to which we sold and issued 2,083,334 shares of our Series D-1 convertible preferred stock to accredited investors, at a purchase price of $0.48 per share, for gross proceeds of approximately $1.0 million.

(15) In July 2017, we held a tenth closing of our Series D-1 financing, pursuant to which we sold and issued 8,745,417 shares of our Series D-1 convertible preferred stock to accredited investors, at a purchase price of $0.48 per share, for gross proceeds of approximately $4.2 million.

(16) In August 2017, we held an eleventh closing of our Series D-1 financing, pursuant to which we sold and issued 6,250,000 shares of our Series D-1 convertible preferred stock to accredited investors, at a purchase price of $0.48 per share, for gross proceeds of approximately $3.0 million.

(17) In November 2017, we held a twelfth closing of our Series D-1 financing, pursuant to which we sold and issued 3,125,000 shares of our Series D-1 convertible preferred stock to accredited investors, at a purchase price of $0.48 per share, for gross proceeds of approximately $1.5 million.

(18) In February 2018, we issued convertible promissory notes in the aggregate principal amount of approximately $13.4 million with an interest rate of 8% per annum. In connection with the completion of our initial public offering, the principal amount of the convertible promissory notes and accrued interest thereon will automatically convert into shares of our common stock, assuming an initial public offering price of $ per share and a conversion date of , 2018.

(19) From January 1, 2015 through April 30, 2018, we granted to our directors, employees, consultants and other service providers options to purchase 21,026,562 shares of our common stock with per share exercise prices ranging from $0.03 to $1.50 under our Amended and Restated 2006 Equity Compensation Plan, as amended.

None of the foregoing transactions involved any underwriters, underwriting discounts or commissions, or our public offering. Unless otherwise specified above, we believes these transactions were exempt from registration under the Securities Act in reliance on Section 4(a)(2) of the Securities Act (and Regulation D or Regulation S promulgated thereunder), or Rule 701 promulgated under Section 3(b) of the Securities Act as transactions by an issuer not involving any public offering or under benefit plans and contracts relating to compensation as provided under Rule 701. The recipients of the securities in each of these transactions represented their intentions to acquire the securities for investment only and not with a view to or for sale in connection with any distribution thereof, and appropriate legends were placed on the share certificates issued in these transactions. All recipients had adequate access, through their relationships with us, to information about us. The sales of these securities were made without any general solicitation or advertising.

Item 16. Exhibits and Financial Statement Schedules.

(a) Exhibits.

Exhibit Number	Description
1.1+	Form of Underwriting Agreement.
3.1	Eighth Amended and Restated Certificate of Incorporation, as amended.
3.2+	Form of Amended and Restated Certificate of Incorporation, to be in effect upon the closing of the offering.
3.3	Bylaws, as amended.
3.4+	Form of Amended and Restated Bylaws, to be in effect upon the closing of the offering.
4.1+	Form of Common Stock Certificate.
4.2	Form of Warrant to Purchase Series B Preferred Stock issued to Square 1 Bank.
4.3	Form of Warrant to Purchase Series B-1 Preferred Stock issued to Square 1 Bank.
4.4	Form of Warrant to Purchase Series B-1 Preferred Stock issued to investors.
4.5	Form of Warrant to Purchase Series D Preferred Stock issued to Western Alliance Bank.
4.6	Form of Warrant to Purchase Series D Preferred Stock issued to investors.
4.7	Warrant to Purchase Series D-1 Preferred Stock issued to Western Alliance Bank.
4.8+	Form of Representative's Warrant (included in Exhibit 1.1).
5.1+	Opinion of Cooley LLP.
10.1	Fifth Amended and Restated Investors' Rights Agreement, dated August 5, 2016.
10.2	Bionano Genomics, Inc. Amended and Restated 2006 Equity Compensation Plan (the "2006 Plan").
10.3	Forms of grant notice, stock option agreement and notice of exercise under the 2006 Plan.
10.4+	Bionano Genomics, Inc. 2018 Equity Incentive Plan (the "2018 Plan").
10.5+	Forms of grant notice, stock option agreement and notice of exercise under the 2018 Plan.
10.6+	Forms of restricted stock unit grant notice and award agreement under the 2018 Plan.
10.7+	Bionano Genomics, Inc. 2018 Employee Stock Purchase Plan.
10.8+	Form of Indemnification Agreement by and between the Registrant and each director and executive officer.
10.9+	Bionano Genomics, Inc. Non-Employee Director Compensation Policy.
10.10	Employment Agreement by and between the Registrant and R. Erik Holmlin, Ph.D., dated November 7, 2017, as amended.
10.11	Employment Agreement by and between the Registrant and Han Cao, Ph.D., dated November 7, 2017, as amended.
10.12	Employment Agreement by and between the Registrant and Mike Ward, dated July 1, 2016.
10.13	Employment Agreement by and between the Registrant and Warren Robinson, dated November 7, 2017.
10.14	Employment Agreement by and between the Registrant and Mark Borodkin, dated November 7, 2017.
10.15	Loan and Security Agreement by and between the Registrant and Western Alliance Bank, dated March 8, 2016.
10.16	First Amendment to the Loan and Security Agreement by and between the Registrant and Western Alliance Bank, dated December 9, 2016.

Exhibit Number	Description
10.17	Second Amendment to the Loan and Security Agreement by and between the Registrant and Western Alliance Bank, dated May 2, 2017.
10.18	Third Amendment to the Loan and Security Agreement by and between the Registrant and Western Alliance Bank, dated November 20, 2017.
10.19	Forbearance and Fourth Amendment to the Loan and Security Agreement by and between the Registrant and Western Alliance Bank, dated February 9, 2018.
10.20	Lease by and between the Registrant and The Irvine Company LLC, dated January 16, 2012.
10.21	First Amendment to the Lease by and between the Registrant and The Irvine Company LLC, dated September 10, 2013.
10.22	Second Amendment to the Lease by and between the Registrant and The Irvine Company LLC, dated July 1, 2015.
10.23*	Master Services Agreement by and between the Registrant and Skorpios Technologies, Inc. (f/k/a Novati Technologies, Inc. and f/k/a SVTC Technologies, LLC), dated March 2, 2009, as amended.
10.24*	Manufacturing Services Agreement by and between the Registrant and Paramit Corporation, dated February 18, 2015.
10.25*	License Agreement by and between Princeton University and the Registrant, dated January 7, 2004.
10.26*	First Amendment to the License Agreement by and between Princeton University and the Registrant, dated December 17, 2004.
10.27*	Second Amendment to the License Agreement by and between Princeton University and the Registrant, dated February 25, 2010.
10.28	Third Amendment to the License Agreement by and between Princeton University and the Registrant, dated October 17, 2011.
10.29*	Fourth Amendment License Agreement by and between Princeton University and the Registrant, dated February 9, 2012.
10.30*	Agreement by and between the Registrant and Berry Genomics Co., Ltd. dated August 2, 2016.
10.31*	Sublicense Agreement by and between the Registrant and Industry 3200 dated December 27, 2013.
10.32*	License Agreement by and between the Registrant and Q Biotechnology CV dated May 1, 2014.
10.33*	Amendment to Non-Exclusive Patent License Agreement by and between the Registrant and Q Biotechnology CV dated May 1, 2014.
10.34*	License Agreement by and between the Registrant and New York University dated November 4, 2013.
10.35*	Option and Sublicense Agreement by and between the Registrant and Pacific Biosciences of California, Inc. dated February 2, 2016.
10.36	Note Purchase Agreement by and among the Registrant and the Investors listed on Exhibit A thereto, dated February 9, 2018.
10.37	First Amendment to Note Purchase Agreement by and among the Registrant and the Investors listed on the Schedule of Investors attached thereto, dated April 2, 2018.
10.38	Fifth Amendment to Loan and Security Agreement by and between the Registrant and Western Alliance Bank, dated June 13, 2018.
21.1	Subsidiaries of the Registrant.
23.1	Consent of Deloitte & Touche LLP, independent registered public accounting firm.
23.2+	Consent of Cooley LLP (included in Exhibit 5.1).
24.1	Power of Attorney (see signature pages).

\+ To be filed by amendment.
* Confidential treatment has been requested with respect to certain portions of this exhibit. Omitted portions have been filed separately with the SEC.

(b) Financial Statement Schedules.

All financial statement schedules are omitted because the information required to be set forth therein is not applicable or is shown in the financial statements or the notes thereto.

Item 17. Undertakings.

(a) The undersigned registrant hereby undertakes to provide to the underwriters at the closing specified in the underwriting agreement certificates in such denominations and registered in such names as required by the underwriters to permit prompt delivery to each purchaser.

(b) Insofar as indemnification for liabilities arising under the Securities Act may be permitted to directors, officers and controlling persons of the registrant under the foregoing provisions, or otherwise, the registrant has been advised that in the opinion of the SEC such indemnification is against public policy as expressed in the Securities Act and is, therefore, unenforceable. In the event that a claim for indemnification against such liabilities (other than the payment by the registrant of expenses incurred or paid by a director, officer, or controlling person of the registrant in the successful defense of any action, suit, or proceeding) is asserted by such director, officer, or controlling person in connection with the securities being registered, the registrant will, unless in the opinion of its counsel the matter has been settled by controlling precedent, submit to a court of appropriate jurisdiction the question whether such indemnification by it is against public policy as expressed in the Securities Act and will be governed by the final adjudication of such issue.

(c) The undersigned registrant hereby undertakes that:

(1) For purposes of determining any liability under the Securities Act, the information omitted from the form of prospectus filed as part of this registration statement in reliance on Rule 430A and contained in a form of prospectus filed by the registrant under Rule 424(b)(1) or (4) or 497(h) under the Securities Act will be deemed to be part of this registration statement as of the time it was declared effective.

(2) For the purpose of determining any liability under the Securities Act of 1933, as amended, each post-effective amendment that contains a form of prospectus will be deemed to be a new registration statement relating to the securities offered therein, and the offering of such securities at that time will be deemed to be the initial bona fide offering thereof.

SIGNATURES

Pursuant to the requirements of the Securities Act of 1933, as amended, the registrant has duly caused this registration statement to be signed on its behalf by the undersigned, thereunto duly authorized, in San Diego, California on June 28, 2018.

BIONANO GENOMICS, INC.

By: /s/ R. Erik Holmlin, Ph.D.
Name: R. Erik Holmlin, Ph.D.
Title: President and Chief Executive Officer

POWER OF ATTORNEY

KNOW ALL PERSONS BY THESE PRESENTS, that each person whose signature appears below constitutes and appoint R. Erik Holmlin, Ph.D. and Mike Ward, and each one of them, as his true and lawful attorneys-in-fact and agents, with full power of substitution and resubstitution, for him and in their name, place and stead, in any and all capacities, to sign any and all amendments (including post-effective amendments) to this registration statement, and to sign any registration statement for the same offering covered by this registration statement that is to be effective on filing pursuant to Rule 462(b) under the Securities Act of 1933, as amended, and all post-effective amendments thereto, and to file the same, with all exhibits thereto and other documents in connection therewith, with the Securities and Exchange Commission, granting unto said attorneys-in-fact and agents, and each of them, full power and authority to do and perform each and every act and thing requisite and necessary to be done in connection therewith, as fully to all intents and purposes as he might or could do in person, hereby ratifying and confirming all that said attorneys-in-fact and agents or any of them, or his substitute or substitutes, may lawfully do or cause to be done by virtue hereof.

Pursuant to the requirements of the Securities Act of 1933, as amended, this registration statement has been signed by the following persons in the capacities and on the dates indicated.

Signature	Title	Date
/s/ R. Erik Holmlin, Ph.D. R. Erik Holmlin, Ph.D.	Chief Executive Officer and Director (*Principal Executive Officer*)	June 28, 2018
/s/ Mike Ward Mike Ward	Chief Financial Officer (*Principal Financial and Accounting Officer*)	June 28, 2018
/s/ David L. Barker, Ph.D. David L. Barker, Ph.D.	Director	June 28, 2018
/s/ Darren Cai, Ph.D. Darren Cai, Ph.D.	Director	June 28, 2018
/s/ Albert A. Luderer, Ph.D. Albert A. Luderer, Ph.D.	Director	June 28, 2018
/s/ Junfeng Wang Junfeng Wang	Director	June 28, 2018

EIGHTH AMENDED AND RESTATED
CERTIFICATE OF INCORPORATION
OF
BIONANO GENOMICS, INC.

(Pursuant to Sections 242 and 245 of the
General Corporation Law of the State of Delaware)

BioNano Genomics, Inc., a corporation organized and existing under and by virtue of the provisions of the General Corporation Law of the State of Delaware, as the same may be amended from time to time (the "**General Corporation Law**").

DOES HEREBY CERTIFY:

1. That the original name of this corporation was BioNanomatrix, Inc. and the Certificate of Incorporation of this corporation was originally filed with the Secretary of State of the State of Delaware on August 16, 2007.

2. That the Board of Directors of this corporation (the "**Board**") duly adopted resolutions proposing to amend and restate the Seventh Amended and Restated Certificate of Incorporation of this corporation, as amended (the "**Restated Certificate**"), declaring said amendment and restatement to be advisable and in the best interests of this corporation and its stockholders, and authorizing the appropriate officers of this corporation to solicit the consent of the stockholders therefor, which resolution setting forth the proposed amendment and restatement is as follows:

RESOLVED, that the Restated Certificate be amended and restated in its entirety to read as follows:

FIRST: The name of this corporation is BioNano Genomics, Inc. (the "**Corporation**").

SECOND: The address of the registered office of the Corporation in the State of Delaware is 1209 Orange Street, in the City of Wilmington, County of New Castle, DE 19801. The name of its registered agent at such address is The Corporation Trust Company.

THIRD: The nature of the business or purposes to be conducted or promoted is to engage in any lawful act or activity for which corporations may be organized under the General Corporation Law.

FOURTH: The total number of shares of all classes of stock which the Corporation shall have authority to issue is (i) 190,268,153 shares of Common Stock, $0.0001 par value per share ("**Common Stock**") and (ii) 165,153,010 shares of Preferred Stock, par value $0.0001 per share, 418,767 shares of which are designated "Series A Convertible Participating Preferred Stock" (the "**Series A Preferred Stock**"), 8,101,042 shares of which are designated "Series B Convertible Participating Preferred Stock" (the "**Series B Preferred Stock**"), 7,523,734 shares of which are designated "Series B-1 Convertible Participating Preferred Stock" (the "**Series B-1 Preferred Stock**", and together with the Series B Preferred Stock, the "**Series B/B-1 Preferred Stock**,"), 23,357,047 shares of which are designated "Series C Convertible Participating Preferred Stock"

(the "**Series C Preferred Stock**"), 52,835,720 shares of which are designated "Series D Convertible Participating Preferred Stock" (the "**Series D Preferred Stock**"), and 72,916,700 shares of which are designated "Series D-1 Convertible Participating Preferred Stock" (the "**Series D-1 Preferred Stock**" and, together with the Series A Preferred Stock, the Series B/B-1 Preferred Stock, the Series C Preferred Stock, and the Series D Preferred Stock, the "**Series Preferred**").

Effective at the time of filing of this Certificate of Incorporation with the Secretary of State of the State of Delaware, every ten (10) shares of Common Stock issued and outstanding shall, automatically and without any action on the part of the respective holder thereof, be converted, combined into and shall become one (1) share of Common Stock without increasing or decreasing the par value of each share of Common Stock (the "**Reverse Split**"); provided, however, that the Corporation shall issue no fractional shares of Common Stock as a result of the Reverse Split, but shall instead pay to any stockholder who would be entitled to receive a fractional share as a result of the actions set forth herein a sum in cash equal to the fair market value of the shares constituting such fractional share as determined in good faith by the Board. The Reverse Split shall occur whether or not the certificates representing such shares of Common Stock are surrendered to the Corporation or its transfer agent. The Reverse Split shall be effected on a record holder-by-record holder basis, such that any fractional shares of Common Stock resulting from the Reverse Split and held by a single record holder shall be aggregated. All amounts in this Certificate of Incorporation have been adjusted to reflect the Reverse Split. All certificates representing shares of Common Stock outstanding immediately prior to the filing of this Certificate of Incorporation shall immediately after the filing of this Certificate of Incorporation represent a number of shares of Common Stock as adjusted to reflect the Reverse Split.

The following is a statement of the designations and the powers, privileges and rights, and the qualifications, limitations or restrictions thereof in respect of each class of capital stock of the Corporation.

A. COMMON STOCK

1. General. Except as required by law or as provided in this Eighth Amended and Restated Certificate of Incorporation (this "**Certificate of Incorporation**"), all shares of Common Stock shall be identical in all respects and shall entitle the holders thereof to the same rights and privileges, subject to the same qualifications, limitations and restrictions. The voting, dividend and liquidation rights of the holders of the Common Stock are subject to and qualified by the rights, powers and preferences of the holders of the Series Preferred set forth herein.

2. Dividends and Distributions. Subject to the provisions of this Certificate of Incorporation, including Section B.1 of Article Fourth, the holders of shares of Common Stock shall be entitled to receive such dividends and distributions, payable in cash or otherwise, as may be declared thereon by the Board from time to time out of assets or funds of the Corporation legally available therefor. The holders of shares of Common Stock shall be entitled to share equally, on a per share basis, in such dividends or distributions, subject to the limitations described below.

3. Voting. The holders of shares of Common Stock are entitled to one vote for each share of Common Stock held at all meetings of stockholders (and written actions in lieu of meetings); provided, however, that, except as otherwise required by law, holders of Common Stock, as such, shall not be entitled to vote on any amendment to this Certificate of Incorporation that relates solely to the terms of one or more outstanding series of Series Preferred if the holders of such affected series are entitled, either separately or together with the holders of one or more other such series, to vote thereon pursuant to this Certificate of Incorporation or pursuant to the General Corporation Law. There shall be no cumulative voting. The number of authorized shares of Common Stock may be increased or decreased (but not below the number of shares thereof then outstanding) by (in addition to any vote of the holders of one or more series of Series Preferred that may be required by the terms of this Certificate of Incorporation) the affirmative vote of the holders of shares of capital stock of the Corporation representing a majority of the votes represented by all outstanding shares of capital stock of the Corporation entitled to vote (voting together as a single class) without the approval of the holders of Common Stock voting as a separate class, irrespective of the provisions of Section 242(b)(2) of the General Corporation Law.

4. Liquidation. After the payments to holders of Series Preferred pursuant to Section B.2 of Article Fourth, the holders of Common Stock shall be entitled to liquidation distributions, if any, with holders of Series Preferred on an as converted basis pursuant to Subsection B.2.2 of Article Fourth.

B. PREFERRED STOCK

Unless otherwise indicated, references to “Sections” or “Subsections” in this Part B of this Article Fourth refer to sections and subsections of Part B of this Article Fourth.

1. Dividends.

1.1 Series Preferred Dividends. From the date of the issuance of the Series D-1 Preferred Stock, holders of the Series Preferred shall be entitled to receive, when, as and if declared by the Board, but only out of funds legally available therefor, cash dividends at the rate of eight percent (8%) of the applicable Original Issue Price (as defined below) per annum on each outstanding share of Series Preferred. Such dividends shall be payable only when, as and if declared by the Board and shall be non-cumulative. The Corporation shall not declare, pay or set aside any dividends on shares of any other class or series of capital stock of the Corporation (other than dividends on shares of Common Stock payable in shares of Common Stock) unless (in addition to the obtaining of any consents required elsewhere in this Certificate of Incorporation) the holders of the Series Preferred then outstanding shall first receive, or simultaneously receive, a dividend on each outstanding share of Series Preferred in an amount at least equal to (i) in the case of a dividend on Common Stock or any class or series that is convertible into Common Stock, that dividend per share of Series Preferred as would equal the product of (A) the dividend payable on each share of such class or series determined, if applicable, as if all shares of such class or series had been converted into Common Stock and (B) the number of shares of Common Stock issuable upon conversion of a share of such series of Series Preferred, in each case calculated on the record date for determination of holders entitled to receive such dividend or (ii) in the case of a dividend on any class or series that is not

convertible into Common Stock, at a rate per share of such series of Series Preferred determined by (A) dividing the amount of the dividend payable on each share of such class or series of capital stock by the original issuance price of such class or series of capital stock (subject to appropriate adjustment in the event of any reorganization, stock dividend, stock split, combination or other similar recapitalization affecting such shares) and (B) multiplying such fraction by an amount equal to the applicable Original Issue Price for such series; provided that, if the Corporation declares, pays or sets aside, on the same date, a dividend on shares of more than one class or series of capital stock of the Corporation, the dividend payable to the holders of Series Preferred pursuant to this Section 1 shall be calculated based upon the dividend on the class or series of capital stock that would result in the highest Series Preferred dividend for such series. Notwithstanding the foregoing, the Corporation shall not declare, pay or set aside any dividends on any shares of Series Preferred other than shares of Series D-1 Preferred Stock unless the holders of the Series D-1 Preferred Stock then outstanding shall first receive, or simultaneously receive, full payment of a dividend on each outstanding share of Series D-1 Preferred Stock in an amount equal to the dividend payable pursuant to parts (i) and (ii) above. The "**Original Issue Price**" shall be $0.48 per share for the Series D-1 Preferred Stock, $0.48 per share for the Series D Preferred Stock, $1.4043 per share for the Series C Preferred Stock, $1.3995 per share for the Series B-1 Preferred Stock, $1.3995 per share for the Series B Preferred Stock and $2.733 per share for the Series A Preferred Stock, each subject to appropriate adjustment in the event of any reorganization, stock split, combination, reclassification, recapitalization or other similar event involving or affecting a change in the Corporation's capital structure. For the avoidance of doubt, all previously accrued but unpaid dividends are hereby cancelled upon the filing of this Certificate of Incorporation.

1.2 Adjustments. All numbers relating to the calculation of dividends pursuant to this Section 1 shall be subject to appropriate adjustment whenever there shall occur a reorganization, stock split, combination, reclassification, recapitalization or other similar event involving or affecting a change in the Corporation's capital structure to provide to the holders of Series Preferred the same economic return as they would have received in the absence of such event.

2. Liquidation, Dissolution or Winding Up; Certain Mergers, Consolidations and Asset Sales.

2.1 Preferential Payments to Holders of Series Preferred.

2.1.1 Series Preferred Liquidation Preference. In the event of any voluntary or involuntary liquidation, dissolution or winding up of the Corporation, or in the event of its insolvency, whether under the General Corporation Law, federal bankruptcy laws, or other applicable federal or state laws (each such event, a "**Liquidation Event**"), (i) the holders of shares of Series D Preferred Stock and Series D-1 Preferred Stock (the "**Series D/D-1 Preferred Stock**"), on a *pari pasu* basis, shall be entitled to receive, prior to and in preference to any payment or distribution (or any setting aside of any payment or distribution) to the holders of Series C Preferred Stock, Series B/B-1 Preferred Stock, Series A Preferred Stock, Common Stock or any other class or series of capital stock ranking on liquidation junior to the Series D/D-1 Preferred Stock, by reason of their ownership thereof, an amount per share equal to the applicable Liquidation Preference (as defined below); (ii) the holders of shares of Series C

Preferred Stock, on a *pari pasu* basis, shall be entitled to receive, prior to and in preference to any payment or distribution (or any setting aside of any payment or distribution) to the holders of Series B/B-1 Preferred Stock, Series A Preferred Stock, Common Stock or any other class or series of capital stock ranking on liquidation junior to the Series C Preferred Stock, by reason of their ownership thereof, an amount per share equal to the applicable Liquidation Preference; and (iii) the holders of shares of Series B/B-1 Preferred Stock and Series A Preferred Stock, on a *pari pasu* basis, shall be entitled to receive, prior to and in preference to any payment or distribution (or any setting aside of any payment or distribution) to the holders of Common Stock or any other class or series of capital stock ranking on liquidation junior to the Series B/B-1 Preferred Stock and Series A Preferred Stock, by reason of their ownership thereof, an amount per share equal to the applicable Liquidation Preference. As used herein, "**Liquidation Preference**" means, (I) where the Corporation is valued at $91,000,000 or below pursuant to a Liquidation Event, the sum of (i) the applicable Original Issue Price for such series of Series Preferred, plus (ii) the amount of any declared but unpaid dividends on shares of Series Preferred (the "**Aggregate Dividend Amount**") and (II) where the Corporation is valued at over $91,000,000, (x) with respect to the first $91,000,000 distributed, the sum of (i) the applicable Original Issue Price for such series of Series Preferred, plus (ii) the Aggregate Dividend Amount, and (y) with respect to all amounts remaining following the first distribution of $91,000,000 (the "**Remaining Amount**"), the first $10,000,000 of the Remaining Amount (or such lesser amount if the Remaining Amount is less than $10,000,000) shall be distributed among the holders of Series D/D-1 Preferred Stock, pro rata based on the number of shares held by each such holder. If upon any Liquidation Event, the assets of the Corporation available for distribution to its stockholders shall be insufficient to pay all of the holders of shares of Series Preferred the full amount to which they shall be entitled under this Subsection 2.1, (i) the holders of shares of Series D/D-1 Preferred Stock shall share ratably in any distribution of the assets available for distribution in proportion to the respective amounts which would otherwise be payable in respect of the shares held by them upon such distribution if all amounts payable on or with respect to such shares were paid in full; (ii) if there are any remaining assets of the Corporation available for distribution to the holders of shares of Series C Preferred Stock after the applicable Liquidation Preference has been fully paid to the holders of shares of Series D/D-1 Preferred Stock, the holders of shares of Series C Preferred Stock shall share ratably in any distribution of the assets available for distribution in proportion to the respective amounts which would otherwise be payable in respect of the shares held by them upon such distribution if all amounts payable on or with respect to such shares were paid in full; and (iii) if there are any remaining assets of the Corporation available for distribution to the holders of shares of Series A Preferred Stock and Series B/B-1 Preferred Stock after the applicable Liquidation Preference has been fully paid to the holders of shares of Series C Preferred Stock, and Series D/D-1 Preferred Stock, the holders of shares of Series A Preferred Stock and Series B/B-1 Preferred Stock shall share ratably in any distribution of the assets available for distribution in proportion to the respective amounts which would otherwise be payable in respect of the shares held by them upon such distribution if all amounts payable on or with respect to such shares were paid in full. In no event shall the payment of all or any portion of the Liquidation Preference be deemed to be a payment of dividends on any shares of Series Preferred to the extent permitted by applicable law.

2.2 Distribution of Remaining Assets. Upon a Liquidation Event, after the payment of the full Liquidation Preference as set forth in Subsection 2.1 above to all holders of shares of Series Preferred, the remaining assets of the Corporation available for distribution to its

stockholders shall be distributed among the holders of the shares of Series Preferred and Common Stock, pro rata based on the number of shares held by each such holder, treating for this purpose all such securities as if they had been converted to Common Stock pursuant to the terms of this Certificate of Incorporation immediately prior to such Liquidation Event.

2.3 Deemed Liquidation Events.

2.3.1 Definition. Each of the following events shall be considered a "**Deemed Liquidation Event**" unless the holders of at least 66-2/3% of the Series Preferred (the "**Requisite Holders**"), elect otherwise by written notice sent to the Corporation at least five (5) days prior to the effective date of any such event:

(a) a merger or consolidation in which

(i) the Corporation is a constituent party; or

(ii) a subsidiary of the Corporation is a constituent party and the Corporation issues shares of its capital stock pursuant to such merger or consolidation,

except any such merger or consolidation involving the Corporation or a subsidiary in which the shares of capital stock of the Corporation outstanding immediately prior to such merger or consolidation continue to represent, or are converted into or exchanged for shares of capital stock that represent, immediately following such merger or consolidation, a majority, by voting power, of the capital stock of (1) the surviving or resulting corporation or (2) if the surviving or resulting corporation is a wholly owned subsidiary of another corporation immediately following such merger or consolidation, the parent corporation of such surviving or resulting corporation (provided that, for the purpose of this Subsection 2.3.1, all shares of Common Stock issuable upon exercise of Options (as defined below) outstanding immediately prior to such merger or consolidation or upon conversion of Convertible Securities (as defined below) outstanding immediately prior to such merger or consolidation shall be deemed to be outstanding immediately prior to such merger or consolidation and, if applicable, converted or exchanged in such merger or consolidation on the same terms as the actual outstanding shares of Common Stock are converted or exchanged);

(b) the closing of the transfer in one transaction or a series of related transactions, to a person or group of affiliated persons (other than an underwriter of the Corporation's securities), of the Corporation's outstanding securities if, after such closing, such person or group of affiliated persons would hold 50% or more of the outstanding voting stock of the Corporation (or the surviving or acquiring entity); or

(c) the sale, lease, transfer, exclusive license or other disposition, in a single transaction or series of related transactions, by the Corporation or any subsidiary of the Corporation of all or substantially all the assets of the Corporation and its subsidiaries taken as a whole, or the sale or disposition (whether by merger or otherwise) of one or more subsidiaries of the Corporation if substantially all of the assets of the Corporation and its subsidiaries taken as a whole are held by such subsidiary or subsidiaries, except where such sale,

lease, transfer, exclusive license or other disposition is to a wholly owned subsidiary of the Corporation.

Notwithstanding anything to the contrary herein, the sale of shares of Series D-1 Preferred Stock by the Corporation under that certain Series D-1 Convertible Participating Preferred Stock Purchase Agreement, dated on or about the date hereof, by and among the Corporation and the Purchasers set forth on Exhibit A thereto (the "**Purchase Agreement**") shall not in any circumstances be considered a "Deemed Liquidation Event."

2.3.2 Transaction Payment. At least ten (10) business days prior to the consummation of a Deemed Liquidation Event, the Corporation, or if the Corporation is not a party to such transaction, the holders of shares of capital stock of the Corporation that are parties to such transaction, shall provide the holders of Series Preferred written notice of such event (the "**Event Notice**"). Unless the Requisite Holders deliver a notice to the Corporation within five (5) days after receipt of an Event Notice stating that such Deemed Liquidation Event shall not be treated as a Liquidation Event, a Deemed Liquidation Event shall be deemed to have been elected by such holders to be treated as a Liquidation Event in which case the Corporation shall, and each holder of Series Preferred shall be entitled to require that, prior to or concurrently with consideration from any such Deemed Liquidation Event being paid to the Corporation (if the consideration is to be received by the Corporation in an asset transaction), or by any third party to stockholders of the Corporation other than holders of Series Preferred (if the consideration is to be received directly by such stockholders in a merger, consolidation, stock purchase or similar transaction), a payment (the "**Transaction Payment**") shall be made to the holders of Series Preferred in an amount equal to the amount that such holders would have received had the entire consideration in the transaction (with respect to a Deemed Liquidation Event involving the sale of all or substantially all the assets of the Corporation, net of any liabilities of the Corporation not assumed or otherwise paid by the acquiring entity) been deemed available assets for distribution to the stockholders of the Corporation upon liquidation pursuant to Subsections 2.1 and 2.2. In no event shall the payment of all or any portion of the Transaction Payment be deemed to be a payment of dividends on any shares of Series Preferred to the extent permitted by applicable law. The Corporation shall not have the power to effect a Deemed Liquidation Event unless the agreement or plan of merger or consolidation provides that the consideration payable to the stockholders of the Corporation shall be allocated among the stockholders of the Corporation in accordance with Subsections 2.1 and 2.2.

2.3.3 Payment of Transaction Payment. If securities of the acquiring entity (the "**Acquiring Entity Stock**") or other property are issued to the holders of the Series Preferred and Common Stock in the Deemed Liquidation Event, then, the Transaction Payment shall be paid to the holders of Series Preferred in such portions of cash, property or Acquiring Entity Stock, such that all holders of Series Preferred and Common Stock shall receive the same proportion of cash, property and Acquiring Entity Stock in respect of the amounts to which they are entitled pursuant to Subsections 2.1 and 2.2. The Acquiring Entity Stock utilized to make the Transaction Payment, if any, shall have the same rights, preferences and restrictions (including whether the issuance or sale of such Acquiring Entity Stock is registered or entitled to registration rights) as the Acquiring Entity Stock issued to the holders of Common Stock in the Deemed Liquidation Event. Notwithstanding the foregoing, neither the Corporation nor the acquiring entity shall be obligated to deliver certificates evidencing the Acquiring Entity Stock

or other property deliverable to a holder of Series Preferred as a result of the Liquidation Event unless and until the certificates representing shares of Series Preferred held by such holder are either delivered to the Corporation or the acquiring entity, or their respective transfer agents, as the Corporation and the acquiring entity may require, duly endorsed in blank for transfer, or the holder certifies in writing to the Corporation or the acquiring entity, or their respective transfer agents, as the Corporation and the acquiring entity may require, that such certificates have been lost, stolen or destroyed and executes an agreement satisfactory to the Corporation or such acquiring entity to indemnify the Corporation and/or such acquiring entity from any loss incurred by it in connection with such certificates. The value of the Acquiring Entity Stock or other property determined as follows shall be used for purposes of determining the amount of the entire consideration in the transaction, the Transaction Payment and the payment thereof. If the consideration received by the Corporation or its stockholders ("**Proceeds**") is other than cash or evidences of indebtedness (for which the value thereof shall be deemed to be the principal amount thereof), its value will be deemed its fair market value, determined as follows:

(a) Any securities (including any Acquiring Entity Stock) included in the Proceeds shall be valued as follows:

(i) If traded on a securities exchange or through the Nasdaq National Market, the value shall be deemed to be the average of the closing prices of the securities on such exchange or system over the twenty (20) trading-day period ending three (3) trading days prior to the closing of the Deemed Liquidation Event;

(ii) If actively traded over-the-counter, the value shall be deemed to be the average of the closing bid or sale prices (whichever is applicable) over the twenty (20) trading-day period ending three (3) trading days prior to the closing of the Deemed Liquidation Event; and

(iii) If there is no active public market, the value shall be the fair market value thereof, as determined by an independent appraisal conducted by an independent third party valuation firm (at the expense of the Corporation) and approved by the Board.

(b) Any Proceeds other than cash, evidences of indebtedness, and securities shall have the fair market value of such Proceeds as determined by an independent appraisal conducted by an independent third party valuation firm (at the expense of the Corporation) and approved by the Board.

(c) The foregoing methods for valuing Proceeds to be distributed or delivered in connection with a Deemed Liquidation Event shall, upon approval by the stockholders of the definitive agreements governing the Deemed Liquidation Event, be

superseded by any determination of such value set forth in the definitive agreements governing such Deemed Liquidation Event.

(d) Contingent Consideration. In the event of a Deemed Liquidation Event, if any portion of the consideration payable to the stockholders of the Corporation is placed into escrow or is payable to the stockholders of the Corporation subject to contingencies, then, in such event, the definitive acquisition agreement relating to such Deemed Liquidation Event shall provide that (i) the portion of such consideration that is not placed in escrow and not subject to any contingencies (the "**Initial Consideration**") shall be allocated among the holders of capital stock of the Corporation in accordance with Subsections 2.1 and 2.2 as if the Initial Consideration were the only consideration payable in connection with such Deemed Liquidation Event and (ii) any additional consideration which becomes payable to the stockholders of the Corporation upon release from escrow or satisfaction of the applicable contingency shall be allocated among the holders of capital stock of the Corporation in accordance with Subsections 2.1 and 2.2 after taking into account the previous payment of the Initial Consideration and any other amounts previously released from escrow or paid upon satisfaction of any contingency to the stockholders of the Corporation as part of the same transaction.

3. Voting.

3.1 General. On any matter presented to the stockholders of the Corporation for their action or consideration at any meeting of stockholders of the Corporation (or by written consent of stockholders in lieu of meeting), each holder of outstanding shares of Series Preferred shall be entitled to cast the number of votes equal to the number of whole shares of Common Stock into which the shares of Series Preferred held by such holder are convertible as of the record date for determining stockholders entitled to vote on such matter. Except as provided by law or by the other provisions of this Certificate of Incorporation, holders of Series Preferred shall vote together with the holders of Common Stock as a single class. Each holder of Series Preferred shall be entitled to notice of any stockholders' meeting in accordance with the Bylaws of the Corporation at the same time and in the same manner as notice is given to all other stockholders entitled to vote at such meetings.

3.2 Election of Directors. The number of directors constituting the Board shall be seven (7).

3.2.1 Series D-1 Directors. For so long as any shares of Series D-1 Preferred Stock remain outstanding, the holders of Series D-1 Preferred Stock shall be entitled to elect two (2) members of the Board at each meeting or pursuant to each consent of the Corporation's stockholders for the election of directors.

3.2.2 Series C Director. For so long as any shares of Series C Preferred Stock remain outstanding, the holders of Series C Preferred Stock shall be entitled to elect one (1) member of the Board at each meeting or pursuant to each consent of the Corporation's stockholders for the election of directors.

3.2.3 Series B/B-1 Director. For so long as any shares of Series B/B-1 Preferred Stock remain outstanding, the holders of Series B/B-1 Preferred Stock, voting together as a single class, shall be entitled to elect one (1) member of the Board at each meeting or pursuant to each consent of the Corporation's stockholders for the election of directors.

3.2.4 Common Director. The holders of record of the shares of Common Stock, exclusively and as a separate class, shall be entitled to elect one (1) member of the Board at each meeting or pursuant to each consent of the Corporation's stockholders for the election of directors, which will be the Corporation's Chief Executive Officer.

3.2.5 Remaining Directors. The balance of the total number of directors of the Corporation shall be elected by the holders of record of a majority of the shares of Series Preferred and Common Stock, voting together as a single class.

3.2.6 At any meeting held for the purpose of electing a director, the presence in person or by proxy of the holders of a majority of the outstanding shares of the classes or series entitled to elect such director shall constitute a quorum for the purpose of electing such director. Any director elected as provided in this Subsection 3.2 may be removed without cause by, and only by, the affirmative vote of the holders of the shares of the classes or series of capital stock entitled to elect such director or directors, given either at a special meeting of such stockholders duly called for that purpose or pursuant to a written consent of stockholders. A vacancy in any directorship filled by the holders of any classes or series shall be filled only by vote or written consent in lieu of a meeting of the holders of such classes or series or by any remaining director or directors elected by the holders of such class or series pursuant to this Subsection 3.2.

3.2.7 Additional Voting Rights. The Series Preferred shall have the additional voting rights specified in Subsection 3.3.

3.3 Series Preferred Protective Provisions.

3.3.1 At any time when any shares of Series Preferred are outstanding, the Corporation shall not, either directly or indirectly by amendment, merger, consolidation, reorganization, via a subsidiary or otherwise, do any of the following without (in addition to any other vote required by law or this Certificate of Incorporation) the written consent or affirmative vote of the Requisite Holders given in writing or by vote at a meeting, consenting or voting (as the case may be) separately as a class, and any such act or transaction entered into without such consent or vote shall be null and void *ab initio*, and of no force or effect:

(a) alter or change the rights, preferences or privileges of the Series Preferred;

(b) authorize or issue any equity security senior to or on a parity with any series of Series Preferred as to dividend rights or redemption rights or liquidation preferences;

(c) authorize any new issuance of any equity securities of the Corporation, excluding (a) any issuance of Common Stock upon conversion of the Series

Preferred pursuant to this Certificate of Incorporation, and (b) the issuance of Common Stock (or options or warrants therefor) under employee equity incentive plans approved by the Board, provided, that the following items shall require the affirmative consent of at least one (1) LC Director (as such term is defined in that certain Fifth Amended and Restated Stockholders Agreement, dated on or about the date hereof (as the same may be amended from time to time, the "Stockholders Agreement")): (i) any award that does not consist solely of a grant of Options (as each such term is defined in the Corporation's 2006 Equity Compensation Plan, as amended); (ii) any such award that, at the time of grant, the exercise of which involves more than one percent (1%) of the Corporation's then outstanding equity securities; (iii) any such award that deviates from the Vesting Terms (as such term is defined in that certain Fifth Amended and Restated Investors' Rights Agreement, dated on or about the date hereof, as the same may be amended from time to time); and (iv) the settlement of any such awards, on or prior to a Qualified IPO, with grantees who are residents of the People's Republic of China, by way of repurchase, redemption, exchange or similar transactions.

(d) increase the number of shares of the Corporation's capital stock reserved for issuance upon exercise of Options or Convertible Securities or upon the grant or award of stock or stock related rights to employees, officers or directors of, or consultants, advisors or service providers to, the Corporation pursuant to equity compensation or incentive plans or arrangements above the number of shares authorized on the filing date of this Certificate of Incorporation (subject to appropriate adjustment in the event of any reorganization, stock split, combination, reclassification, recapitalization or other similar event involving or affecting a change in the Corporation's capital structure);

(e) amend the Corporation's 2006 Equity Compensation Plan, as amended, or approve any new equity compensation or incentive plan;

(f) amend or waive any provision of the Corporation's Certificate of Incorporation or Bylaws in a manner that would alter or change the rights, preferences or privileges of any Series Preferred;

(g) increase or decrease the authorized number of shares of Common Stock or Series Preferred;

(h) redeem or repurchase any shares of capital stock of the Corporation (other than (i) redemptions of the Series D-1 Preferred Stock as expressly authorized herein or (ii) pursuant to equity incentive agreements with service providers giving the Corporation the right to repurchase shares upon the termination of services);

(i) effect any Liquidation Event or Sale of the Company (as such term is defined in the Stockholders Agreement) or any voluntary recapitalization, reorganization or bankruptcy, or consent to any of the foregoing;

(j) increase or decrease the authorized size of the Board, or create a committee of the Board;

(k) declare or pay any dividends on or make any distribution on, or agree or obligate itself to declare or pay any dividends on or make any distribution on,

Series Preferred, Common Stock or any other capital stock of the Corporation ranking junior to the Series Preferred with respect the payment of dividends;

(l) authorize the extension by the Corporation of any loan or guarantee for indebtedness in excess of $500,000 in the aggregate to any third party (except for trade accounts of the Corporation or any subsidiary arising in the ordinary course of business);

(m) create or incur or authorize the creation or incurrence of any new indebtedness for borrowed money (or any increase of any existing indebtedness for borrowed money as of the filing date of this Certificate of Incorporation) in excess of $1,000,000 in the aggregate;

(n) mortgage or pledge, or create a security interest in, or permit any subsidiary to mortgage, pledge or create a security interest in, the property or assets of the Corporation or such subsidiary;

(o) authorize the acquisition of one or more businesses or assets with a purchase price in excess of $3,000,000 in the aggregate;

(p) authorize the appointment or replacement of the Chief Executive Officer, Chief Financial Officer, Chief Operating Officer, or Chief Scientific Officer of the Corporation;

(q) authorize any transaction involving both the Corporation and any of the Corporation's employees, officers, directors or stockholders or any affiliate thereof, except for (i) arms-length employment agreements, and (ii) any arms-length transaction that is in the ordinary course of business;

(r) authorize appointment and removal of auditors of the Corporation or any material change in the accounting and financial policies of the Corporation;

(s) authorize any increase in compensation of any employee of the Corporation with monthly salary of at least $30,000 by more than 50% in a 12 month period (provided that this clause (r) does not reduce or modify the authority of the Board to generally review and approve executive compensation);

(t) authorize any items of expenditure outside the annual budget in excess of $500,000 per month, individually or in the aggregate;

(u) create or fund any subsidiary, or permit any subsidiary to hold capital stock in any other subsidiary or any other corporation, partnership, limited liability company or other entity;

(v) enter into new lines of business or materially change the nature of the Corporation's existing line of business;

(w) enter into or become a party to any transaction or agreement, or otherwise take any action, which would result in or give rise to the taxation of holders of Series Preferred under Section 305 Internal Revenue Code of 1986, as amended; and

(x) enter into a binding agreement to do any of the foregoing, or effect any of the foregoing, as applicable, with respect to any direct or indirect subsidiary or affiliate of the Corporation.

4. Optional Conversion.

The holders of the Series Preferred shall have conversion rights as follows (the "**Conversion Rights**"):

4.1 Right to Convert.

4.1.1 Series Preferred Conversion Ratio. Each share of Series Preferred shall be convertible, at the option of the holder thereof, at any time and from time to time, and without the payment of additional consideration by the holder thereof, into fully paid and nonassessable shares of Common Stock. The number of shares of Common Stock which a holder of Series Preferred shall be entitled to receive upon conversion shall be equal to the product obtained by multiplying (a) the number of shares of Series Preferred being converted at any time by (b) the applicable Conversion Rate (as defined below) then in effect. The "**Conversion Rate**" in effect at any time shall be equal to the sum of (x) the quotient obtained by dividing the applicable Original Conversion Value (as defined below), by the applicable Conversion Price (as defined below) then in effect plus (y) the quotient obtained by dividing an amount equal to the applicable Aggregate Dividend Amount on each share of Series Preferred by an amount equal to the then current fair market value, as determined in good faith by the Board, of one share of Common Stock at the time of any such conversion. The "**Original Conversion Value**" and the "**Conversion Price**" shall initially be equal to $0.48 per share for each of the Series D-1 Preferred Stock, $0.48 per share for each of the Series D Preferred Stock, $1.4043 per share for each of the Series C Preferred Stock and $1.3995 per share for each of the Series B-1 Preferred Stock, the Series B Preferred Stock and the Series A Preferred Stock (each as adjusted in the event of any reorganization, stock split, combination, reclassification, recapitalization or other similar event involving or affecting a change in the Corporation's capital structure). The initial Conversion Price of each series of Series Preferred, and the rate at which shares of Series Preferred may be converted into shares of Common Stock, shall be subject to adjustment as provided below.

4.1.2 Termination of Conversion Rights. In the event of a Liquidation Event or a Deemed Liquidation Event, the Conversion Rights shall terminate at the close of business on the last full day preceding the date fixed for the payment of any such amounts distributable on such event to the holders of Series Preferred.

4.2 Fractional Shares. No fractional shares of Common Stock shall be issued upon conversion of the Series Preferred. In lieu of any fractional shares to which the holder would otherwise be entitled, the Corporation shall pay cash equal to such fraction multiplied by the fair market value of a share of Common Stock as determined in good faith by the Board.

Whether or not fractional shares would be issuable upon such conversion shall be determined on the basis of the total number of shares of Series Preferred the holder is at the time converting into Common Stock and the aggregate number of shares of Common Stock issuable upon such conversion.

4.3 Mechanics of Conversion.

4.3.1 Notice of Conversion. In order for a holder of Series Preferred to voluntarily convert shares of Series Preferred into shares of Common Stock, such holder shall surrender the certificate or certificates for such shares of Series Preferred (or, if such registered holder alleges that such certificate has been lost, stolen or destroyed, a lost certificate affidavit and agreement reasonably acceptable to the Corporation to indemnify the Corporation against any claim that may be made against the Corporation on account of the alleged loss, theft or destruction of such certificate), at the office of the transfer agent for the Series Preferred (or at the principal office of the Corporation if the Corporation serves as its own transfer agent), together with written notice that such holder elects to convert all or any number of the shares of the Series Preferred represented by such certificate or certificates and, if applicable, any event on which such conversion is contingent. Such notice shall state such holder's name or the names of the nominees in which such holder wishes the certificate or certificates for shares of Common Stock to be issued. If required by the Corporation, certificates surrendered for conversion shall be endorsed or accompanied by a written instrument or instruments of transfer, in form reasonably satisfactory to the Corporation, duly executed by the registered holder or his, her or its attorney duly authorized in writing. The close of business on the date of receipt by the transfer agent (or by the Corporation if the Corporation serves as its own transfer agent) of such certificates (or lost certificate affidavit and agreement) and notice shall be the time of conversion (the "**Conversion Time**"), and the shares of Common Stock issuable upon conversion of the shares represented by such certificate shall be deemed to be outstanding of record as of such date. The Corporation shall, as soon as practicable after the Conversion Time, issue and deliver to such holder of Series Preferred, or to his, her or its nominees, a certificate or certificates for the number of full shares of Common Stock issuable upon such conversion in accordance with the provisions hereof, together with cash as provided in Subsection 4.2 in lieu of any fraction of a share of Common Stock otherwise issuable upon such conversion.

4.3.2 Reservation of Shares. The Corporation shall at all times when any shares of Series Preferred are outstanding, reserve and keep available out of its authorized but unissued capital stock, for the purpose of effecting the conversion of the Series Preferred, such number of its duly authorized shares of Common Stock as shall from time to time be sufficient to effect the conversion of all outstanding Series Preferred; and if at any time the number of authorized but unissued shares of Common Stock shall not be sufficient to effect the conversion of all then outstanding shares of the Series Preferred, the Corporation shall take such corporate action as may be necessary to increase its authorized but unissued shares of Common Stock to such number of shares as shall be sufficient for such purposes, including, without limitation, engaging in reasonable best efforts to obtain the requisite stockholder approval of any necessary amendment to this Certificate of Incorporation. Before taking any action which would cause an adjustment reducing the Conversion Price for any series of Series Preferred below the then par value of the shares of Common Stock issuable upon conversion of such series of Series Preferred, the Corporation will take any corporate action which may, in the opinion of its

counsel, be necessary in order that the Corporation may validly and legally issue fully paid and nonassessable shares of Common Stock at such adjusted Conversion Price, as applicable.

4.3.3 Effect of Conversion. All shares of Series Preferred which shall have been surrendered for conversion as herein provided shall no longer be deemed to be outstanding and all rights with respect to such shares, including the rights, if any, to receive notices and to vote, shall immediately cease and terminate at the Conversion Time, except only the right of the holders thereof to receive shares of Common Stock in exchange therefor. Any shares of Series Preferred so converted shall be retired and cancelled and shall not be reissued as shares of such series, and the Corporation (without the need for stockholder action) may from time to time take such appropriate action as may be necessary to reduce the authorized number of shares of Series Preferred accordingly.

4.3.4 No Further Adjustment. Upon any such conversion, no adjustment to the applicable Conversion Price shall be made for any declared but unpaid dividends on the Series Preferred surrendered for conversion or on the Common Stock delivered upon conversion.

4.3.5 Taxes. The Corporation shall pay any and all issue and other similar taxes (but not any income or similar taxes) that may be payable in respect of any issuance or delivery of shares of Common Stock upon conversion of shares of Series Preferred pursuant to this Section 4. The Corporation shall not, however, be required to pay any tax which may be payable in respect of any transfer involved in the issuance and delivery of shares of Common Stock in a name other than that in which the shares of Series Preferred so converted were registered, and no such issuance or delivery shall be made unless and until the person or entity requesting such issuance has paid to the Corporation the amount of any such tax or has established, to the satisfaction of the Corporation, that such tax has been paid.

4.4 Adjustments to Conversion Price for Diluting Issues.

4.4.1 Special Definitions. For purposes of this Article Fourth, the following definitions shall apply:

(a) **"Convertible Securities"** shall mean any evidences of indebtedness, shares or other securities directly or indirectly convertible into or exchangeable for Common Stock, but excluding Options.

(b) **"Option"** shall mean rights, options or warrants to subscribe for, purchase or otherwise acquire Common Stock or Convertible Securities.

(c) **"Series Preferred Original Issue Date"** shall mean the Series A Original Issue Date with respect to the Series A Preferred Stock, the Series B Original Issue Date with respect to the Series B/B-1 Preferred Stock, the Series C Original Issue Date with respect to the Series C Preferred Stock, the Series D Original Issue Date with respect to the Series D Preferred Stock and the Series D-1 Original Issue Date with respect to the SeriesD-1 Preferred Stock.

(d) **"Series A Original Issue Date"** shall mean the date on which the first share of Series A Preferred Stock was issued.

(e) **"Series B Original Issue Date"** shall mean the date on which the first share of Series B Preferred Stock was issued.

(f) **"Series C Original Issue Date"** shall mean the date on which the first share of Series C Preferred Stock was issued.

(g) **"Series D Original Issue Date"** shall mean the date on which the first share of Series D Preferred Stock was issued.

(h) "**Series D-1 Original Issue Date**" shall mean the date on which the first share of Series D-1 Preferred Stock was issued.

(i) **"Additional Shares of Common Stock"** shall mean all shares of Common Stock issued (or, pursuant to Subsection 4.4.3 below, deemed to be issued) by the Corporation after the applicable Series Preferred Original Issue Date, other than the following shares of Common Stock, and shares of Common Stock deemed issued pursuant to the following Options and Convertible Securities (collectively "**Exempted Securities**"):

(i) shares of Common Stock, Options or Convertible Securities issued as a dividend or distribution on the Series Preferred;

(ii) shares of Common Stock, Options or Convertible Securities issued by reason of a dividend, stock split, split-up or other distribution on shares of Common Stock that is covered by Subsections 4.5, 4.6, 4.7 or 4.8 below;

(iii) shares of Common Stock or Options issued to employees or directors of, or consultants or advisors to, the Corporation or any of its subsidiaries pursuant to a plan, agreement or arrangement approved by the Board;

(iv) shares of Common Stock or Convertible Securities actually issued upon the exercise of Options or shares of Common Stock actually issued upon the conversion or exchange of Convertible Securities, in each case provided such issuance is pursuant to the terms of such Option or Convertible Security;

(v) shares of Common Stock, Options or Convertible Securities issued in connection with sponsored research, collaboration, technology license, development, OEM, marketing, customer, vendor, supplier or other similar agreements or strategic transactions entered into for primarily non-equity financing purposes where both the transaction and

its status as not constituting an anti-dilution trigger are approved by the Board (including the affirmative consent of at least one (1) LC Director);

(vi) shares of Common Stock, Options or Convertible Securities issued in connection with equipment lease financing arrangements, or bank financing transactions, in each case, approved by the Board (including the affirmative consent of at least one (1) LC Director);

(vii) shares of Common Stock, Options or Convertible Securities issued in connection with acquisitions or business combinations, in each case, approved by the Requisite Holders;

(viii) shares of Common Stock, Options or Convertible Securities issued or issuable pursuant to the terms of any Options, Convertible Securities or any arrangements or agreements to issue Options or Convertible Securities outstanding immediately prior to the filing of this Certificate of Incorporation; or

(ix) shares of Common Stock or Convertible Securities issued or issuable pursuant to the terms of the Purchase Agreement.

4.4.2 No Adjustment of Applicable Conversion Price. No adjustment in the Conversion Price for the Series Preferred shall be made as the result of the issuance or deemed issuance of Additional Shares of Common Stock if the Corporation receives written notice from the Requisite Holders agreeing that no such adjustment shall be made as the result of the issuance or deemed issuance of such Additional Shares of Common Stock.

4.4.3 Deemed Issue of Additional Shares of Common Stock.

(a) If the Corporation at any time or from time to time after the applicable Series Preferred Original Issue Date shall issue any Options or Convertible Securities (excluding Options or Convertible Securities which are themselves Exempted Securities) or shall fix a record date for the determination of holders of any class of securities entitled to receive any such Options or Convertible Securities, then the maximum number of shares of Common Stock (as set forth in the instrument relating thereto, assuming the satisfaction of any conditions to exercisability, convertibility or exchangeability but without regard to any provision contained therein for a subsequent adjustment of such number) issuable upon the exercise of such Options or, in the case of Convertible Securities and Options therefor, the conversion or exchange of such Convertible Securities, shall be deemed to be Additional Shares of Common Stock issued as of

the time of such issue or, in case such a record date shall have been fixed, as of the close of business on such record date.

(b) If the terms of any Option or Convertible Security, the issuance of which resulted in an adjustment to the applicable Conversion Price for any series of Series Preferred pursuant to the terms of Subsections 4.4.4 below, are revised as a result of an amendment to such terms or any other adjustment pursuant to the provisions of such Option or Convertible Security (but excluding automatic adjustments to such terms pursuant to anti-dilution or similar provisions of such Option or Convertible Security) to provide for either (1) any increase or decrease in the number of shares of Common Stock issuable upon the exercise, conversion and/or exchange of any such Option or Convertible Security or (2) any increase or decrease in the consideration payable to the Corporation upon such exercise, conversion and/or exchange, then, effective upon such increase or decrease becoming effective, the applicable Conversion Price for such series of Series Preferred computed upon the original issue of such Option or Convertible Security (or upon the occurrence of a record date with respect thereto) shall be readjusted to such applicable Conversion Price as would have been obtained had such revised terms been in effect upon the original date of issuance of such Option or Convertible Security. Notwithstanding the foregoing, no readjustment pursuant to this clause (b) shall have the effect of increasing the applicable Conversion Price for any series of Series Preferred to an amount which exceeds the lower of (i) the applicable Conversion Price for such series in effect immediately prior to the original adjustment made as a result of the issuance of such Option or Convertible Security, or (ii) the applicable Conversion Price for such series that would have resulted from any issuances of Additional Shares of Common Stock (other than deemed issuances of Additional Shares of Common Stock as a result of the issuance of such Option or Convertible Security) between the original adjustment date and such readjustment date.

(c) If the terms of any Option or Convertible Security (excluding Options or Convertible Securities which are themselves Exempted Securities), the issuance of which did not result in an adjustment to the applicable Conversion Price for any series of Series Preferred pursuant to the terms of Subsections 4.4.4 below (either because the consideration per share (determined pursuant to Subsection 4.4.5 hereof) of the Additional Shares of Common Stock subject thereto was equal to or greater than the applicable Conversion Price for each such series then in effect, or because such Option or Convertible Security was issued before the applicable Series Preferred Original Issue Date), are revised after the Series Preferred Original Issue Date as a result of an amendment to such terms or any other adjustment pursuant to the provisions of such Option or Convertible Security (but excluding automatic adjustments to such terms pursuant to anti-dilution or similar provisions of such Option or Convertible Security) to provide for either (1) any increase or decrease in the number of shares of Common Stock issuable upon the exercise, conversion or exchange of any such Option or Convertible Security or (2) any increase or decrease in the consideration payable to the Corporation upon such exercise, conversion or exchange, then such Option or Convertible Security, as so amended or adjusted, and the Additional Shares of Common Stock subject thereto (determined in the manner provided in Subsection 4.4.3(a) above) shall be deemed to have been issued effective upon such increase or decrease becoming effective.

(d) Upon the expiration or termination of any unexercised Option or unconverted or unexchanged Convertible Security (or portion thereof) which resulted

(either upon its original issuance or upon a revision of its terms) in an adjustment to the applicable Conversion Price for any series of Series Preferred pursuant to the terms of Subsections 4.4.4 below, the applicable Conversion Price for such series shall be readjusted to such applicable Conversion Price as would have been obtained had such Option or Convertible Security (or portion thereof) never been issued.

(e) If the number of shares of Common Stock issuable upon the exercise, conversion and/or exchange of any Option or Convertible Security, or the consideration payable to the Corporation upon such exercise, conversion and/or exchange, cannot be determined at the time such Option or Convertible Security is issued or amended, any adjustment to the applicable Conversion Price for any series of Series Preferred that would result under the terms of this Subsection 4.4.3 at the time of such issuance or amendment shall instead be effected at the time such number of shares and/or amount of consideration is first determinable (assuming for purposes of calculating such adjustment to the applicable Conversion Price for such series that such issuance or amendment took place at the time such determination can be made).

4.4.4 Adjustment of Conversion Price for Series D-1 Preferred Stock, Series D Preferred Stock, Series C Preferred Stock, Series B/B-1 Preferred Stock and Series A Preferred Stock Upon Issuance of Additional Shares of Common Stock. In the event the Corporation shall at any time after the Series D-1 Original Issue Date issue Additional Shares of Common Stock (including Additional Shares of Common Stock deemed to be issued pursuant to Subsection 4.4.3), without consideration or for a consideration per share less than the Conversion Price for the Series D-1 Preferred Stock, Series D Preferred Stock, Series C Preferred Stock, Series B/B-1 Preferred Stock or Series A Preferred Stock, as applicable, in effect immediately prior to such issue, then the Conversion Price for the Series D-1 Preferred Stock, Series D Preferred Stock, Series C Preferred Stock, Series B/B-1 Preferred Stock or Series A Preferred Stock, as applicable, shall be reduced, concurrently with such issue, to the consideration per share received by the Corporation for such issue or deemed issue of the Additional Shares of Common Stock; provided that if such issuance or deemed issuance was without consideration, then the Corporation shall be deemed to have received an aggregate of $0.0001 of consideration for all such Additional Shares of Common Stock issued or deemed to be issued.

4.4.5 Determination of Consideration. For purposes of this Subsection 4.4, the consideration received by the Corporation for the issuance of any Additional Shares of Common Stock shall be computed as follows:

(a) Cash and Property: Such consideration shall:

(i) insofar as it consists of cash, be computed at the aggregate amount of cash received by the Corporation, excluding amounts paid or payable for accrued interest;

(ii) insofar as it consists of property other than cash, be computed at the fair market value thereof at the time of such issue, as determined in good faith by

the Board (including the affirmative consent of at least one (1) LC Director); and

(iii) in the event Additional Shares of Common Stock are issued together with other shares or securities or other assets of the Corporation for consideration which covers both, be the proportion of such consideration so received, computed as provided in clauses (i) and (ii) above, as determined in good faith by the Board (including the affirmative consent of at least one (1) LC Director).

(b) Options and Convertible Securities. The consideration per share received by the Corporation for Additional Shares of Common Stock deemed to have been issued pursuant to Subsection 4.4.3, relating to Options and Convertible Securities, shall be determined by dividing:

(i) the total amount, if any, received or receivable by the Corporation as consideration for the issue of such Options or Convertible Securities, plus the minimum aggregate amount of additional consideration (as set forth in the instruments relating thereto, without regard to any provision contained therein for a subsequent adjustment of such consideration) payable to the Corporation upon the exercise of such Options or the conversion or exchange of such Convertible Securities, or in the case of Options for Convertible Securities, the exercise of such Options for Convertible Securities and the conversion or exchange of such Convertible Securities, by

(ii) the maximum number of shares of Common Stock (as set forth in the instruments relating thereto, without regard to any provision contained therein for a subsequent adjustment of such number) issuable upon the exercise of such Options or the conversion or exchange of such Convertible Securities, or in the case of Options for Convertible Securities, the exercise of such Options for Convertible Securities and the conversion or exchange of such Convertible Securities.

4.4.6 Multiple Closing Dates. In the event the Corporation shall issue on more than one date Additional Shares of Common Stock that are a part of one transaction or a series of related transactions and that would result in an adjustment to the Conversion Price for any series of Series Preferred pursuant to the terms of Subsection 4.4.4 above, and such issuance

dates occur within a period of no more than ninety (90) days from the first such issuance to the final such issuance, then, upon the final such issuance, the applicable Conversion Price for such series shall be readjusted to give effect to all such issuances as if they occurred on the date of the first such issuance (and without giving effect to any additional adjustments as a result of any such subsequent issuances within such period).

4.5 Adjustment for Stock Splits and Combinations. If the Corporation shall at any time or from time to time after the applicable Series Preferred Original Issue Date effect a subdivision of the outstanding Common Stock, the Conversion Price for each series of Series Preferred in effect immediately before that subdivision shall be proportionately decreased so that the number of shares of Common Stock issuable on conversion of each share of such series shall be increased in proportion to such increase in the aggregate number of shares of Common Stock outstanding. If the Corporation shall at any time or from time to time after the applicable Series Preferred Original Issue Date combine the outstanding shares of Common Stock, the Conversion Price for each series of Series Preferred in effect immediately before the combination shall be proportionately increased so that the number of shares of Common Stock issuable on conversion of each share of such series shall be decreased in proportion to such decrease in the aggregate number of shares of Common Stock outstanding. Any adjustment under this subsection shall become effective at the close of business on the date the subdivision or combination becomes effective.

4.6 Adjustment for Certain Dividends and Distributions. In the event the Corporation at any time or from time to time after the applicable Series Preferred Original Issue Date shall make or issue, or fix a record date for the determination of holders of Common Stock entitled to receive, a dividend or other distribution payable on the Common Stock in additional shares of Common Stock, then and in each such event the Conversion Price for each series of Series Preferred in effect immediately before such event shall be decreased as of the time of such issuance or, in the event such a record date shall have been fixed, as of the close of business on such record date, by multiplying the applicable Conversion Price for such series then in effect by a fraction equal to:

(1) the numerator of which shall be the total number of shares of Common Stock issued and outstanding immediately prior to the time of such issuance or the close of business on such record date, and

(2) the denominator of which shall be the total number of shares of Common Stock issued and outstanding immediately prior to the time of such issuance or the close of business on such record date plus the number of shares of Common Stock issuable in payment of such dividend or distribution.

Notwithstanding the foregoing, (a) if such record date shall have been fixed and such dividend is not fully paid or if such distribution is not fully made on the date fixed therefor, the Conversion Price for each series of Series Preferred shall be recomputed accordingly as of the close of business on such record date and thereafter the Conversion Price for each series shall be adjusted

pursuant to this subsection as of the time of actual payment of such dividends or distributions; and (b) that no such adjustment shall be made if the holders of Series Preferred simultaneously receive a dividend or other distribution of shares of Common Stock in a number equal to the number of shares of Common Stock as they would have received if all outstanding shares of Series Preferred had been converted into Common Stock on the date of such event.

4.7 Adjustments for Other Dividends and Distributions. In the event the Corporation at any time or from time to time after the applicable Series Preferred Original Issue Date shall make or issue, or fix a record date for the determination of holders of Common Stock entitled to receive, a dividend or other distribution payable in securities of the Corporation (other than a distribution of shares of Common Stock in respect of outstanding shares of Common Stock) or in other property and the provisions of Section 1 do not apply to such dividend or distribution, then and in each such event the holders of Series Preferred shall receive, simultaneously with the distribution to the holders of Common Stock, a dividend or other distribution of such securities or other property in an amount equal to the amount of such securities or other property as they would have received if all outstanding shares of Series Preferred had been converted into Common Stock on the date of such event.

4.8 Adjustment for Merger or Reorganization, etc. Subject to the provisions of Subsection 2.3, if there shall occur any reorganization, recapitalization, reclassification, consolidation, merger or similar event involving the Corporation in which the Common Stock (but not the Series Preferred) is converted into or exchanged for securities, cash or other property (other than a transaction covered by Subsections 4.4, 4.6 or 4.7), then, following any such reorganization, recapitalization, reclassification, consolidation or merger, each share of Series Preferred shall thereafter be convertible in lieu of the Common Stock into which it was convertible prior to such event into the kind and amount of securities, cash or other property which a holder of the number of shares of Common Stock of the Corporation issuable upon conversion of one share of Series Preferred immediately prior to such reorganization, recapitalization, reclassification, consolidation or merger would have been entitled to receive pursuant to such transaction; and, in such case, appropriate adjustment (as determined in good faith by the Board) shall be made in the application of the provisions in this Section 4 with respect to the rights and interests thereafter of the holders of the Series Preferred, to the end that the provisions set forth in this Section 4 (including provisions with respect to changes in and other adjustments of the applicable Conversion Price for any series of Series Preferred) shall thereafter be applicable, as nearly as reasonably may be, in relation to any securities or other property thereafter deliverable upon the conversion of the Series Preferred.

4.9 Certificate as to Adjustments. Upon the occurrence of each adjustment or readjustment of the Conversion Price for any series of Series Preferred pursuant to this Section 4, the Corporation at its expense shall as promptly as reasonably practicable but in any event not later than ten (10) days thereafter, compute such adjustment or readjustment in accordance with the terms hereof and furnish to each holder of Series Preferred a certificate setting forth such adjustment or readjustment (including the kind and amount of securities, cash or other property into which the Series Preferred is convertible) and showing in detail the facts upon which such adjustment or readjustment is based. The Corporation shall, as promptly as reasonably practicable after the written request at any time of any holder of Series Preferred (but in any event not later than ten (10) days thereafter), furnish or cause to be furnished to such holder a

certificate setting forth (i) the Conversion Price for such series then in effect, and (ii) the number of shares of Common Stock and the amount, if any, of other securities, cash or property which then would be received upon the conversion of Series Preferred.

4.10 Notice of Record Date. In the event:

(a) the Corporation shall take a record of the holders of its Common Stock (or other capital stock or securities at the time issuable upon conversion of the Series Preferred) for the purpose of entitling or enabling them to receive any dividend or other distribution, or to receive any right to subscribe for or purchase any shares of capital stock of any class or any other securities, or to receive any other security;

(b) of any capital reorganization of the Corporation, any reclassification of the Common Stock of the Corporation, or any Deemed Liquidation Event; or

(c) of the voluntary or involuntary dissolution, liquidation or winding-up of the Corporation,

then, and in each such case, the Corporation will send or cause to be sent to the holders of the Series Preferred a notice specifying, as the case may be, (i) the record date for such dividend, distribution or right, and the amount and character of such dividend, distribution or right, or (ii) the effective date on which such reorganization, reclassification, consolidation, merger, transfer, dissolution, liquidation or winding-up is proposed to take place, and the time, if any is to be fixed, as of which the holders of record of Common Stock (or such other capital stock or securities at the time issuable upon the conversion of the Series Preferred) shall be entitled to exchange their shares of Common Stock (or such other capital stock or securities) for securities or other property deliverable upon such reorganization, reclassification, consolidation, merger, transfer, dissolution, liquidation or winding-up, and the amount per share and character of such exchange applicable to the Series Preferred and the Common Stock. Such notice shall be sent at least ten (10) days prior to the record date or effective date for the event specified in such notice.

5. Mandatory Conversion.

5.1 Trigger Events. Upon either (a) the closing of the sale of shares of Common Stock to the public (i) in which the price per share paid by the public (prior to the deduction of underwriting discounts and registration expenses) multiplied by the fully-diluted outstanding shares of the Corporation immediately prior to such closing (inclusive of options, warrants, other convertible securities and shares reserved under any equity plan) is no less than $150,000,000 and (ii) resulting in at least $30,000,000 in gross proceeds to the Corporation (prior to the deduction of underwriting discounts and registration expenses), in a firm-commitment underwritten public offering pursuant to an effective registration statement under the Securities Act of 1933, as amended (the "**Qualified IPO**"), or (b) the date and time, or the occurrence of an event, specified by vote or written consent of the Requisite Holders (the time of such closing or the date and time specified or the time of the event specified in such vote or written consent is referred to herein as the "**Mandatory Conversion Time**"), (i) all outstanding shares of Series Preferred shall automatically be converted into shares of Common Stock, at the then effective conversion rate and (ii) such shares may not be reissued by the Corporation.

5.2 Procedural Requirements. All holders of record of shares of Series Preferred shall be sent written notice of the Mandatory Conversion Time and the place designated for mandatory conversion of all such shares of Series Preferred pursuant to this Section 5. Such notice need not be sent in advance of the occurrence of the Mandatory Conversion Time. Upon receipt of such notice, each holder of shares of Series Preferred shall surrender his, her or its certificate or certificates for all such shares (or, if such holder alleges that such certificate has been lost, stolen or destroyed, a lost certificate affidavit and agreement reasonably acceptable to the Corporation to indemnify the Corporation against any claim that may be made against the Corporation on account of the alleged loss, theft or destruction of such certificate) to the Corporation at the place designated in such notice, and shall thereafter receive certificates for the number of shares of Common Stock to which such holder is entitled pursuant to this Section 5. At the Mandatory Conversion Time, all outstanding shares of Series Preferred shall be deemed to have been converted into shares of Common Stock, which shall be deemed to be outstanding of record, and all rights with respect to the Series Preferred so converted, including the rights, if any, to receive notices and vote (other than as a holder of Common Stock), will terminate, except only the rights of the holders thereof, upon surrender of their certificate or certificates (or lost certificate affidavit and agreement) therefor, to receive the items provided for in the last sentence of this Subsection 5.2. If so required by the Corporation, certificates surrendered for conversion shall be endorsed or accompanied by written instrument or instruments of transfer, in form reasonably satisfactory to the Corporation, duly executed by the registered holder or by his, her or its attorney duly authorized in writing. As soon as practicable after the Mandatory Conversion Time and the surrender of the certificate or certificates (or lost certificate affidavit and agreement) for Series Preferred, the Corporation shall issue and deliver to such holder, or to his, her or its nominees, a certificate or certificates for the number of full shares of Common Stock issuable on such conversion in accordance with the provisions hereof, together with cash as provided in Subsection 4.2 in lieu of any fraction of a share of Common Stock otherwise issuable upon such conversion.

5.3 Effect of Mandatory Conversion. All certificates evidencing shares of Series Preferred which are required to be surrendered for conversion in accordance with the provisions hereof shall, from and after the Mandatory Conversion Time, be deemed to have been retired and cancelled and the shares of Series Preferred represented thereby converted into Common Stock for all purposes, notwithstanding the failure of the holder or holders thereof to surrender such certificates on or prior to such date. Such converted Series Preferred may not be reissued as shares of such series, and the Corporation may thereafter take such appropriate action (without the need for stockholder action) as may be necessary to reduce the authorized number of shares of each such series of Series Preferred accordingly.

6. Redemption.

6.1 Request for Redemption. Subject to the terms and conditions of this Section 6 and the provisions of applicable law, the Corporation shall, (i) subject to the Corporation receiving any requisite consents from any applicable lending institutions, upon receiving a written request from LC (as defined in the Purchase Agreement) in the event that the Corporation has not received at least an aggregate of $15,000,000 of gross proceeds under the Purchase Agreement within 120 days after the filing of this Certificate of Incorporation, or (ii) upon receiving a written request at any time after December 31, 2021, signed by the holders of a

majority of the then outstanding shares of the Series D-1 Preferred Stock (the holders making such request in sub-clause (i) or (ii), as applicable, the "**Redeeming Holders**" and each of them, a "**Redeeming Holder**"), redeem, on the date three (3) months following the Corporation's receipt of such written redemption request (the "**Redemption Date**"), all of the Series D-1 Preferred Stock held by such Redeeming Holders that are outstanding on the date the Corporation receives such written redemption request to the extent that such outstanding shares of Series D-1 Preferred Stock have not been previously redeemed or converted into shares of Common Stock at least three (3) days prior to the Redemption Date. The shares of Series D-1 Preferred Stock called for redemption as provided above shall be redeemed in cash at the Redemption Price of such shares of Series D-1 Preferred Stock and such Redemption Price shall be paid from any source of funds legally available therefor, until (a) all outstanding shares of Series D-1 Preferred Stock to be redeemed have been redeemed or have been converted to shares of Common Stock as provided in Section 4 and Section 5 hereof or (b) the request for redemption has been withdrawn or terminated as provided below.

6.2 Withdrawal or Termination of Request. A redemption request may be withdrawn or terminated upon the request of a Redeeming Holder with respect to the shares of Series D-1 Preferred Stock held by such Redeeming Holder, but only with respect to the shares of Series D-1 Preferred Stock that had not been redeemed in full in cash as of the date such request for withdrawal or termination is made. After any such withdrawn or terminated redemption request, the shares of Series D-1 Preferred Stock subject thereto shall again be subject to redemption pursuant to Section 6.1 hereof.

6.3 Redemption Price. The redemption price for each share of Series D-1 Preferred Stock (the "**Redemption Price**") shall equal an amount in cash equal to the higher of (i) the Original Issue Price for the Series D-1 Preferred Stock plus all declared but unpaid dividends on such Series D-1 Preferred Stock up to the Redemption Date and (ii) the fair market value of the share of Series D-1 Preferred Stock, the valuation of which shall be determined by an independent appraisal (exclusive of any liquidity or minority ownership discounts) conducted by an independent third party valuation firm mutually agreed by the Redeeming Holders and the Corporation.

6.4 Insufficient Legally Available Funds. Notwithstanding any other provision set forth in this Section 6, if upon any Redemption Date scheduled for the redemption of shares of Series D-1 Preferred Stock, the funds and assets of the Corporation legally available to redeem such shares of Series D-1 Preferred Stock shall be insufficient to redeem all such shares of Series D-1 Preferred Stock then scheduled to be redeemed, then:

(a) the holders of such shares of Series D-1 Preferred Stock to be redeemed shall share ratably in any redemption in proportion to the respective Redemption Prices that would otherwise be payable in respect of such shares of Series D-1 Preferred Stock held by them upon such redemption if all amounts payable on or with respect to such shares of Series D-1 Preferred Stock were paid in full; and

(b) any unredeemed shares of Series D-1 Preferred Stock shall be carried forward and shall be redeemed (together with any other shares of Series D-1 Preferred Stock then scheduled to be redeemed) at the next such scheduled Redemption Date determined

by the Redeeming Holders to the full extent of legally available funds of the Corporation at such time.

Any such unredeemed shares of Series D-1 Preferred Stock shall continue to be so carried forward until redeemed and shall continue to be outstanding and entitled to all dividend, liquidation, conversion and other rights, powers and preferences of the Series D-1 Preferred Stock respectively until three (3) days prior to the Redemption Date upon which such shares of Series D-1 Preferred Stock are to be redeemed.

6.5 Redemption Notice. At least twenty (20) but no more than sixty (60) days prior to the initial Redemption Date for the shares of Series D-1 Preferred Stock, written notice in accordance with the provisions of Section 9 hereof shall be mailed by the Corporation to each Redeeming Holder, notifying such Redeeming Holder of (a) the redemption to be effected, (b) specifying the Redemption Date(s), the applicable Redemption Price, the number of shares of Series D-1 Preferred Stock held by such Redeeming Holder to be redeemed, the place at which payment may be obtained and the date on which such Redeeming Holder's Conversion Rights as to such shares of Series D-1 Preferred Stock terminate (which date shall be three (3) days prior to each Redemption Date with respect to the shares of Series D-1 Preferred Stock to be redeemed on that date) and (c) calling upon such Redeeming Holder to surrender to the Corporation, in the manner and at the place designated, the certificate or certificates representing the shares of Series D-1 Preferred Stock to be redeemed (the "**Redemption Notice**"). At least thirty (30) days prior to the Redemption Date, written notice in accordance with the provisions of Section 9 hereof shall be mailed by the Corporation to each holder of Series D-1 Preferred Stock that is not at such time a Redeeming Holder, (a) notifying each such holder of the redemption to be effected, (b) specifying the Redemption Date(s), the applicable Redemption Price, the number of shares of Series D-1 Preferred Stock held by such holder that are eligible to be redeemed if such holder elects to participate in such redemption, the place at which payment may be obtained and the date on which such holder's Conversion Rights as to such shares of Series D-1 Preferred Stock terminate if such holder elects to participate in the redemption (which date shall be three (3) days prior to each Redemption Date with respect to the shares of Series D-1 Preferred Stock to be redeemed on that date), (c) providing such holder the opportunity to notify the Corporation within fifteen (15) days after the date of such notice if such holder elects to participate in the redemption, in which case the holder shall thereafter be deemed a Redeeming Holder, and (d) to the extent such holder elects to participation in the redemption, calling upon such holder to surrender to the Corporation, in the manner and at the place designated, the certificate or certificates representing the shares of Series D-1 Preferred Stock to be redeemed.

6.6 Surrender of Certificates. On or before each designated Redemption Date, each Redeeming Holder shall (unless such Redeeming Holder has previously exercised the right to convert such shares of Series D-1 Preferred Stock into shares of Common Stock as provided in Section 4 hereof), surrender the certificate(s) representing such shares of Series D-1 Preferred Stock to be redeemed to the Corporation (or, if such Redeeming Holder alleges that any such certificate has been lost, stolen or destroyed, a lost certificate affidavit), in the manner and at the place designated in the Redemption Notice, and thereupon the Redemption Price for such shares of Series D-1 Preferred Stock shall be payable to the order of the person whose name appears on such certificate(s) as the owner thereof, and each surrendered certificate shall be cancelled and retired. If less than all of the shares of Series D-1 Preferred Stock represented by such certificate

are redeemed, then the Corporation shall promptly issue a new certificate representing the unredeemed shares of Series D-1 Preferred Stock.

6.7 Effect of Redemption. If the Redemption Notice shall have been duly given to each Redeeming Holder, and if on any Redemption Date the Redemption Price for the shares of Series D-1 Preferred Stock to be redeemed thereon is either paid or made available for payment through the deposit arrangements specified in Section 6.8 hereof, then notwithstanding that the certificates evidencing any of the such shares of Series D-1 Preferred Stock so called for redemption on such Redemption Date shall not have been surrendered, such shares of Series D-1 Preferred Stock shall not thereafter be transferred on the Corporation's books and the rights of all of the holders of such shares of Series D-1 Preferred Stock with respect to such shares of Series D-1 Preferred Stock shall terminate on such Redemption Date, except only the right of the holders to receive the Redemption Price from the Corporation or the payment agent, without interest, upon surrender of their certificate(s) therefor (or, if such holder alleges that any such certificate has been lost, stolen or destroyed, a lost certificate affidavit).

6.8 Deposit of Redemption Price. On or prior to the Redemption Date for any shares of Series D-1 Preferred Stock, the Corporation may, at its option, deposit with an independent payment agent, a sum equal to the aggregate Redemption Price for the shares of Series D-1 Preferred Stock called for redemption on that Redemption Date and not yet redeemed, with irrevocable instructions and authority to the payment agent to pay, on or after the Redemption Date, the Redemption Price to the respective holders upon the surrender of their share certificates (or, if such holder alleges that any such certificate has been lost, stolen or destroyed, a lost certificate affidavit). The deposit shall constitute full payment of the shares of Series D-1 Preferred Stock called for redemption on that Redemption Date to their holders, and from and after such Redemption Date, such shares of Series D-1 Preferred Stock shall be deemed to be redeemed and no longer outstanding. Any funds so deposited and unclaimed at the end of one (1) year from such Redemption Date shall be released or repaid to the Corporation, after which time the holders of shares of Series D-1 Preferred Stock called for redemption who have not claimed such funds shall be entitled to receive payment of the Redemption Price only from the Corporation.

7. Redeemed or Otherwise Acquired Shares. Any shares of Series Preferred which are redeemed or otherwise acquired by the Corporation or any of its subsidiaries shall be automatically and immediately cancelled and retired and shall not be reissued, sold or transferred. Neither the Corporation nor any of its subsidiaries may exercise any voting or other rights granted to the holders of Series Preferred following redemption.

8. Waiver. Any of the rights, powers, preferences and other terms of the Series Preferred set forth herein may be waived on behalf of all holders of Series Preferred by the affirmative consent or vote of the Requisite Holders.

9. Notices. Any notice required or permitted by the provisions of this Article Fourth to be given to a holder of shares of Series Preferred shall be mailed, postage prepaid, to the post office address last shown on the records of the Corporation, or given by electronic communication in compliance with the provisions of the General Corporation Law, and shall be deemed sent upon such mailing or electronic transmission.

FIFTH: The Corporation will not, by amendment of this Certificate of Incorporation or through any reorganization, transfer of capital stock or assets, consolidation, merger, dissolution, issue of securities or any other voluntary action, avoid or seek to avoid the observance or performance of any of the terms of the Series Preferred set forth herein, but will at all times in good faith assist in the carrying out of all such terms. Without limiting the generality of the foregoing, the Corporation (a) will not increase the par value of any shares of stock receivable on the conversion of the Series Preferred above the applicable Original Issue Price and (b) will take such action as may be necessary or appropriate in order that the Corporation may validly and legally issue fully-paid and nonassessable shares of stock on the conversion of the Series Preferred from time to time outstanding.

SIXTH: Subject to any additional vote required by this Certificate of Incorporation, in furtherance and not in limitation of the powers conferred by statute, the Board is expressly authorized to make, repeal, alter, amend and rescind any or all of the Bylaws of the Corporation.

SEVENTH: Elections of directors need not be by written ballot unless the Bylaws of the Corporation shall so provide.

EIGHTH: Meetings of stockholders may be held within or without the State of Delaware, as the Bylaws of the Corporation may provide. The books and records of the Corporation may be kept outside the State of Delaware at such place or places as may be designated from time to time by the Board or in the Bylaws of the Corporation.

NINTH: To the fullest extent permitted by law, a director of the Corporation shall not be personally liable to the Corporation or its stockholders for monetary damages for breach of fiduciary duty as a director. If the General Corporation Law or any other law of the State of Delaware is amended after approval by the stockholders of this Article Ninth to authorize corporate action further eliminating or limiting the personal liability of directors, then the liability of a director of the Corporation shall be eliminated or limited to the fullest extent permitted by the General Corporation Law.

Any repeal or modification of the foregoing provisions of this Article Ninth by the stockholders of the Corporation shall not adversely affect any right or protection of a director of the Corporation existing at the time of, or increase the liability of any director of the Corporation with respect to any acts or omissions of such director occurring prior to, such repeal or modification.

TENTH: The Corporation shall, to the maximum extent permitted from time to time under applicable law, indemnify and hold harmless, and upon request shall advance expenses to any person who is or was a party or is threatened to be made a party to any threatened, pending or completed action, suit, proceeding or claim, whether civil, criminal, administrative or investigative, by reason of the fact that such person is or was or has agreed to be a director or officer of the Corporation or while a director or officer is or was serving at the request of the Corporation as a director, officer, employee or agent of any other corporation, partnership, joint venture, trust or other enterprise, including service with respect to employee benefit plans, against any and all expenses (including attorney’s fees and expenses), judgments,

fines, penalties and amounts paid in settlement or incurred in connection with the investigation, preparation to defend or defense of such action, suit, proceeding or claim. Such rights arising under any bylaw, agreement, vote of directors or stockholders or otherwise shall inure to the benefit of the heirs and legal representatives of such person.

The Corporation hereby acknowledges that, to the extent a director is serving on the Board at the direction of a stockholder who owns shares of Series Preferred (an "**Investor**"), such director may have certain rights to indemnification, advancement of expenses and/or insurance provided by the Investor and/or certain of their affiliates (collectively, the "**Investor Indemnitors**"). The Corporation hereby agrees (i) that it is the indemnitor of first resort (i.e., its obligations to such director are primary and any obligation of the Investor Indemnitors to advance expenses or to provide indemnification for the same expenses or liabilities incurred by such director are secondary); (ii) that it shall be required to advance the full amount of expenses incurred by such director and shall be liable for the full amount of all expenses to the extent legally permitted and as required by the terms of this Certificate of Incorporation or the Bylaws of the Corporation, as amended (or any agreement between the Corporation and such director), without regard to any rights such director may have against the Investor Indemnitors; and, (iii) that it irrevocably waives, relinquishes and releases the Investor Indemnitors from any and all claims against the Investor Indemnitors for contribution, subrogation or any other recovery of any kind in respect thereof. The Corporation further agrees that no advancement or payment by the Investor Indemnitors on behalf of such director with respect to any claim for which such director has sought indemnification from the Corporation shall affect the foregoing and the Investor Indemnitors shall have a right of contribution and/or be subrogated to the extent of such advancement or payment to all of the rights of recovery of such director against the Corporation.

Any amendment, repeal or modification of the foregoing provisions of this Article Tenth shall not adversely affect any right or protection of any director, officer or other agent of the Corporation existing at the time of such amendment, repeal or modification.

ELEVENTH: The Corporation renounces any interest or expectancy of the Corporation in, or in being offered an opportunity to participate in, any Excluded Opportunity. An "**Excluded Opportunity**" is any matter, transaction or interest that is presented to, or acquired, created or developed by, or which otherwise comes into the possession of, (i) any director of the Corporation who is not an employee of the Corporation or any of its subsidiaries, or (ii) any holder of Series Preferred or any partner, member, director, manager, stockholder, employee or agent of any such holder, other than someone who is an employee of the Corporation or any of its subsidiaries (collectively, "**Covered Persons**"), unless such matter, transaction or interest was presented to, or acquired, created or developed by, or otherwise came into the possession of, a Covered Person expressly and solely in such Covered Person's capacity as a director of the Corporation. No amendment, repeal or modification of this Article Eleventh shall apply to or have any effect on the liability or alleged liability of any officer, director or stockholder of the Corporation for or with respect to any opportunities which such officer, director or stockholder becomes aware prior to such amendment, modification or repeal.

TWELFTH: For purposes of Section 500 of the California Corporations Code (to the extent applicable), in connection with any repurchase of shares of Common Stock permitted under this Certificate of Incorporation from employees, officers, directors or

consultants of the Corporation in connection with a termination of employment or services pursuant to agreements or arrangements approved by the Board (in addition to any other consent required under this Certificate of Incorporation), such repurchase may be made without regard to any "preferential dividends arrears amount" or "preferential rights amount" (as those terms are defined in Section 500 of the California Corporations Code). Accordingly, for purposes of making any calculation under California Corporations Code Section 500 in connection with such repurchase, the amount of any "preferential dividends arrears amount" or "preferential rights amount" (as those terms are defined therein) shall be deemed to be zero (0).

* * *

3: That the foregoing amendment and restatement was approved by the holders of the requisite number of shares of the Corporation in accordance with Section 228 of the General Corporation Law.

4: That this Certificate of Incorporation, which restates and integrates and further amends the provisions of the Restated Certificate, has been duly adopted in accordance with Sections 242 and 245 of the General Corporation Law.

IN WITNESS WHEREOF, this Eighth Amended and Restated Certificate of Incorporation has been executed by a duly authorized officer of this corporation on August 4, 2016.

By: /s/ Erik Holmlin
Name: Erik Holmlin
Title: Chief Executive Officer

FIRST CERTIFICATE OF AMENDMENT
TO EIGHTH AMENDED AND RESTATED
CERTIFICATE OF INCORPORATION
OF
BIONANO GENOMICS, INC.

BioNano Genomics, Inc. (the "***Corporation***"), a corporation organized and existing under and by virtue of the General Corporation Law of the State of Delaware (the "***DGCL***"), hereby certifies that:

1. The name of the Corporation is BioNano Genomics, Inc. The Corporation's Certificate of Incorporation was originally filed with the Secretary of State of the State of Delaware on August 16, 2007 under the name of BioNanomatrix, Inc.

2. The Eighth Amended and Restated Certificate of Incorporation of the Corporation (the "***Charter***") was filed with the Secretary of State of the State of Delaware on August 4, 2016.

3. The Board of Directors of the Corporation (the "***Board***"), acting in accordance with the provisions of Sections 141 and 242 of the DGCL, duly adopted resolutions amending the Charter as follows:

The first sentence of Article FOURTH of the Charter is hereby amended and restated in its entirety as follows:

"**FOURTH:** The total number of shares of all classes of stock which the Corporation shall have authority to issue is (i) 190,559,820 shares of Common Stock, $0.0001 par value per share ("**Common Stock**") and (ii) 165,444,677 shares of Preferred Stock, par value $0.0001 per share, 418,767 shares of which are designated "Series A Convertible Participating Preferred Stock" (the "**Series A Preferred Stock**"), 8,101,042 shares of which are designated "Series B Convertible Participating Preferred Stock" (the "**Series B Preferred Stock**"), 7,523,734 shares of which are designated "Series B-1 Convertible Participating Preferred Stock" (the "**Series B-1 Preferred Stock**" and together with the Series B Preferred Stock, the "**Series B/B-1 Preferred Stock**,"), 23,357,047 shares of which are designated "Series C Convertible Participating Preferred Stock" (the "**Series C Preferred Stock**"), 52,835,720 shares of which are designated "Series D Convertible Participating Preferred Stock" (the "**Series D Preferred Stock**"), and 73,208,367 shares of which are designated "Series D-1 Convertible Participating Preferred Stock" (the "**Series D-1 Preferred Stock**" and, together with the Series A Preferred Stock, the Series B/B-1 Preferred Stock, the Series C Preferred Stock, and the Series D Preferred Stock, the "**Series Preferred**")."

4. Thereafter, pursuant to a resolution of the Board, this First Certificate of Amendment was submitted to the stockholders of the Corporation for their approval, and was duly adopted in accordance with Sections 228 and 242 of the DGCL.

5. All other provisions of the Eighth Amended and Restated Certificate of Incorporation of the Corporation, as currently on file with the Secretary of State of the State of Delaware, shall remain in full force and effect.

[SIGNATURE PAGE FOLLOWS]

IN WITNESS WHEREOF, the Corporation has caused this First Certificate of Amendment to be signed by its Chief Executive Officer this 9th day of December, 2016.

/s/ R. Erik Holmlin

Name: R. Erik Holmlin
Title: Chief Executive Officer

SECOND CERTIFICATE OF AMENDMENT
TO EIGHTH AMENDED AND RESTATED
CERTIFICATE OF INCORPORATION
OF
BIONANO GENOMICS, INC.

BioNano Genomics, Inc. (the "***Corporation***"), a corporation organized and existing under and by virtue of the General Corporation Law of the State of Delaware (the "***DGCL***"), hereby certifies that:

1. The name of the Corporation is BioNano Genomics, Inc. The Corporation's Certificate of Incorporation was originally filed with the Secretary of State of the State of Delaware on August 16, 2007 under the name of BioNanomatrix, Inc.

2. The Eighth Amended and Restated Certificate of Incorporation of the Corporation (the "***Charter***") was filed with the Secretary of State of the State of Delaware on August 4, 2016.

3. The Board of Directors of the Corporation (the "***Board***"), acting in accordance with the provisions of Sections 141 and 242 of the DGCL, duly adopted resolutions amending the Charter as follows:

(i) The first sentence of Article FOURTH of the Charter is hereby amended and restated in its entirety as follows:

"**FOURTH:** The total number of shares of all classes of stock which the Corporation shall have authority to issue is (i) 211,393,220 shares of Common Stock, $0.0001 par value per share ("**Common Stock**") and (ii) 186,278,077 shares of Preferred Stock, par value $0.0001 per share, 418,767 shares of which are designated "Series A Convertible Participating Preferred Stock" (the "**Series A Preferred Stock**"), 8,101,042 shares of which are designated "Series B Convertible Participating Preferred Stock" (the "**Series B Preferred Stock**"), 7,523,734 shares of which are designated "Series B-1 Convertible Participating Preferred Stock" (the "**Series B-1 Preferred Stock**" and together with the Series B Preferred Stock, the "**Series B/B-1 Preferred Stock**,"), 23,357,047 shares of which are designated "Series C Convertible Participating Preferred Stock" (the "**Series C Preferred Stock**"), 52,835,720 shares of which are designated "Series D Convertible Participating Preferred Stock" (the "**Series D Preferred Stock**"), and 94,041,767 shares of which are designated "Series D-1 Convertible Participating Preferred Stock" (the "**Series D-1 Preferred Stock**" and, together with the Series A Preferred Stock, the Series B/B-1 Preferred Stock, the Series C Preferred Stock, and the Series D Preferred Stock, the "**Series Preferred**")."

(ii) The Last Paragraph of Article FOURTH, Section B.2.3.1 is hereby amended and restated in its entirety as follows:

"Notwithstanding anything to the contrary herein, the sale of shares of Series D-1 Preferred Stock by the Corporation under that certain Series D-1 Convertible Participating Preferred Stock Purchase Agreement, dated on or about the date hereof, by and among the Corporation and the Purchasers set forth on Exhibit A thereto (as the same may be amended from time to time, the "**Purchase Agreement**") shall not in any circumstances be considered a "Deemed Liquidation Event."

4. Thereafter, pursuant to a resolution of the Board, this Second Certificate of Amendment was submitted to the stockholders of the Corporation for their approval, and was duly adopted in accordance with Sections 228 and 242 of the DGCL.

5. All other provisions of the Charter, as amended to date and as currently on file with the Secretary of State of the State of Delaware, shall remain in full force and effect.

[SIGNATURE PAGE FOLLOWS]

IN WITNESS WHEREOF, the Corporation has caused this Second Certificate of Amendment to be signed by its Chief Executive Officer this 25th day of January, 2017.

/s/ R. Erik Holmlin

Name: R. Erik Holmlin
Title: Chief Executive Officer

THIRD CERTIFICATE OF AMENDMENT
TO EIGHTH AMENDED AND RESTATED
CERTIFICATE OF INCORPORATION
OF
BIONANO GENOMICS, INC.

BioNano Genomics, Inc. (the "***Corporation***"), a corporation organized and existing under and by virtue of the General Corporation Law of the State of Delaware (the "***DGCL***"), hereby certifies that:

1. The name of the Corporation is BioNano Genomics, Inc. The Corporation's Certificate of Incorporation was originally filed with the Secretary of State of the State of Delaware on August 16, 2007 under the name of BioNanomatrix, Inc.

2. The Eighth Amended and Restated Certificate of Incorporation of the Corporation (the "***Charter***") was filed with the Secretary of State of the State of Delaware on August 4, 2016.

3. The Board of Directors of the Corporation (the "***Board***"), acting in accordance with the provisions of Sections 141 and 242 of the DGCL, duly adopted resolutions amending the Charter as follows:

(i) The first sentence of Article FOURTH of the Charter is hereby amended and restated in its entirety as follows:

"**FOURTH:** The total number of shares of all classes of stock which the Corporation shall have authority to issue is (i) 243,160,120 shares of Common Stock, $0.0001 par value per share ("**Common Stock**") and (ii) 218,044,977 shares of Preferred Stock, par value $0.0001 per share, 418,767 shares of which are designated "Series A Convertible Participating Preferred Stock" (the "**Series A Preferred Stock**"), 8,101,042 shares of which are designated "Series B Convertible Participating Preferred Stock" (the "**Series B Preferred Stock**"), 7,523,734 shares of which are designated "Series B-1 Convertible Participating Preferred Stock" (the "**Series B-1 Preferred Stock**" and together with the Series B Preferred Stock, the "**Series B/B-1 Preferred Stock**,"), 23,357,047 shares of which are designated "Series C Convertible Participating Preferred Stock" (the "**Series C Preferred Stock**"), 52,835,720 shares of which are designated "Series D Convertible Participating Preferred Stock" (the "**Series D Preferred Stock**"), and 125,808,667 shares of which are designated "Series D-1 Convertible Participating Preferred Stock" (the "**Series D-1 Preferred Stock**" and, together with the Series A Preferred Stock, the Series B/B-1 Preferred Stock, the Series C Preferred Stock, and the Series D Preferred Stock, the "**Series Preferred**")."

4. Thereafter, pursuant to a resolution of the Board, this Third Certificate of Amendment was submitted to the stockholders of the Corporation for their approval, and was duly adopted in accordance with Sections 228 and 242 of the DGCL.

5. All other provisions of the Charter, as amended to date and as currently on file with the Secretary of State of the State of Delaware, shall remain in full force and effect.

[SIGNATURE PAGE FOLLOWS]

IN WITNESS WHEREOF, the Corporation has caused this Third Certificate of Amendment to be signed by its Chief Executive Officer this 17th day of November, 2017.

/s/ R. Erik Holmlin

Name: R. Erik Holmlin
Title: Chief Executive Officer

BYLAWS

OF

BIONANOMATRIX, INC.
(a Delaware corporation)

Adopted as of August 16, 2007

ARTICLE I

OFFICES AND FISCAL YEAR

SECTION 1.01 Registered Office.—The registered office of the corporation shall be in the City of Wilmington, County of New Castle, State of Delaware until otherwise established in the manner provided by law.

SECTION 1.02 Other Offices.—The corporation may also have offices at such other places within or without the State of Delaware as the board of directors may from time to time determine or the business of the corporation requires.

SECTION 1.03 Fiscal Year.—The fiscal year of the corporation shall end on the 31st of December in each year.

ARTICLE II

NOTICE - WAIVERS - MEETINGS

SECTION 2.01 Notice, What Constitutes.

(a) Notice to Stockholders.—Whenever, under the provisions of the General Corporation Law of the State of Delaware (the "DGCL") or the certificate of incorporation or these bylaws, notice is required to be given to any stockholder, it shall mean (i) notice in writing delivered personally or mailed to the stockholder at his address as it appears on the books of the corporation, or (ii) if consented to by the stockholder, notice by a form of communication, not directly involving the physical transmission of paper, that creates a record that may be retained, retrieved and reviewed by a recipient thereof, and that may be directly reproduced in paper form by such a recipient through an automated process (any such method, an "electronic transmission").

(b) Notice to Directors.—Whenever, under the provisions of the DGCL or the certificate of incorporation or these bylaws, notice is required to be given to any director, it shall mean (i) notice in writing delivered personally or mailed (whether by United States mail, courier or other form of express delivery service) to the director at his address as it appears on the books of the corporation or (ii) if consented to by the director, notice by electronic transmission.

(c) When Deemed Given.—If the notice is sent by mail, it shall be deemed to be given when deposited in the United States mail, postage prepaid, directed to the stockholder or director

at such stockholder's or director's address as it appears on the books of the corporation. If notice is given by facsimile telecommunication, it shall be deemed to be given when directed to a number at which the stockholder or director has consented to receive notice. If notice is given by electronic mail, it shall be deemed given when directed to an electronic mail address at which the stockholder or director has consented to receive notice. If notice is given by a posting on an electronic network together with separate notice to the stockholder or director of such specific posting, it shall be deemed to be given upon the later of such posting and the giving of such separate notice. If notice is given by another form of electronic transmission, it shall be deemed given when directed to the stockholder or director. Any consent to notice by electronic transmission shall be revocable by the stockholder or director by written notice to the corporation. An affidavit of the secretary or an assistant secretary or of the transfer agent or other agent of the corporation that notice has been given by a form of electronic transmission shall, in the absence of fraud, be prima facie evidence of the facts stated therein.

SECTION 2.02 Notice of Meetings of Board of Directors.—Notice of a regular meeting of the board of directors need not be given. Notice of every special meeting of the board of directors shall be given to each director either (x) in writing delivered personally or mailed (whether by United States mail, courier or other form of express delivery service) to the director at his address as it appears on the books of the corporation or (y) by electronic transmission. Notice by personal delivery or electronic transmission shall be given at least 24 hours prior to such special meeting. Notice by courier or express delivery service shall be given at least 48 hours prior to such special meeting. Notice by United States mail shall be given at least five days prior to such special meeting. Every such notice shall state the time and place of the meeting. Neither the business to be transacted at, nor the purpose of, any regular or special meeting of the board need be specified in a notice of the meeting.

SECTION 2.03 Notice of Meetings of Stockholders.—Written notice of the place, if any, date and hour of every meeting of the stockholders, whether annual or special, as well as the means of remote communication, if any, by which stockholders and proxyholders may be deemed to be present in person and vote at such meeting, shall be given to each stockholder of record entitled to vote at the meeting not less than ten nor more than 60 days before the date of the meeting. Every notice of a special meeting shall state the purpose or purposes thereof.

SECTION 2.04 Waivers of Notice.

(a) Written Waiver.—Whenever notice is required to be given under any provisions of the DGCL or the certificate of incorporation or these bylaws, a written waiver, signed by the person or persons entitled to the notice, or a waiver by electronic transmission by the person entitled to notice, whether before or after the time stated therein, shall be deemed equivalent to notice. Neither the business to be transacted at, nor the purpose of, any regular or special meeting of the stockholders, directors, or members of a committee of directors need be specified in any written waiver of notice of such meeting or any waiver by electronic transmission.

(b) Waiver by Attendance.—Attendance of a person at a meeting, either in person or by proxy, shall constitute a waiver of notice of such meeting, except where a person attends a meeting for the express purpose of objecting at the beginning of the meeting to the transaction of any business because the meeting was not lawfully called or convened.

SECTION 2.05 Exception to Requirements of Notice.

(a) General Rule.—Whenever notice is required to be given, under any provision of the DGCL or the certificate of incorporation or these bylaws, to any person with whom communication is unlawful, the giving of such notice to such person shall not be required and there shall be no duty to apply to any governmental authority or agency for a license or permit to give such notice to such person. Any action or meeting which shall be taken or held without notice to any such person with whom communication is unlawful shall have the same force and effect as if such notice had been duly given.

(b) Stockholders Without Forwarding Addresses.—Whenever notice is required to be given, under any provision of the DGCL or the certificate of incorporation or these bylaws, to any stockholder to whom (i) notice of two consecutive annual meetings, and all notices of meetings or of the taking of action by written consent without a meeting to such person during the period between such two consecutive annual meetings, or (ii) all, and at least two, payments (if sent by first class mail) of dividends or interest on securities during a 12 month period, have been mailed addressed to such person at his address as shown on the records of the corporation and have been returned undeliverable, the giving of such notice to such person shall not be required. Any action or meeting which shall be taken or held without notice to such person shall have the same force and effect as if such notice had been duly given. If any such person shall deliver to the corporation a written notice setting forth the person's then current address, the requirement that notice be given to such person shall be reinstated. The exception in clause (i) of this subsection (b) shall not be applicable to any notice returned as undeliverable if the notice given was by electronic transmission.

(c) Undeliverable Electronic Transmissions.—Any consent to delivery of notice by electronic transmission shall be deemed revoked if (i) the corporation is unable to deliver by electronic transmission two consecutive notices by the corporation in accordance with such consent and (ii) such inability becomes known to the secretary or an assistant secretary of the corporation or to the transfer agent or other person responsible for the giving of notice; provided, however, that the inadvertent failure to treat such inability as a revocation shall not invalidate any meeting or other action. In the event any consent to electronic delivery is deemed revoked under this Section 2.05(c), delivery of notice shall be made by other means unless subject to an exception under subsections (a) or (b) above.

SECTION 2.06 Conference Meetings.—One or more directors may participate in a meeting of the board, or of a committee of the board, by means of conference telephone or other communications equipment by means of which all persons participating in the meeting can hear each other. Participation in a meeting pursuant to this section shall constitute presence in person at such meeting.

ARTICLE III

MEETINGS OF STOCKHOLDERS

SECTION 3.01 Place of Meeting; Participation By Remote Communication.—All meetings of the stockholders of the corporation shall be held at such place within or without the

State of Delaware as shall be designated by the board of directors in the notice of such meeting. The board of directors may, in its sole discretion, determine (i) that the meeting shall not be held at any place, but shall instead be held solely by means of remote communication equipment or (ii) that in addition to being held at the place specified in the notice of the meeting, the stockholders may participate in the meeting and be deemed present in person and vote by means of remote communication. Subject to any guidelines or procedures adopted by the board of directors, stockholders and proxyholders not physically present at a meeting of stockholders but who attend by means of remote communication approved by the board of directors may participate in the meeting and be deemed present in person and vote at the meeting; provided, however, that (i) the corporation must implement reasonable measures to verify that each person deemed present and permitted to vote at the meeting by means of remote communication is a stockholder or proxyholder, (ii) the corporation must implement reasonable measures to provide such stockholders and proxyholders a reasonable opportunity to participate in the meeting and to vote on matters submitted to the stockholders, including an opportunity to read or hear the proceedings of the meeting substantially concurrently with such proceedings, and (iii) if any stockholder or proxyholder votes or takes other action at the meeting by means of remote communication, a record of such vote or other action shall be maintained by the corporation.

SECTION 3.02 Annual Meeting.—The board of directors may fix and designate the date and time of the annual meeting of the stockholders, and at said meeting the stockholders then entitled to vote shall elect directors and shall transact such other business as may properly be brought before the meeting.

SECTION 3.03 Special Meetings.—Special meetings of the stockholders of the corporation may be called at any time by the chairman of the board, a majority of the board of directors, the president, or at the request, in writing, of stockholders entitled to cast at least a majority of the votes that all stockholders are entitled to cast at the particular meeting. At any time, upon the written request of any person or persons who have duly called a special meeting, which written request shall state the purpose or purposes of the meeting, it shall be the duty of the secretary to fix the date of the meeting which shall be held at such date and time as the secretary may fix, not less than ten nor more than 60 days after the receipt of the request, and to give due notice thereof. If the secretary shall neglect or refuse to fix the time and date of such meeting and give notice thereof, the person or persons calling the meeting may do so.

SECTION 3.04 Quorum, Manner of Acting and Adjournment.

(a) Quorum.—The holders of a majority in voting power of the shares entitled to vote, present in person or represented by proxy, shall constitute a quorum at all meetings of the stockholders except as otherwise provided by the DGCL, by the certificate of incorporation or by these bylaws. If a quorum is not present or represented at any meeting of the stockholders, the stockholders entitled to vote thereat, present in person or represented by proxy, shall have power to adjourn the meeting from time to time until a quorum is present or represented, without notice other than announcement at the meeting of the time and place, if any, to which the meeting has been adjourned and the means of remote communication, if any, by which stockholders and proxyholders may be deemed to be present in person and vote at such adjourned meeting. At any such adjourned meeting at which a quorum is present or represented, the corporation may transact any business which might have been transacted at the original meeting. If the

adjournment is for more than 30 days, or if after the adjournment a new record date is fixed for the adjourned meeting, a notice of the adjourned meeting shall be given to each stockholder of record entitled to vote at the meeting.

(b) Manner of Acting.—Directors shall be elected by a plurality of the votes of the shares present in person or represented by proxy at the meeting and entitled to vote on the election of directors. In all matters other than the election of directors, the affirmative vote of the majority in voting power of shares present in person or represented by proxy at the meeting and entitled to vote thereon shall be the act of the stockholders, unless the question is one upon which, by express provision of the applicable statute or the certificate of incorporation, a different vote is required in which case such express provision shall govern and control the decision of the question. The stockholders present in person or represented by proxy at a duly organized meeting can continue to do business until adjournment, notwithstanding withdrawal of enough stockholders to leave less than a quorum.

SECTION 3.05 Organization.—At every meeting of the stockholders, the chairman of the board, if there be one, or in the case of a vacancy in the office or absence of the chairman of the board, one of the following persons present in the order stated: the vice chairman of the board, if one has been appointed, the president, the vice presidents in their order of rank or seniority, a chairman designated by the board of directors or a chairman chosen by the stockholders entitled to cast a majority of the votes which all stockholders present in person or by proxy are entitled to cast, shall act as chairman of the meeting, and the secretary, or, in the absence of the secretary, an assistant secretary, or in the absence of the secretary and the assistant secretaries, a person appointed by the chairman of the meeting, shall act as secretary of the meeting.

SECTION 3.06 Voting.

(a) General Rule.—Unless otherwise provided in the certificate of incorporation, each stockholder shall be entitled to one vote, in person or by proxy, for each share of capital stock having voting power held by such stockholder.

(b) Voting and Other Action by Proxy.—

(1) A stockholder may authorize another person or persons to act for the stockholder as proxy. In the case of a proxy granted by execution of a writing, such execution may be accomplished by the stockholder or the authorized officer, director, employee or agent of the stockholder signing such writing or causing his or her signature to be affixed to such writing by any reasonable means including, but not limited to, by facsimile signature. A stockholder may authorize another person or persons to act for the stockholder as proxy by transmitting or authorizing the transmission of a telegram, cablegram, or other means of electronic transmission to the person who will be the holder of the proxy or to a proxy solicitation firm, proxy support service organization or like agent duly authorized by the person who will be the holder of the proxy to receive such transmission if such telegram, cablegram or other means of electronic transmission sets forth or is submitted with information from which it can be determined that the telegram, cablegram or other electronic transmission was authorized by the stockholder.

(2) No proxy shall be voted or acted upon after three years from its date, unless the proxy provides for a longer period.

(3) A duly executed proxy shall be irrevocable if it states that it is irrevocable and if, and only so long as, it is coupled with an interest sufficient in law to support an irrevocable power. A proxy may be made irrevocable regardless of whether the interest with which it is coupled is an interest in the stock itself or an interest in the corporation generally.

SECTION 3.07 Consent of Stockholders in Lieu of Meeting.—Any action required to be taken at any annual or special meeting of stockholders of the corporation, or any action which may be taken at any annual or special meeting of such stockholders, may be taken without a meeting, without prior notice and without a vote, if a consent or consents in writing, setting forth the action so taken, shall be signed by the holders of outstanding stock having not less than the minimum number of votes that would be necessary to authorize or take such action at a meeting at which all shares entitled to vote thereon were present and voted and shall be delivered to the corporation by delivery to its registered office in Delaware, its principal place of business, or an officer or agent of the corporation having custody of the book in which proceedings of meetings of stockholders are recorded. Every written consent shall bear the date of signature of each stockholder who signs the consent and no written consent shall be effective to take the corporate action referred to therein unless, within 60 days of the earliest dated consent delivered in the manner required in this section to the corporation, written consents signed by a sufficient number of holders to take action are delivered to the corporation by delivery to its registered office in Delaware, its principal place of business, or an officer or agent of the corporation having custody of the book in which proceedings of meetings of stockholders are recorded. Delivery made to a corporation's registered office shall be by hand or by certified or registered mail, return receipt requested. A telegram, cablegram or other electronic transmission consenting to an action to be taken and transmitted by a stockholder or proxyholder, or by a person or person authorized to act for a stockholder or proxyholder, shall be deemed to be written, signed and dated for purposes of this section, provided that any such telegram, cablegram or other electronic transmission sets forth or is delivered with information from which the corporation can determine (A) that the telegram, cablegram or other electronic transmission was transmitted by the stockholder or proxyholder or by a person or persons authorized to act for the stockholder or proxyholder and (B) the date on which such stockholder or proxyholder or authorized person or persons transmitted such telegram, cablegram or electronic transmission. The date on which such telegram, cablegram or electronic transmission is transmitted shall be deemed to be the date on which such consent was signed. No consent given by telegram, cablegram or other electronic transmission shall be deemed to have been delivered until such consent is reproduced in paper form and until such paper form shall be delivered to the corporation by delivery to its registered office in the State of Delaware, its principal place of business or an officer or agent of the corporation having custody of the book in which proceedings of meetings of stockholders are recorded. Notwithstanding the foregoing limitations on delivery, consents given by telegram, cablegram or other electronic transmission may be otherwise delivered to the principal place of business of the corporation or to an officer or agent of the corporation having custody of the book in which proceedings of meetings of stockholders are recorded if, to the extent and in the manner provided by resolution of the board of directors of the corporation. Any copy, facsimile or other reliable reproduction of a consent in writing may be substituted or used in lieu of the original writing for any and all purposes for which the original writing could be used, provided

that such copy, facsimile or other reproduction shall be a complete reproduction of the entire original writing. Prompt notice of the taking of corporate action without a meeting by less than unanimous written consent shall be given to those stockholders who have not consented in writing and who, if the action had been taken at a meeting, would have been entitled to notice of the meeting if the record date for such meeting had been the date that written consents signed by a sufficient number of holders to take the action were delivered to the corporation.

SECTION 3.08 Voting Lists.—The officer who has charge of the stock ledger of the corporation shall prepare and make, at least ten days before every meeting of stockholders, a complete list of the stockholders entitled to vote at the meeting. The list shall be arranged in alphabetical order, showing the address of each stockholder and the number of shares registered in the name of each stockholder. Electronic mail addresses or other electronic contact information need not be included on such list. The list shall be open to the examination of any stockholder, for any purpose germane to the meeting for a period of at least 10 days prior to the meeting: (i) on a reasonably accessible electronic network, provided that the information required to gain access to such list is provided with the notice of the meeting, or (ii) during ordinary business hours, at the principal place of business of the corporation. In the event that the corporation determines to make the list available on an electronic network, the corporation may take reasonable steps to ensure that such information is available only to stockholders of the corporation. If the meeting is to be held at a place, then the list shall be produced and kept at the time and place of the meeting during the whole time thereof, and may be inspected by any stockholder who is present. If the meeting is to be held solely by means of remote communication, then the list shall be open to the examination of any stockholder during the whole time of the meeting on a reasonably accessible electronic network, and the information required to access such list shall be provided with the notice of the meeting.

SECTION 3.09 Inspectors of Election.

(a) Appointment.—Elections of directors need not be by written ballot, and the vote upon any other matter need not be by written ballot. In advance of any meeting of stockholders the board of directors may, and if required by law shall, appoint one or more inspectors, who need not be stockholders, to act at the meeting. If inspectors are not so appointed, the chairman of the meeting may, and if required by law shall, and upon the demand of any stockholder or his proxy at the meeting and before voting begins shall, appoint one or more inspectors. The number of inspectors shall be either one or three, as determined in the case of inspectors appointed upon demand of a stockholder or his proxy, by stockholders present entitled to cast a majority of the votes which all stockholders present are entitled to cast thereon. No person who is a candidate for office shall act as an inspector. In case any person appointed as an inspector fails to appear or fails or refuses to act, the vacancy may be filled by appointment made by the board of directors in advance of the convening of the meeting, or at the meeting by the chairman of the meeting.

(b) Duties.—If inspectors are appointed, they shall determine the number of shares outstanding and the voting power of each, the shares represented at the meeting, the existence of a quorum and the authenticity, validity and effect of proxies and ballots, shall receive votes or ballots, shall hear and determine all challenges and questions in any way arising in connection with the right to vote, shall count and tabulate all votes, shall determine the result, and shall do such acts as may be proper to conduct the election or vote with fairness to all stockholders. If

there be three inspectors of election, the decision, act or certificate of a majority shall be effective in all respects as the decision, act or certificate of all.

(c) Report.—On request of the chairman of the meeting or of any stockholder or his proxy, or if required by law, the inspectors shall make a report in writing of any challenge or question or matter determined by them, and execute a certificate of any fact found by them.

ARTICLE IV

BOARD OF DIRECTORS

SECTION 4.01 Powers.—All powers vested by law in the corporation shall be exercised by or under the authority of, and the business and affairs of the corporation shall be managed under the direction of, the board of directors.

SECTION 4.02 Number and Term of Office.—The initial director or directors of the corporation shall be the person or persons specified in the Consent of Incorporator of the corporation. Thereafter, the board of directors shall consist of such number of directors as may be determined from time to time by resolution of the board of directors. Each director shall hold office until the expiration of the term for which he or she was selected and until a successor shall have been elected and qualified or until his or her earlier death, resignation or removal. Directors need not be residents of the State of Delaware or stockholders of the corporation.

SECTION 4.03 Vacancies.—Vacancies and newly created directorships resulting from any increase in the authorized number of directors elected by all of the stockholders having a right to vote as a single class may be filled by a majority of the directors then in office, though less than a quorum, or by a sole remaining director, and the directors so chosen shall hold office until their successors are elected and qualified or until their earlier death, resignation or removal. If there are no directors in office, then an election of directors may be held in the manner provided by statute. Whenever the holders of any class or classes of stock or series thereof are entitled to elect one or more directors by the provisions of the certificate of incorporation, vacancies and newly created directorships of such class or classes or series may be filled by a majority of the directors elected by such class or classes or series thereof then in office, or by a sole remaining director so elected. If, at the time of filling any vacancy or any newly created directorship, the directors then in office shall constitute less than a majority of the whole board (as constituted immediately prior to any such increase), the Delaware Court of Chancery may, upon application of any stockholder or stockholders holding at least ten percent of the total number of the shares at the time outstanding having the right to vote for such directors, summarily order an election to be held to fill any such vacancies or newly created directorships, or to replace the directors chosen by the directors then in office.

SECTION 4.04 Resignations.—Any director may resign at any time upon notice given in writing or by electronic transmission to the corporation. The resignation shall be effective upon receipt thereof by the corporation or at such subsequent time as shall be specified in the notice of resignation and, unless otherwise specified in the notice, the acceptance of the resignation shall not be necessary to make it effective.

SECTION 4.05 Removal.—Any director or the entire board of directors may, unless otherwise provided by law, be removed with or without cause by the holders of shares entitled to cast a majority of the votes which all stockholders are entitled to cast at an election of directors.

SECTION 4.06 Organization.—At every meeting of the board of directors, the chairman of the board, if there be one, or, in the case of a vacancy in the office or absence of the chairman of the board, one of the following officers present in the order stated: the vice chairman of the board, if there be one, the president, the vice presidents in their order of rank and seniority, or a chairman of the meeting chosen by a majority of the directors present, shall preside, and the secretary, or, in the absence of the secretary, an assistant secretary, or in the absence of the secretary and the assistant secretaries, any person appointed by the chairman of the meeting, shall act as secretary of the meeting.

SECTION 4.07 Place of Meeting.—Meetings of the board of directors shall be held at such place within or without the State of Delaware as the board of directors may from time to time determine, or as may be designated in the notice of the meeting.

SECTION 4.08 Regular Meetings.—Regular meetings of the board of directors shall be held without notice at such time and place as shall be designated from time to time by resolution of the board of directors.

SECTION 4.09 Special Meetings.—Special meetings of the board of directors shall be held whenever called by the president or by two or more of the directors.

SECTION 4.10 Quorum, Manner of Acting and Adjournment.

(a) General Rule.—At all meetings of the board a majority of the total number of directors shall constitute a quorum for the transaction of business. The vote of a majority of the directors present at any meeting at which a quorum is present shall be the act of the board of directors, except as may be otherwise specifically provided by the DGCL or by the certificate of incorporation. If a quorum is not present at any meeting of the board of directors, the directors present thereat may adjourn the meeting from time to time, without notice other than announcement at the meeting, until a quorum is present.

(b) Unanimous Written Consent.—Unless otherwise restricted by the certificate of incorporation, any action required or permitted to be taken at any meeting of the board of directors may be taken without a meeting, if all members of the board consent thereto in writing or by electronic transmission, and the writing or writings or electronic transmission or transmissions are filed with the minutes of proceedings of the board. Such filing shall be in paper form if the minutes are maintained in paper form and shall be in electronic form if the minutes are maintained in electronic form.

SECTION 4.11 Executive and Other Committees.

(a) Establishment.—The board of directors may, by resolution, establish an Executive Committee and one or more other committees, each committee to consist of one or more directors. The board may designate one or more directors as alternate members of any committee, who may replace any absent or disqualified member at any meeting of the

committee. In the absence or disqualification of a member of a committee and the alternate or alternates, if any, designated for such member, the member or members of the committee present at any meeting and not disqualified from voting, whether or not they constitute a quorum, may unanimously appoint another director to act at the meeting in the place of any such absent or disqualified member.

(b) Powers.—The Executive Committee, if established, and any such other committee to the extent provided in the resolution establishing such committee shall have and may exercise all the power and authority of the board of directors in the management of the business and affairs of the corporation and may authorize the seal of the corporation to be affixed to all papers which may require it; but no such committee shall have the power or authority in reference to (i) approving or adopting, or recommending to the stockholders, any action or matter expressly required by the DGCL to be submitted to stockholders for approval, or (ii) adopting, amending or repealing any bylaw of the corporation. The Executive Committee shall, without limitation, have the power and authority to declare dividends, to authorize the issuance of stock and to adopt a certificate of ownership and merger pursuant to Section 253 of the DGCL (provided that no vote of stockholders of the corporation is required for the effectuation of such merger). Other committees shall have such names as may be determined from time to time by resolution adopted by the board of directors. Each committee so formed shall keep regular minutes of its meetings and report the same to the board of directors when required.

(c) Committee Procedures.—The term “board of directors” or “board,” when used in any provision of these bylaws relating to the organization or procedures of or the manner of taking action by the board of directors, shall be construed to include and refer to the Executive Committee and any other committees of the board.

SECTION 4.12 Compensation of Directors.—Unless otherwise restricted by the certificate of incorporation, the board of directors shall have the authority to fix the compensation of directors.

ARTICLE V

OFFICERS

SECTION 5.01 Number, Qualifications and Designation.—The officers of the corporation shall be chosen by the board of directors and shall include a president, a secretary, a treasurer, and such other officers as may be elected in accordance with the provisions of Section 5.03 of this Article V. Any number of offices may be held by the same person. Officers may, but need not, be directors or stockholders of the corporation. The board of directors may elect from among the members of the board a chairman of the board and a vice chairman of the board who shall be officers of the corporation. The chairman of the board or the president, as designated from time to time by the board of directors, shall be the chief executive officer of the corporation.

SECTION 5.02 Election and Term of Office.—The officers of the corporation, except those elected by delegated authority pursuant to section 5.03 of this Article, shall be elected annually by the board of directors, and each such officer shall hold office for a term of one year

and until a successor is elected and qualified, or until his or her earlier resignation or removal. Any officer may resign at any time upon written notice to the corporation.

SECTION 5.03 Subordinate Officers, Committees and Agents.—The board of directors may from time to time elect such other officers and appoint such committees, employees or other agents as it deems necessary, who shall hold their offices for such terms and shall exercise such powers and perform such duties as are provided in these bylaws, or as the board of directors may from time to time determine. The board of directors may delegate to any officer or committee the power to elect subordinate officers and to retain or appoint employees or other agents, or committees thereof, and to prescribe the authority and duties of such subordinate officers, committees, employees or other agents.

SECTION 5.04 The Chairman and Vice Chairman of the Board.—The chairman of the board, if there be one, or in the absence of the chairman, the vice chairman of the board, if there be one, shall preside at all meetings of the stockholders and of the board of directors, and shall perform such other duties as may from time to time be assigned to them by the board of directors.

SECTION 5.05 The President.—The president shall have general supervision over the business and operations of the corporation, subject, however, to the control of the board of directors. The president shall, in general, perform all duties incident to the office of president, and such other duties as from time to time may be assigned by the board of directors and, if the chairman of the board is the chief executive officer, the chairman of the board.

SECTION 5.06 The Vice Presidents.—The vice presidents, if there be any, shall perform the duties of the president in the absence of the president and such other duties as may from time to time be assigned to them by the board of directors or by the president.

SECTION 5.07 The Secretary.—The secretary, or an assistant secretary, shall attend all meetings of the stockholders and of the board of directors and shall record the proceedings of the stockholders and of the directors and of committees of the board in a book or books to be kept for that purpose; shall see that notices are given and records and reports properly kept and filed by the corporation as required by law; shall be the custodian of the seal of the corporation and see that it is affixed to all documents to be executed on behalf of the corporation under its seal; and, in general, shall perform all duties incident to the office of secretary, and such other duties as may from time to time be assigned by the board of directors or the president.

SECTION 5.08 The Treasurer.—The treasurer, or an assistant treasurer, shall have or provide for the custody of the funds or other property of the corporation; shall collect and receive or provide for the collection and receipt of moneys earned by or in any manner due to or received by the corporation; shall deposit all funds in his or her custody as treasurer in such banks or other places of deposit as the board of directors may from time to time designate; whenever so required by the board of directors, shall render an account showing his or her transactions as treasurer and the financial condition of the corporation; and, in general, shall discharge such other duties as may from time to time be assigned by the board of directors or the president.

SECTION 5.09 Officers' Bonds.—No officer of the corporation need provide a bond to guarantee the faithful discharge of the officer's duties unless the board of directors shall by resolution so require a bond in which event such officer shall give the corporation a bond (which shall be renewed if and as required) in such sum and with such surety or sureties as shall be satisfactory to the board of directors for the faithful performance of the duties of office.

SECTION 5.10 Salaries.—The salaries of the officers and agents of the corporation elected by the board of directors shall be fixed from time to time by the board of directors.

ARTICLE VI

CERTIFICATES OF STOCK, TRANSFER, ETC.

SECTION 6.01 Form and Issuance.

(a) Issuance.—The shares of the corporation shall be represented by certificates unless the board of directors shall by resolution provide that some or all of any class or series of stock shall be uncertificated shares. Any such resolution shall not apply to shares represented by a certificate until the certificate is surrendered to the corporation. Notwithstanding the adoption of any resolution providing for uncertificated shares, every holder of stock represented by certificates and upon request every holder of uncertificated shares shall be entitled to have a certificate signed by, or in the name of the corporation by, the chairman or vice chairman of the board of directors, or the president or vice president, and by the treasurer or an assistant treasurer, or the secretary or an assistant secretary, representing the number of shares registered in certificate form.

(b) Form and Records.—Stock certificates of the corporation shall be in such form as approved by the board of directors. The stock record books and the blank stock certificate books shall be kept by the secretary or by any agency designated by the board of directors for that purpose. The stock certificates of the corporation shall be numbered and registered in the stock ledger and transfer books of the corporation as they are issued.

(c) Signatures.—Any of or all the signatures upon the stock certificates of the corporation may be a facsimile. In case any officer, transfer agent or registrar who has signed, or whose facsimile signature has been placed upon, any share certificate shall have ceased to be such officer, transfer agent or registrar, before the certificate is issued, it may be issued with the same effect as if the signatory were such officer, transfer agent or registrar at the date of its issue.

SECTION 6.02 Transfer.—Transfers of shares shall be made on the share register or transfer books of the corporation upon surrender of the certificate therefor, endorsed by the person named in the certificate or by an attorney lawfully constituted in writing. No transfer shall be made which would be inconsistent with the provisions of Article 8, Title 6 of the Delaware Uniform Commercial Code-Investment Securities.

SECTION 6.03 Lost, Stolen, Destroyed or Mutilated Certificates.—The board of directors may direct a new certificate of stock or uncertificated shares to be issued in place of any certificate theretofore issued by the corporation alleged to have been lost, stolen or destroyed, upon the making of an affidavit of that fact by the person claiming the certificate of

stock to be lost, stolen or destroyed. When authorizing such issue of a new certificate or certificates, the board of directors may, in its discretion and as a condition precedent to the issuance thereof, require the owner of such lost, stolen or destroyed certificate or certificates, or the legal representative of the owner, to give the corporation a bond sufficient to indemnify against any claim that may be made against the corporation on account of the alleged loss, theft or destruction of such certificate or the issuance of such new certificate or uncertificated shares.

SECTION 6.04 Record Holder of Shares.—The corporation shall be entitled to recognize the exclusive right of a person registered on its books as the owner of shares to receive dividends, and to vote as such owner, and to hold liable for calls and assessments a person registered on its books as the owner of shares, and shall not be bound to recognize any equitable or other claim to or interest in such share or shares on the part of any other person, whether or not it shall have express or other notice thereof, except as otherwise provided by the laws of the State of Delaware.

SECTION 6.05 Determination of Stockholders of Record.

(a) Meetings of Stockholders.—In order that the corporation may determine the stockholders entitled to notice of or to vote at any meeting of stockholders or any adjournment thereof, the board of directors may fix a record date, which record date shall not precede the date upon which the resolution fixing the record date is adopted by the board of directors, and which record date shall not be more than 60 nor less than ten days before the date of such meeting. If no record date is fixed by the board of directors, the record date for determining stockholders entitled to notice of or to vote at a meeting of stockholders shall be at the close of business on the day next preceding the day on which notice is given, or, if notice is waived, at the close of business on the day next preceding the day on which the meeting is held. A determination of stockholders of record entitled to notice of or to vote at a meeting of stockholders shall apply to any adjournment of the meeting unless the board of directors fixes a new record date for the adjourned meeting.

(b) Consent of Stockholders.—In order that the corporation may determine the stockholders entitled to consent to corporate action in writing without a meeting, the board of directors may fix a record date, which record date shall not precede the date upon which the resolution fixing the record date is adopted by the board of directors, and which date shall not be more than ten days after the date upon which the resolution fixing the record date is adopted by the board of directors. If no record date has been fixed by the board of directors, the record date for determining stockholders entitled to consent to corporate action in writing without a meeting, when no prior action by the board of directors is required by the DGCL, shall be the first date on which a signed written consent setting forth the action taken or proposed to be taken is delivered to the corporation by delivery to its registered office in Delaware, its principal place of business, or an officer or agent of the corporation having custody of the book in which proceedings of meetings of stockholders are recorded. Delivery made to a corporation's registered office shall be by hand or by certified or registered mail, return receipt requested. If no record date has been fixed by the board of directors and prior action by the board of directors is required by the DGCL, the record date for determining stockholders entitled to consent to corporate action in writing without a meeting shall be at the close of business on the day on which the board of directors adopts the resolution taking such prior action.

(c) Dividends.—In order that the corporation may determine the stockholders entitled to receive payment of any dividend or other distribution or allotment of any rights or the stockholders entitled to exercise any rights in respect of any change, conversion or exchange of stock, or for the purpose of any other lawful action, the board of directors may fix a record date, which record date shall not precede the date upon which the resolution fixing the record date is adopted, and which record date shall be not more than 60 days prior to such action. If no record date is fixed, the record date for determining stockholders for any such purpose shall be at the close of business on the day on which the board of directors adopts the resolution relating thereto.

ARTICLE VII

INDEMNIFICATION

SECTION 7.01 Right to Indemnification.—The corporation shall indemnify and hold harmless, to the fullest extent permitted by applicable law as it presently exists or may hereafter be amended, any person (an "Indemnitee") who was or is made or is threatened to be made a party or is otherwise involved in any action, suit or proceeding, whether civil, criminal, administrative or investigative (a "proceeding"), by reason of the fact that he, or a person for whom he is the legal representative, is or was a director or officer of the corporation or, while a director or officer of the corporation, is or was serving at the request of the corporation as a director, officer, employee or agent of another corporation or of a partnership, joint venture, trust, enterprise or nonprofit entity, including service with respect to employee benefit plans, against all liability and loss suffered and expenses (including attorneys' fees) reasonably incurred by such Indemnitee. Notwithstanding the preceding sentence, except as otherwise provided in Section 7.03, the corporation shall be required to indemnify an Indemnitee in connection with a proceeding (or part thereof) commenced by such Indemnitee only if the commencement of such proceeding (or part thereof) by the Indemnitee was authorized by the board of directors of the corporation.

SECTION 7.02 Prepayment of Expenses.—The corporation shall pay the expenses (including attorneys' fees) incurred by an Indemnitee in defending any proceeding in advance of its final disposition, provided, however, that, to the extent required by law, such payment of expenses in advance of the final disposition of the proceeding shall be made only upon receipt of an undertaking by the Indemnitee to repay all amounts advanced if it should be ultimately determined that the Indemnitee is not entitled to be indemnified under this Article VII or otherwise.

SECTION 7.03 Claims.—If a claim for indemnification or payment of expenses under this Article VII is not paid in full within sixty days after a written claim therefor by the Indemnitee has been received by the corporation, the Indemnitee may file suit to recover the unpaid amount of such claim and, if successful in whole or in part, shall be entitled to be paid the expense of (including reasonable attorneys' fees) prosecuting such claim. In any such action the corporation shall have the burden of proving that the Indemnitee is not entitled to the requested indemnification or payment of expenses under applicable law.

SECTION 7.04 Nonexclusivity of Rights.—The rights conferred on any Indemnitee by this Article VII shall not be exclusive of any other rights which such Indemnitee may have or hereafter acquire under any statute, provision of the certificate of incorporation, these bylaws, agreement, vote of stockholders or disinterested directors or otherwise.

SECTION 7.05 Other Sources.—The corporation's obligation, if any, to indemnify or to advance expenses to any Indemnitee who was or is serving at its request as a director, officer, employee or agent of another corporation, partnership, joint venture, trust, enterprise or nonprofit entity shall be reduced by any amount such Indemnitee may collect as indemnification or advancement of expenses from such other corporation, partnership, joint venture, trust, enterprise or nonprofit entity.

SECTION 7.06 Amendment or Repeal.—Any repeal or modification of the foregoing provisions of this Article VII shall not adversely affect any right or protection hereunder of any Indemnitee in respect of any act or omission occurring prior to the time of such repeal or modification.

SECTION 7.07 Other Indemnification and Prepayment of Expenses.—This Article VII shall not limit the right of the corporation, to the extent and in the manner permitted by law, to indemnify and to advance expenses to persons other than Indemnitees when and as authorized by appropriate corporate action.

ARTICLE VIII

GENERAL PROVISIONS

SECTION 8.01 Dividends.—Subject to the restrictions contained in the DGCL and any restrictions contained in the certificate of incorporation, the board of directors may declare and pay dividends upon the shares of capital stock of the corporation.

SECTION 8.02 Contracts.—Except as otherwise provided in these bylaws, the board of directors may authorize any officer or officers including the chairman and vice chairman of the board of directors, or any agent or agents, to enter into any contract or to execute or deliver any instrument on behalf of the corporation and such authority may be general or confined to specific instances.

SECTION 8.03 Corporate Seal.—The corporation shall have a corporate seal, which shall have inscribed thereon the name of the corporation, the year of its organization and the words "Corporate Seal, Delaware". The seal may be used by causing it or a facsimile thereof to be impressed or affixed or in any other manner reproduced.

SECTION 8.04 Deposits.—All funds of the corporation shall be deposited from time to time to the credit of the corporation in such banks, trust companies, or other depositories as the board of directors may approve or designate, and all such funds shall be withdrawn only upon checks signed by such one or more officers or employees as the board of directors shall from time to time determine.

SECTION 8.05 Corporate Records.

(a) Examination by Stockholders.—Every stockholder shall, upon written demand under oath stating the purpose thereof, have a right to examine, in person or by agent or attorney, during the usual hours for business, for any proper purpose, the stock ledger, list of stockholders, books or records of account, and records of the proceedings of the stockholders and directors of the corporation, and to make copies or extracts therefrom. A proper purpose shall mean a purpose reasonably related to such person's interest as a stockholder. In every instance where an attorney or other agent shall be the person who seeks the right to inspection, the demand under oath shall be accompanied by a power of attorney or such other writing which authorizes the attorney or other agent to so act on behalf of the stockholder. The demand under oath shall be directed to the corporation at its registered office in Delaware or at its principal place of business. Where the stockholder seeks to inspect the books and records of the corporation, other than its stock ledger or list of stockholders, the stockholder shall first establish (1) that the stockholder has complied with the provisions of this section respecting the form and manner of making demand for inspection of such documents; and (2) that the inspection sought is for a proper purpose. Where the stockholder seeks to inspect the stock ledger or list of stockholders of the corporation and has complied with the provisions of this section respecting the form and manner of making demand for inspection of such documents, the burden of proof shall be upon the corporation to establish that the inspection sought is for an improper purpose.

(b) Examination by Directors.—Any director shall have the right to examine the corporation's stock ledger, a list of its stockholders and its other books and records for a purpose reasonably related to the person's position as a director.

SECTION 8.06 Amendment of Bylaws.—These bylaws may be altered, amended or repealed or new bylaws may be adopted either (1) by vote of the stockholders at a duly organized annual or special meeting of stockholders, or (2) by vote of a majority of the board of directors at any regular or special meeting of directors if such power is conferred upon the board of directors by the certificate of incorporation.

FIRST AMENDMENT TO
BYLAWS
OF
BIONANO GENOMICS, INC.

The undersigned, being the Secretary of **BIONANO GENOMICS, INC.**, a Delaware corporation, does hereby certify that the Bylaws of this corporation was amended, effective September 9, 2014, as follows:

1. Section 6.02 shall be amended and restated in its entirety as follows:

SECTION 6.02 Transfer.—Transfers of shares shall be made on the share register or transfer books of the corporation upon surrender of the certificate therefor, endorsed by the person named in the certificate or by an attorney lawfully constituted in writing. No transfer shall be made which would be inconsistent with the provisions of Article 8, Title 6 of the Delaware Uniform Commercial Code-Investment Securities. If a stockholder desires to transfer any shares of common stock of the corporation ("Common Stock"), then the stockholder shall first give written notice thereof to the corporation. The notice shall name the proposed transferee and state the number of shares of Common Stock to be transferred, the proposed consideration, and all other terms and conditions of the proposed transfer. Any shares of Common Stock proposed to be transferred will first be subject to the corporation's right of first refusal located in Article IX hereof.

2. A new Article IX of the Company's Bylaws should be inserted to read in its entirety as follows:

ARTICLE IX

RIGHT OF FIRST REFUSAL

SECTION 9.01 Right of First Refusal.—No stockholder shall transfer any of the shares of Common Stock, except by a transfer which meets the requirements set forth in Section 6.02 and below:

(a) If the stockholder desires to transfer any of his shares of Common Stock, then the stockholder shall first give the notice specified in Section 6.02 hereof.

(b) For 30 days following receipt of such notice, the corporation shall have the option to purchase all (but not less than all) of the shares of Common Stock specified in the notice at the price and upon the terms set forth in such notice; *provided, however,* that, with the consent of the stockholder, the corporation shall have the option to purchase a lesser portion of the shares specified in said notice at the price and upon the terms set forth therein. In the event

of a gift, property settlement or other transfer in which the proposed transferee is not paying the full price for the shares, and that is not otherwise exempted from the provisions of this Section 9.01, the price shall be deemed to be the fair market value of the Common Stock at such time as determined in good faith by the Board of Directors. In the event the corporation elects to purchase all of the shares or, with consent of the stockholder, a lesser portion of the shares, it shall give written notice to the transferring stockholder of its election and settlement for said shares shall be made as provided below in paragraph (d).

(c) The corporation may assign its rights hereunder.

(d) In the event the corporation and/or its assignee(s) elect to acquire any of the shares of the transferring stockholder as specified in said transferring stockholder's notice, the Secretary of the corporation shall so notify the transferring stockholder and settlement thereof shall be made in cash within 30 days after the Secretary of the corporation receives said transferring stockholder's notice; provided that if the terms of payment set forth in said transferring stockholder's notice were other than cash against delivery, the corporation and/or its assignee(s) shall pay for said shares on the same terms and conditions set forth in said transferring stockholder's notice.

(e) In the event the corporation and/or its assignees(s) do not elect to acquire all of the shares specified in the transferring stockholder's notice, said transferring stockholder may, subject to the corporation's approval and all other restrictions on transfer located in Section 6.02 hereof, within the 60-day period following the expiration or waiver of the option rights granted to the corporation and/or its assignees(s) herein, transfer the shares specified in said transferring stockholder's notice which were not acquired by the corporation and/or its assignees(s) as specified in said transferring stockholder's notice. All shares so sold by said transferring stockholder shall continue to be subject to the provisions of this bylaw in the same manner as before said transfer.

(f) Anything to the contrary contained herein notwithstanding, the following transactions shall be exempt from the right of first refusal in Section 9.01(a):

(1) A stockholder's transfer of any or all shares held either during such stockholder's lifetime or on death by will or intestacy to such stockholder's immediate family or to any custodian or trustee for the account of such stockholder or such stockholder's immediate family or to any limited partnership of which the stockholder, members of such stockholder's immediate family or any trust for the account of such stockholder or such stockholder's immediate family will be the general or limited partner(s) of such partnership. "Immediate family" as used herein shall mean spouse, lineal descendant, father, mother, brother, or sister of the stockholder making such transfer;

(2) A stockholder's bona fide pledge or mortgage of any shares with a commercial lending institution, provided that any subsequent transfer of said shares by said institution shall be conducted in the manner set forth in this bylaw;

(3) A stockholder's transfer of any or all of such stockholder's shares to the corporation or to any other stockholder of the corporation;

(4) A stockholder's transfer of any or all of such stockholder's shares to a person who, at the time of such transfer, is an officer or director of the corporation;

(5) A corporate stockholder's transfer of any or all of its shares pursuant to and in accordance with the terms of any merger, consolidation, reclassification of shares or capital reorganization of the corporate stockholder, or pursuant to a sale of all or substantially all of the stock or assets of a corporate stockholder;

(6) A corporate stockholder's transfer of any or all of its shares to any or all of its stockholders; or

(7) A transfer by a stockholder which is a limited or general partnership to any or all of its partners or former partners in accordance with partnership interests.

(8) A transfer that complies with the provisions of the Third Amended and Restated Stockholders Agreement dated September 9, 2014 by and among the Company and the Stockholders (as defined therein), as the same may be amended from time to time (the "Stockholders Agreement").

In any such case, the transferee, assignee, or other recipient shall receive and hold such Common Stock subject to the provisions of this Section 9.01 and the transfer restrictions in Section 6.02, and there shall be no further transfer of such Common Stock except in accord with this bylaw and the transfer restrictions in Section 6.02.

(g) The provisions of this bylaw may be waived with respect to any transfer either by the corporation, upon duly authorized action of its Board of Directors, or by the stockholders, upon the express written consent of the owners of a majority of the voting power of the corporation (excluding the votes represented by those shares to be transferred by the transferring stockholder). This bylaw may be amended or repealed either by a duly authorized action of the Board of Directors or by the stockholders, upon the express written consent of the owners of a majority of the voting power of the corporation.

(h) Any sale or transfer, or purported sale or transfer, of securities of the corporation shall be null and void unless the terms, conditions, and provisions of this bylaw and, if applicable, the terms, conditions, and provisions of the Stockholders Agreement are strictly observed and followed.

(i) The foregoing right of first refusal shall terminate upon the date securities of the corporation are first offered to the public pursuant to a registration statement filed with, and declared effective by, the United States Securities and Exchange Commission under the Securities Act of 1933, as amended.

(j) The certificates representing shares of Common Stock of the corporation shall bear on their face the following legend so long as the foregoing right of first refusal remains in effect:

"THE SHARES REPRESENTED BY THIS CERTIFICATE ARE SUBJECT TO A RIGHT OF FIRST REFUSAL OPTION IN FAVOR OF THE CORPORATION AND/OR ITS ASSIGNEE(S), AS PROVIDED IN THE BYLAWS OF THE CORPORATION."

(k) Notwithstanding the foregoing, this bylaw shall in no manner limit the rights of first refusal and co-sale that the corporation or other stockholders may have pursuant to the Stockholders Agreement. If the transfer of the shares of Common Stock proposed to be sold or transferred is subject to a right of first refusal in favor of the corporation pursuant to such agreement, then the proposed sale or transfer shall be subject only to such right of first refusal set forth in such agreement and not to the right of first refusal set forth in these Bylaws, which right shall be ineffective with respect to such proposed sale or transfer."

[Remainder of page intentionally left blank.]

The undersigned hereby certifies that he is the duly elected and acting Secretary of BioNano Genomics, Inc. (the "***Company***") and that the First Amendment to Bylaws attached hereto was duly adopted by the Board of Directors of the Company on September 8, 2014.

IN WITNESS WHEREOF, the undersigned has hereunto set his hand as of the 9 day of September, 2014.

/s/ Thomas A. Coll
Thomas A. Coll
Secretary

THIS WARRANT AND THE SHARES ISSUABLE HEREUNDER HAVE NOT BEEN REGISTERED UNDER. THE SECURITIES ACT OF 1933, AS AMENDED, AND MAY NOT BE SOLD, PLEDGED OR OTHERWISE TRANSFERRED EXCEPT IN ACCORDANCE WITH APPLICABLE LAW.

SECOND WARRANT TO PURCHASE STOCK

Corporation:	BioNanomatrix, Inc.
Number of Shares:	42,872
Class of Stock:	Series B Preferred Stock
Initial Exercise Price:	$1.3995 per share
Issue Date:	September 14, 2011
Expiration Date:	September 14, 2018

THIS WARRANT CERTIFIES THAT, for good and valuable consideration, the receipt of which is hereby acknowledged, **SQUARE 1 BANK** or its assignee ("***Holder***") is entitled to purchase at any time and from time to time prior to the Expiration Date, the number of fully paid and nonassessable shares of the class of securities (the "***Shares***") of the corporation (the "***Company***") at the initial exercise price per Share (the "***Warrant Price***") all as set forth above and as adjusted pursuant to Article 2 of this warrant, subject to the provisions and upon the terms and conditions set forth in this warrant.

ARTICLE 1

EXERCISE

1.1 Method of Exercise. Holder may exercise this warrant prior to the Expiration Date by delivering this warrant and a duly executed Notice of Exercise in substantially the form attached as Appendix 1 to the principal office of the Company. Unless Holder is exercising the conversion right set forth in Section 1.2, Holder shall also deliver to the Company a check for aggregate Warrant Price for the Shares being purchased.

1.2 Conversion Right. In lieu of exercising this warrant as specified in Section 1.1, Holder may from time to time convert this warrant, in whole or in part, into a number of Shares determined by dividing (a) the aggregate fair market value of the Shares or other securities otherwise issuable upon exercise of this warrant minus the aggregate Warrant Price of such Shares by (b) the fair market value of one Share. The fair market value of the Shares shall be determined pursuant to Section 1.3. If the fair market value of one Share as determined pursuant to Section 1.3 is less than the exercise price per Share hereunder at the time of any automatic conversion pursuant to Section 1.6.2, then the warrant shall not be automatically converted into Shares under Section 1.6.2 but instead upon the occurrence of such Acquisition shall expire unexercised and be of no further force and effect.

1.3 Fair Market Value. If the Shares are traded regularly in a public market, the fair market value of the Shares shall be the closing price of the Shares (or the closing price of the Company's stock into which the Shares are convertible) reported for the business day immediately before Holder delivers its Notice of Exercise to the Company. If the Shares are not

regularly traded in a public market, the Board of Directors of the Company shall determine fair market value in its reasonable good faith judgment.

1.4 Delivery of Certificate and New Warrant. Promptly after Holder exercises or converts this warrant, the Company shall deliver to Holder certificates for the Shares acquired and, if this warrant has not been fully exercised or converted and has not expired, a new warrant representing the Shares not so acquired.

1.5 Replacement of Warrants. On receipt of evidence reasonably satisfactory to the Company of the loss, theft, destruction or mutilation of this warrant and, in the case of loss, theft or destruction, on delivery of an indemnity agreement reasonably satisfactory in form and amount to the Company or, in the case of mutilation, on surrender and cancellation of this warrant, the Company at its expense shall execute and deliver, in lieu of this warrant, a new warrant of like tenor.

1.6 Conversion on Sale, Merger, or Consolidation of the Company.

1.6.1 "***Acquisition.***" For the purpose of this warrant, "***Acquisition***" means (a) any sale, license, or other disposition of all or substantially all of the assets (including intellectual property) of the Company, or (b) any reorganization, consolidation, merger or sale of the voting securities of the Company or any other transaction where the holders of the Company's securities before the transaction beneficially own less than 50% of the outstanding voting, securities of the surviving entity after the transaction.

1.6.2 Conversion of Warrant upon Acquisition. If, upon the closing of any Acquisition, Holder has not otherwise exercised this warrant in full, then this warrant shall be deemed to have been automatically converted pursuant to Section 1.2, and thereafter Holder shall participate in the Acquisition on the same terms as other holders of the same class of securities of the Company.

ARTICLE 2

ADJUSTMENTS TO THE SHARES

2.1 Stock Dividends, Splits, Etc. If the Company declares or pays a dividend on its common stock payable in common stock, or other securities, or subdivides the outstanding common stock into a greater amount of common stock, then upon exercise of this warrant, for each Share acquired, Holder shall receive, without cost to Holder, the total number and kind of securities to which Holder would have been entitled had Holder owned the Shares of record as of the date the dividend or subdivision occurred.

2.2 Reclassification, Exchange or Substitution. Upon any reclassification, exchange, substitution, or other event that results in a change of the number and/or class of the securities issuable upon exercise or conversion of this warrant, Holder be entitled to receive, upon exercise or conversion of this warrant, the number and kind of securities and property that Holder would have received for the Shares if this warrant had been exercised immediately before such reclassification, exchange, substitution, or other event. Such an event shall include any automatic conversion of the outstanding or issuable securities of the Company

of the same class or series as the Shares to common stock pursuant to the terms of the Company's Articles of Incorporation upon the closing of a registered public offering of the Company's common stock. The Company or its successor shall promptly issue to Holder a new warrant for such new securities or other property. The new warrant shall provide for adjustments which shall be as nearly equivalent as may be practicable to the adjustments provided for in this Article 2 including, without limitation, adjustments to the Warrant Price and to the number of securities or property issuable upon exercise of the new warrant. The provisions of this Section 2.2 shall similarly apply to successive reclassifications, exchanges, substitutions, or other events.

2.3 Adjustments for Combinations, Etc. If the outstanding Shares are combined or consolidated, by reclassification or otherwise, into a lesser number of shares, the Warrant Price shall be proportionately increased. If the outstanding Shares are combined or consolidated, by reclassification or otherwise, into a greater number of shares, the Warrant Price shall be proportionately decreased.

2.4 Certificate as to Adjustments. Upon each adjustment of the Warrant Price, the Company at its expense shall promptly compute such adjustment, and furnish Holder with a certificate of its Chief Financial Officer setting forth such adjustment and the facts upon which such adjustment is based. The Company shall, upon written request, furnish Holder a certificate setting forth the Warrant Price in effect upon the date thereof and the series of adjustments leading to such Warrant Price.

2.5 Fractional Shares. No fractional Shares shall be issuable upon exercise or conversion of the Warrant and the Number of Shares to be issued shall be rounded down to the nearest whole Share. If a fractional share interest arises upon any exercise or conversion of the Warrant, the Company shall eliminate such fractional share interest by paying Holder amount computed by multiplying the fractional interest by the fair market value of a full Share.

ARTICLE 3

REPRESENTATIONS AND COVENANTS OF THE COMPANY AND THE HOLDER

3.1 Representation and Warranties of the Company. The Company hereby represents and warrants to the Holder as follows:

(a) All Shares which may be issued upon the exercise of the purchase right represented by this warrant, and all securities, if any, issuable upon conversion of the Shares, shall, upon issuance, be duly authorized, validly issued, fully paid and nonassessable, and free of any liens and encumbrances except for restrictions on transfer provided for herein or under applicable federal and state securities laws.

(b) The Company's capitalization table attached to this warrant is true and complete in all material respects as of the Issue Date.

3.2 Notice of Certain Events. The Company shall provide Holder with not less than 10 days prior written notice, including a description of the material facts surrounding the impact on the Holder's Warrant of, any of the following events: (a) declaration of any dividend or distribution upon its common stock, whether in cash, property, stock, or other securities and whether or not a regular cash dividend; (b) offering for subscription pro rata to the holders of any class or series of its stock any additional shares of stock of any class or series or other rights; (c) effecting any reclassification or recapitalization of common stock; or (d) the merger or consolidation with or into any other corporation, or sale, lease, license, or conveyance of all or substantially all of its assets, or liquidation, dissolution or winding up.

3.3 Information Rights. So long as the Holder holds this warrant and/or any of the Shares, the Company shall deliver to the Holder (a) promptly after mailing, copies of all communiques to the shareholders of the Company, (b) within one hundred eighty (180) days after the end of each fiscal year of the Company, the annual audited financial statements of the Company certified by independent public accountants of recognized standing and (c) within forty-five (45) days after the end of each of the first three quarters of each fiscal year, the Company's quarterly, unaudited financial statements.

3.4 Registration Under Securities Act of 1933, as amended and Other Rights and Obligations. The Company and the Holder agree that the Shares or, if the Shares are convertible into common stock of the Company, such common stock, shall be "Registrable Securities", and Holder shall be a "holder of Registrable Securities" under the Investors' Rights Agreement among the Company and other persons dated as of August 16, 2007 (as it may be amended and/or restated, the "***IRA***") solely for the purposes of receiving the registration rights (and being subject to the related obligations) set forth in Sections 4 through 11 thereof. In addition, prior to the issuance of the shares of Common Stock issuable upon exercise of this Warrant, the Holder agrees to be bound to the Stockholders Agreement dated among the Company arid other persons dated as of August 16, 2007 (as it may be amended and/or restated, the "***Stockholders Agreement***") as a "***Holder***" pursuant thereto. The Company has provided to the Holder the current copies of the IRA and the Stockholders Agreement as of the Issue Date. Upon request of the Company, the Holder will execute joinders to the IRA and the Stockholders

Agreement or a separate agreement evidencing the provisions that the Holder agrees to be bound by pursuant to this Section 3.4. In the event of a conflict between the provisions of either the IRA or the Stockholders Agreement, and this warrant, the provisions of this warrant shall govern.

3.5 Representations and Warranties of the Holder. The Holder represents and warrants to the Company as follows:

(a) It is acquiring the Warrant, and (if and when it exercises this Warrant) it will acquire the Shares, for its own account for investment and not with a view to, or for sale in connection with, any distribution thereof, nor with any present intention of distributing or selling the same; and the Holder has no present or contemplated agreement, undertaking, arrangement, obligation, indebtedness or commitment providing for the disposition thereof.

(b) The Holder is an "accredited investor" as defined in Rule 501(a) under the Securities Act of 1933, as amended (the "***Act***").

(c) The Holder has made such inquiry concerning the Company and its business and personnel as it has deemed appropriate; and the Holder has sufficient knowledge and experience in finance and business that it is capable of evaluating the risks and merits of its investment in the Company.

ARTICLE 4

MISCELLANEOUS

4.1 Term: Exercise Upon Expiration. This warrant is exercisable in whole or in part, at any time and from time to time during the Exercise Period. If this warrant has not been exercised prior to the end of the Exercise Date, this warrant shall be deemed to have been automatically exercised on the Exercise Date by "cashless" conversion pursuant to Section 1.2.

4.2 Legends. This warrant and the Shares (and the securities issuable, directly or indirectly, upon conversion of the Shares, if any) shall be imprinted with a legend in substantially the following form together with any other legend required under the IRA, the Stockholders Agreement or to implement the other provisions of Section 3.4 hereof:

THIS SECURITY HAS NOT BEEN REGISTERED UNDER THE SECURITIES ACT OF 1933, AS AMENDED, AND MAY NOT BE SOLD, PLEDGED OR OTHERWISE TRANSFERRED EXCEPT IN ACCORDANCE WITH APPLICABLE LAW AND IN ACCORDANCE WITH SECTION 4.3 OF THE WARRANT PURSUANT TO WHICH THIS SECURITY WAS ISSUED.

4.3 Compliance with Securities Laws on Transfer. This warrant and the Shares issuable upon exercise of this warrant (and the securities issuable, directly or indirectly, upon conversion of the Shares, if any) may not be transferred or assigned in whole or in part without compliance with applicable federal and state securities laws by the transferor and the transferee. The Company may require Holder to provide an opinion of counsel, except if the transfer is to

an affiliate of Holder or if there is no material question as to the availability of current information as referenced in Rule 144(c), Holder represents that it has complied with Rule 144 (d) and (e) in reasonable detail, the selling broker represents that it has complied with Rule 144(f), and the Company is provided with a copy of Holder's notice of proposed sale.

4.4 Transfer Procedure. Subject to the provisions of Section 4.3, Holder may transfer all or part of this warrant or the Shares issuable upon exercise of this warrant (or the securities .issuable, directly or indirectly, upon conversion of the Shares, if any) by giving the Company notice of the portion of the warrant being transferred setting forth the name, address and taxpayer identification number of the transferee and surrendering this warrant to the Company for reissuance to the transferee(s) (and Holder, if applicable). No surrender or reissuance shall be required if the transfer is to an affiliate of Holder.

4.5 Notices. All notices and other communications from the Company to the Holder, or vice versa, shall be deemed delivered and effective when given personally or mailed by first-class registered or certified mail, postage prepaid, at such address as may have been furnished to the Company or the Holder, as the case may be, in writing by the Company or such Holder from time to time. All notices to the Holder shall be addressed as follows:

Square 1 Bank
Attn: Warrant Administrator
406 Blackwell Street, Suite 240
Crowe Building .
Durham, NC 27701

4.6 Amendments. This warrant and any term hereof may be changed, waived, discharged or terminated only by an instrument in writing signed by the party against which enforcement of such change, waiver, discharge or termination is sought.

4.7 Attorneys' Fees. In the event of any dispute between the parties concerning the terms and provisions of this warrant, the party prevailing in such dispute shall be entitled to collect from the other party all costs incurred in such dispute, including reasonable attorneys' fees.

4.8 Governing Law. This warrant shall be governed by and construed in accordance with the laws of the State of North Carolina, without giving effect to its principles regarding conflicts of law.

BIONANOMATRIX, INC.

By: _____

Name: _____

Title: _____

APPENDIX 1

NOTICE OF EXERCISE

1. The undersigned hereby elects to purchase _____ shares of the _____ stock of **BIONANOMATRIX, INC.** pursuant to the terms of the attached warrant, and tenders herewith payment of the purchase price of such shares in full.

1. The undersigned hereby elects to convert the attached warrant into shares in the manner specified in the warrant. This conversion is exercised with respect to _____ of the shares covered by the warrant.

[Strike paragraph that does not apply.]

2. Please issue a certificate or certificates representing said shares in the name of the undersigned or in such other name as is specified below:

Square 1 Bank
Attn: Warrant Administrator
406 Blackwell Street, Suite 240
Fowler Building
Durham, NC 27701

3. The undersigned represents it is acquiring the shares solely for its own account and not as a nominee for any other party and not with a view toward the resale or distribution thereof except in compliance with applicable securities laws.

SQUARE 1 BANK or Registered Assignee

_____
(Signature)

_____
(Date)

THIS WARRANT AND THE SHARES ISSUABLE HEREUNDER HAVE NOT BEEN REGISTERED UNDER THE SECURITIES ACT OF 1933, AS AMENDED, AND MAY NOT BE SOLD, PLEDGED OR OTHERWISE TRANSFERRED EXCEPT IN ACCORDANCE WITH APPLICABLE LAW.

FOURTH WARRANT TO PURCHASE STOCK

Corporation:	BioNano Genomics, Inc.
Number of Shares:	10,718
Class of Stock:	Series B-1 Preferred Stock
Initial Exercise Price:	$1.3995 per share
Issue Date:	December 11, 2013
Expiration Date:	December 11, 2020

THIS FOURTH WARRANT CERTIFIES THAT for good and valuable consideration, the receipt of which is hereby acknowledged, **SQUARE 1 BANK** or its assignee ("***Holder***") is entitled to purchase at any time and from time to time prior to the Expiration Date, the number of fully paid and nonassessable shares of the class of securities (the "***Shares***") of the corporation (the "***Company***") at the initial exercise price per Share (the "***Warrant Price***") all as set forth above and as, adjusted pursuant to Article 2 of this warrant, subject to the provisions and upon the terms and conditions set forth in this warrant.

ARTICLE 1

EXERCISE

1.1 Method of Exercise. Holder may exercise this warrant prior to the Expiration Date by delivering this warrant and a duly executed Notice of Exercise in substantially the form attached as Appendix 1 to the principal office of the Company. Unless Holder is exercising the conversion right set forth in Section 1.2, Holder shall also deliver to the Company a check for the aggregate Warrant Price for the Shares being purchased.

1.2 Conversion Right. In lieu of exercising this warrant as specified in Section 1.1, Holder may from time to time convert this warrant, in whole or in part, into a number of Shares determined by dividing (a) the aggregate fair market value of the Shares or other securities otherwise issuable upon exercise of this warrant minus the aggregate Warrant Price of such Shares by (b) the fair market value of one Share. The fair market value of the Shares shall be determined pursuant to Section 1.3. If the fair market value of one Share as determined pursuant to Section 1.3 is less than the exercise price per Share hereunder at the time of any automatic conversion pursuant to Section 1.6.2, then this warrant shall not be automatically converted into Shares under Section 1.6.2 but instead upon the occurrence of such Acquisition shall expire unexercised and be of no further force and effect.

1.3 Fair Market Value. If the Shares are traded regularly in a public market, the fair market value of the Shares shall be the closing price of the Shares (or the closing price of the Company's stock into which the Shares are convertible) reported for the business day immediately before Holder delivers its Notice of Exercise to the Company. If the Shares are not

regularly traded in a public market, the Board of Directors of the Company shall determine fair market value in its reasonable good faith judgment.

1.4 Delivery of Certificate and New Warrant. Promptly after Holder exercises or converts this warrant, the Company shall deliver to Holder certificates for the Shares acquired and, if this warrant has not been fully exercised or converted and has not expired, a new warrant representing the Shares not so acquired.

1.5 Replacement of Warrants. On receipt of evidence reasonably satisfactory to the Company of the loss, theft, destruction or mutilation of this warrant and, in the case of loss, theft or destruction, on delivery of an indemnity agreement reasonably satisfactory in form and amount to the Company or, in the case of mutilation, on surrender and cancellation of this warrant, the Company at its expense shall execute and deliver, in lieu of this warrant, a new warrant of like tenor.

1.6 Conversion on Sale, Merger, or Consolidation of the Company.

1.6.1 "***Acquisition***." For the purpose of this warrant, "Acquisition" means (a) any sale, license, or other disposition of all or substantially all of the assets (including intellectual property) of the Company, or (b) any reorganization, consolidation, merger or sale of the voting securities of the Company or any other transaction where the holders of the Company's securities before the transaction beneficially own less than 50% of the outstanding voting securities of the surviving entity after the transaction.

1.6.2 Conversion of Warrant upon Acquisition. If, upon the closing of any Acquisition, Holder has not otherwise exercised this warrant in full, then this warrant shall be deemed to have been automatically converted pursuant to Section 1.2, and thereafter Holder shall participate in the Acquisition on the same terms as other holders of the same class of securities of the Company.

ARTICLE 2

ADJUSTMENTS TO THE SHARES

2.1 Stock Dividends, Splits, Etc. If the Company declares or pays a dividend on its common stock payable in common stock, or other securities, or subdivides the outstanding common stock into a greater amount of common stock, then upon exercise of this warrant, for each Share acquired, Holder shall receive, without cost to Holder, the total number and kind of securities to which Holder would have been entitled had Holder owned the Shares of record as of the date the dividend or subdivision occurred.

2.2 Reclassification, Exchange or Substitution. Upon any reclassification, exchange, substitution, or other event that results in a change of the number and/or class of the securities issuable upon exercise or conversion of this warrant, Holder shall be entitled to receive, upon exercise or conversion of this warrant, the number and kind of securities and property that Holder would have received for the Shares if this warrant had been exercised immediately before such reclassification, exchange, substitution, or other event. Such an event shall include any automatic conversion of the outstanding or issuable securities of the Company

of the same class or series as the Shares to common stock pursuant to the terms of the Company's Certificate of Incorporation upon the closing of a registered public offering of the Company's common stock, The Company or its successor shall promptly issue to Holder a new warrant for such new securities or other property. The new warrant shall provide for adjustments which shall be as nearly equivalent as may be practicable to the adjustments provided for in this Article 2 including, without limitation, adjustments to the Warrant Price and to the number of securities or property issuable upon exercise of the new warrant. The provisions of this Section 2.2 shall similarly apply to successive reclassifications, exchanges, substitutions, or other events.

2.3 Adjustments for Combinations, Etc. If the outstanding Shares are combined or consolidated, by reclassification or otherwise, into a lesser number of shares, the Warrant Price shall be proportionately increased. If the outstanding Shares are combined or consolidated, by reclassification or otherwise, into a greater number of shares, the Warrant Price shall be proportionately decreased.

2.4 Certificate as to Adjustments. Upon each adjustment of the Warrant Price, the Company at its expense shall promptly compute such adjustment, and furnish Holder with a certificate of its Chief Financial Officer setting forth such adjustment and the facts upon which such adjustment is based. The Company shall, upon written request, furnish Holder a certificate setting forth the Warrant Price in effect upon the date thereof and the series of adjustments leading to such Warrant Price.

2.5 Fractional Shares. No fractional Shares shall be issuable upon exercise or conversion of this warrant and the Number of Shares to be issued shall be rounded down to the nearest whole Share. If a fractional share interest arises upon any exercise or conversion of this warrant, the Company shall eliminate such fractional share interest by paying Holder amount computed by multiplying the fractional interest by the fair market value of a full Share.

ARTICLE 3

REPRESENTATIONS AND COVENANTS OF THE COMPANY AND THE HOLDER

3.1 Representations and Warranties of the Company. The Company hereby represents and warrants to the Holder as follows:

(a) All Shares which may be issued upon the exercise of the purchase right represented by this warrant, and all securities, if any, issuable upon conversion of the Shares, shall, upon issuance, be duly authorized, validly issued, fully paid and nonassessable, and free of any liens and encumbrances except for restrictions on transfer provided for herein or under applicable federal and state securities laws.

(b) The Company's capitalization table attached to this warrant is true and complete in all material respects as of the Issue Date.

3.2 Notice of Certain Events. The Company shall provide Holder with not less than 10 days prior written notice, including a description of the material facts surrounding the impact

on the Holder's warrant of, any of the following events: (a) declaration of any dividend or distribution upon its common stock, whether in cash, property, stock, or other securities and whether or not a regular cash dividend; (b) offering for subscription pro rata to the holders of any class or series of its stock any additional shares of stock of any class or series or other rights; (c) effecting any reclassification or recapitalization of common stock; or (d) the merger or consolidation with or into any other corporation, or sale, lease, license, or conveyance of all or substantially all of its assets, or liquidation, dissolution or winding up.

3.3 Information Rights. So long as the Holder holds this warrant and/or any of the Shares, the Company shall deliver to the Holder (a) promptly after mailing, copies of all communiques to the shareholders of the Company, (b) within one hundred eighty (180) days after the end of each fiscal year of the Company, the annual audited financial statements of the Company certified by independent public accountants of recognized standing and (c) within forty-five (45) days after the end of each of the first three quarters of each fiscal year, the Company's quarterly, unaudited financial statements.

3.4 Registration Under Securities Act of 1933, as amended and Other Rights and Obligations. The Company and the Holder agree that the Shares or, if the Shares are convertible into common stock of the Company, such common stock, shall be "Registrable Securities", and Holder shall be a "holder of Registrable Securities" under the Amended and Restated Investors' Rights Agreement among the Company and other persons dated as of June 20, 2012 (as it may be amended and/or restated, the "***IRA***") solely for the purposes of receiving the registration rights (and being subject to the related obligations) set forth in Sections 4 through 11 thereof. In addition, prior to the issuance of the Shares issuable upon exercise of this warrant, the Holder agrees to be bound to the Amended and Restated Stockholders Agreement among the Company and other persons dated as of June 20, 2012 (as it may be amended and/or restated, the "***Stockholders Agreement***") as a "Stockholder" and a "Series B-1 Investor" or a "Common Holder," as applicable, pursuant thereto. The Company has provided to the Holder the current copies of the IRA and the Stockholders Agreement as of the Issue Date. Upon request of the Company, the Holder will execute joinders to the IRA and the Stockholders Agreement or a separate agreement evidencing the provisions that the Holder agrees to be bound by pursuant to this Section 3.4. In the event of a conflict between the provisions of either the IRA or the Stockholders Agreement, and this warrant, the provisions of this warrant shall govern.

3.5 Representations and Warranties of the Holder. The Holder represents and warrants to the Company as follows:

(a) It is acquiring this warrant, and (if and when it exercises this warrant) it will acquire the Shares, for its own account for investment and not with a view to, or for sale in connection with, any distribution thereof, nor with any present intention of distributing or selling the same; and the Holder has no present or contemplated agreement, undertaking, arrangement, obligation, indebtedness or commitment providing for the disposition thereof.

(b) The Holder is an "accredited investor" as defined in Rule 501(a) under the Securities Act of 1933, as amended.

(c) The Holder has made such inquiry concerning the Company and its business and personnel as it has deemed appropriate; and the Holder has sufficient knowledge and experience in finance and business that it is capable of evaluating the risks and merits of its investment in the Company.

ARTICLE 4

MISCELLANEOUS

4.1 Term: Exercise Upon Expiration. This warrant is exercisable in whole or in part, at any time and from time to time prior to the Expiration Date. If this warrant has not been exercised prior to the Expiration Date, this warrant shall be deemed to have been automatically exercised on the Expiration Date by "cashless" conversion pursuant to Section 1.2.

4.2 Legends. This warrant and the Shares (and the securities issuable, directly or indirectly, upon conversion of the Shares, if any) shall be imprinted with a legend in substantially the following form together with any other legend required under the IRA, the Stockholders Agreement or to implement the other provisions of Section 3.4 hereof:

THIS SECURITY HAS NOT BEEN REGISTERED UNDER THE SECURITIES ACT OF 1933, AS AMENDED, AND MAY NOT BE SOLD, PLEDGED OR OTHERWISE TRANSFERRED EXCEPT IN ACCORDANCE WITH APPLICABLE LAW AND -EN ACCORDANCE WITH SECTION 4.3 OF THE WARRANT PURSUANT TO WHICH THIS SECURITY WAS ISSUED.

4.3 Compliance with Securities Laws on Transfer. This warrant and the Shares issuable upon exercise of this warrant (and the securities issuable, directly or indirectly, upon conversion of the Shares, if any) may not be transferred or assigned in whole or in part without compliance with applicable federal and state securities laws by the transferor and the transferee, The Company may require Holder to provide an opinion of counsel, except if the transfer is to an affiliate of Holder or if there is no material question as to the availability of current information as referenced in Rule 144(c), Holder represents that it has complied with Rule 144 (d) and (e) in reasonable detail, the selling broker represents that it has complied with Rule 144(f), and the Company is provided with a copy of Holder's notice of proposed sale.

4.4 Transfer Procedure. Subject to the provisions of Section 4.3, Holder may transfer all or part of this warrant or the Shares issuable upon exercise of this warrant (or the securities issuable, directly or indirectly, upon conversion of the Shares, if any) by giving the Company notice of the portion of this warrant being transferred setting forth the name, address and taxpayer identification number of the transferee and surrendering this warrant to the Company for reissuance to the transferee(s) (and Holder, if applicable). No surrender or reissuance shall be required if the transfer is to an affiliate of Holder.

4.5 Notices. All notices and other communications from the Company to the Holder, or vice versa, shall be deemed delivered and effective when given personally or mailed by first-class registered or certified mail, postage prepaid, at such address as may have been furnished to

the Company or the Holder, as the case may be, in writing by the Company or such Holder from time to time. All notices to the Holder shall be addressed as follows:

Square 1 Bank
Attn: Warrant Administrator
406 Blackwell Street, Suite 240
Crowe Building
Durham, NC 27701

4.6 Amendments. This warrant and any term hereof may be changed, waived, discharged or terminated only by an instrument in writing signed by the party against which enforcement of such change, waiver, discharge or termination is sought.

4.7 Attorneys' Fees. In the event of any dispute between the parties concerning the terms and provisions of this warrant, the party prevailing in such dispute shall be entitled to collect from the other party all costs incurred in such dispute, including reasonable attorneys' fees.

4.8 Governing Law. This warrant shall be governed by and construed in accordance with the laws of the State of North Carolina, without giving effect to its principles regarding conflicts of law.

BIONANO GENOMICS, INC.

By: _____

Name: _____

Title: _____

APPENDIX 1

NOTICE OF EXERCISE

1. The undersigned hereby elects to purchase _____ shares of the _____ stock of **BIONANO GENOMICS, INC.** pursuant to the terms of the attached warrant, and tenders herewith payment of the purchase price of such shares in full.

1. The undersigned hereby elects to convert the attached warrant into shares in the manner specified in the warrant. This conversion is exercised with respect to _____ of the shares covered by the warrant.

[Strike paragraph that does not apply.]

2. Please issue a certificate or certificates representing said shares in the name of the undersigned or in such other name as is specified below:

Square 1 Bank
Attn: Warrant Administrator
406 Blackwell Street, Suite 240
Fowler Building
Durham, NC 27701

3. The undersigned represents it is acquiring the shares solely for its own account and not as a nominee for any other party and not with a view toward the resale or distribution thereof except in compliance with applicable securities laws.

SQUARE 1 BANK or Registered Assignee

_____
(Signature)

_____
(Date)

Exhibit 4.4

THIS WARRANT AND THE UNDERLYING SECURITIES HAVE NOT BEEN REGISTERED UNDER THE SECURITIES ACT OF 1933, AS AMENDED (THE "ACT"). THEY MAY NOT BE SOLD, OFFERED FOR SALE, PLEDGED OR HYPOTHECATED IN THE ABSENCE OF AN EFFECTIVE REGISTRATION STATEMENT AS TO SUCH SECURITIES UNDER THE ACT OR AN OPINION OF COUNSEL SATISFACTORY TO THE COMPANY THAT SUCH REGISTRATION IS NOT REQUIRED.

BIONANO GENOMICS, INC.

WARRANT TO PURCHASE SERIES B-1 PREFERRED STOCK

PB1 – [__] **June 12, 2014**

VOID AFTER JUNE 12, 2024

THIS CERTIFIES THAT, for value received, **[_____]** (the "***Holder***"), is entitled to subscribe for and purchase from **BIONANO GENOMICS, INC.**, a Delaware corporation, with its principal office at 9640 Towne Centre Drive, Suite 100, San Diego, CA 92121 (the "***Company***"), an aggregate of [_____] Exercise Shares at the Exercise Price (each subject to adjustment as provided herein). This Warrant is part of a series of substantially similar warrants issued to certain persons and entities pursuant to the terms of that certain Note and Warrant Purchase Agreement dated as of even date herewith, by and among the Company and the purchasers listed therein (as such may be amended from time to time, the "***Purchase Agreement***").

1. DEFINITIONS. As used herein, the following terms shall have the following respective meanings:

(a) "***Acquisition***" shall mean (A) any consolidation or merger of the Company with or into any other corporation or other entity or person, or any other corporate reorganization, other than any such consolidation, merger or reorganization in which the stockholders of the Company immediately prior to such consolidation, merger or reorganization, continue to hold at least a majority of the voting power of the surviving entity in substantially the same proportions (or, if the surviving entity is a wholly owned subsidiary, its parent) immediately after such consolidation, merger or reorganization; or (B) any transaction or series of related transactions to which the Company is a party in which in excess of 50% of the Company's voting power is transferred; provided that an Acquisition shall not include any transaction or series of related transactions solely for bona fide equity financing purposes in which cash is received by the Company or any successor or indebtedness of the Company is cancelled or converted or a combination thereof.

(b) "***Asset Transfer***" shall mean the sale, lease, transfer, exclusive license or other disposition, in a single transaction or series of related transactions, by the Company or any subsidiary of the Company of all or substantially all the assets of the Company and its subsidiaries taken as a whole, or the sale or disposition (whether by merger or otherwise) of one or more subsidiaries of the Company if substantially all of the assets of the Company and its subsidiaries taken as a whole are held by such subsidiary or subsidiaries, except where such sale, lease, transfer, exclusive license or other disposition is to a wholly owned subsidiary of the Company.

(c) "***Exercise Period***" shall mean the period commencing with the date hereof and ending ten years later, unless sooner terminated as provided below.

(d) "***Exercise Price***" shall initially mean $1.3995 per Exercise Share subject to adjustment pursuant to Section 5 below.

(e) "***Exercise Shares***" shall mean shares of the Company's Series B-1 Preferred Stock issuable upon exercise of this Warrant.

(f) "***Termination Date***" shall mean the earlier of: (i) the date of the expiration of the Exercise Period or (ii) the date of the termination of this Warrant pursuant to Section 7 below.

2. EXERCISE OF WARRANT.

2.1 The rights represented by this Warrant may be exercised in whole or in part at any time during the Exercise Period, by delivery of the following to the Company at its address set forth above (or at such other address as it may designate by notice in writing to the Holder):

(a) An executed Notice of Exercise in the form attached hereto;

(b) Payment of the Exercise Price either (i) in cash or by check, or (ii) by cancellation of indebtedness; and

(c) This Warrant.

Upon the exercise of the rights represented by this Warrant, a certificate or certificates for the Exercise Shares so purchased, registered in the name of the Holder or persons affiliated with the Holder, if the Holder so designates, shall be issued and delivered to the Holder within a reasonable time after the rights represented by this Warrant shall have been so exercised. In the event that this Warrant is being exercised for less than all of the then-current number of Exercise Shares purchasable hereunder, the Company shall, concurrently with the issuance by the Company of the number of Exercise Shares for which this Warrant is then being exercised, issue a new Warrant exercisable for the remaining number of Exercise Shares purchasable hereunder.

The person in whose name any certificate or certificates for Exercise Shares are to be issued upon exercise of this Warrant shall be deemed to have become the holder of record of such shares on the date on which this Warrant was surrendered and payment of the Exercise Price was made, irrespective of the date of delivery of such certificate or certificates, except that, if the date of such surrender and payment is a date when the stock transfer books of the Company are closed, such person shall be deemed to have become the holder of such shares at the close of business on the next succeeding date on which the stock transfer books are open.

2.2 Net Exercise. Notwithstanding any provisions herein to the contrary, if the fair market value of one Exercise Share is greater than the Exercise Price (at the date of calculation as set forth below), in lieu of exercising this Warrant pursuant to Section 2.1, the Holder may elect to receive Exercise Shares equal to the value (as determined below) of this

Warrant (or the portion thereof being cancelled pursuant to this Section 2.2) by surrender of this Warrant at the principal office of the Company together with the properly endorsed Notice of Exercise in which event the Company shall issue to the Holder a number of Exercise Shares computed using the following formula:

$$X = \frac{Y\ (A-B)}{A}$$

Where X = the number of Exercise Shares to be issued to the Holder

Y = the number of Exercise Shares purchasable under the Warrant or, if only a portion of the Warrant is being exercised, that portion of the Warrant being cancelled pursuant to this Section 2.2 (at the date of such calculation)

A = the fair market value of one Exercise Share (at the date of such calculation)

B = Exercise Price (as adjusted to the date of such calculation)

For purposes of the above calculation, the fair market value of one Exercise Share shall be determined by the Company's Board of Directors in good faith; provided, however, that in the event that this Warrant is exercised pursuant to this Section 2.2 in connection with the Company's initial public offering of its Common Stock, the fair market value per share shall be the product of (i) the per share offering price to the public of the Company's initial public offering, and (ii) the number of shares of Common Stock into which each Exercise Share is convertible at the time of such exercise.

2.3 Net Exercise on Termination Date. If this Warrant has not been exercised prior to the Termination Date, this Warrant shall be deemed to have been automatically exercised on the Termination Date pursuant to the "Net Exercise" provisions set forth in Section 2.2 hereof.

3. COVENANTS AS TO EXERCISE SHARES. The Company covenants and agrees that all Exercise Shares that may be issued upon the exercise of the rights represented by this Warrant will, upon issuance, be validly issued and outstanding, fully paid and nonassessable, and free from all taxes, liens and charges with respect to the issuance thereof. The Company further covenants and agrees that the Company will at all times during the Exercise Period, have authorized and reserved, free from preemptive rights, a sufficient number of shares of the series of equity securities comprising the Exercise Shares to provide for the exercise of the rights represented by this Warrant. If at any time during the Exercise Period the number of authorized but unissued shares of such series of the Company's equity securities shall not be sufficient to permit exercise of this Warrant, the Company will take such corporate action as may, in the opinion of its counsel, be necessary to increase its authorized but unissued shares of such series of the Company's equity securities to such number of shares as shall be sufficient for such purposes and a sufficient number of shares of Common Stock to provide for the conversion of Exercise Shares issued upon the exercise of the rights represented by this Warrant, including,

without limitation, engaging in reasonable best efforts to obtain the requisite stockholder approval of any necessary amendment to the Company's Certificate of Incorporation.

4. REPRESENTATIONS OF HOLDER.

4.1 Acquisition of Warrant for Personal Account. The Holder represents and warrants that it is acquiring the Warrant and the Exercise Shares solely for its account for investment and not with a view to or for sale or distribution of said Warrant or Exercise Shares or any part thereof. The Holder also represents that the entire legal and beneficial interests of the Warrant and Exercise Shares the Holder is acquiring is being acquired for, and will be held for, its account only.

4.2 Information and Sophistication. Holder hereby: (i) acknowledges that it has received all the information it has requested from the Company and it considers necessary or appropriate for deciding whether to acquire this Warrant and the Exercise Shares, (ii) represents that it has had an opportunity to ask questions and receive answers from the Company regarding the financial condition of the Company and the risks associated with the acquisition of this Warrant and the Exercise Shares and (iii) further represents that it has such knowledge and experience in financial and business matters that it is capable of evaluating the merits and risk of this investment.

4.3 Ability to Bear Economic Risk. Holder acknowledges that investment in the securities of the Company involves a high degree of risk, and represents that it is able, without materially impairing its financial condition, to hold the Exercise Shares for an indefinite period of time and to suffer a complete loss of its investment.

4.4 Securities Are Not Registered.

(a) The Holder understands that the Warrant and the Exercise Shares have not been registered under the Securities Act of 1933, as amended (the "***Act***"), on the basis that no distribution or public offering of the stock of the Company is to be effected. The Holder realizes that the basis for the exemption may not be present if, notwithstanding its representations, the Holder has a present intention of acquiring the securities for a fixed or determinable period in the future, selling (in connection with a distribution or otherwise), granting any participation in, or otherwise distributing the securities. The Holder has no such present intention.

(b) The Holder recognizes that the Warrant and the Exercise Shares must be held indefinitely unless they are subsequently registered under the Act or an exemption from such registration is available. The Holder recognizes that the Company has no obligation to register the Warrant or the Exercise Shares of the Company, or to comply with any exemption from such registration.

(c) The Holder is aware that neither the Warrant nor the Exercise Shares may be sold pursuant to Rule 144 adopted under the Act unless certain conditions are met, including, among other things, the existence of a public market for the shares, the availability of certain current public information about the Company, the resale following the required holding period under Rule 144 and the number of shares being sold during any three

month period not exceeding specified limitations. Holder is aware that the conditions for resale set forth in Rule 144 have not been satisfied and that the Company presently has no plans to satisfy these conditions in the foreseeable future.

4.5 Disposition of Warrant and Exercise Shares.

(a) The Holder further agrees not to make any disposition of all or any part of the Warrant or Exercise Shares in any event unless and until:

(i) The Company shall have received a letter secured by the Holder from the Securities and Exchange Commission (the "***Commission***") stating that no action will be recommended to the Commission with respect to the proposed disposition;

(ii) There is then in effect a registration statement under the Act covering such proposed disposition and such disposition is made in accordance with said registration statement; or

(iii) The Holder shall have notified the Company of the proposed disposition and shall have furnished the Company with a statement of the circumstances surrounding the proposed disposition, and if reasonably requested by the Company, the Holder shall have furnished the Company with an opinion of counsel, reasonably satisfactory to the Company, for the Holder to the effect that such disposition will not require registration of such Warrant or Exercise Shares under the Act or any applicable state securities laws. The Company agrees that it will not require an opinion of counsel with respect to transactions under Rule 144 of the Act, except in unusual circumstances.

(iv) Notwithstanding the foregoing or anything to the contrary herein, the provisions of this Section 4.5 shall not apply to the proposed disposition of all or any part of this Warrant or Exercise Shares by the Holder to *(x)* any of its current or former stockholders, members, partners or other equity holders or *(y)* any person who is managed by, or has the same management company or investment advisor or similar company of the Holder or *(z)* any of the Holder's affiliates.

(b) The Holder understands and agrees that all certificates evidencing the shares to be issued to the Holder may bear the following legend:

THESE SECURITIES HAVE NOT BEEN REGISTERED UNDER THE SECURITIES ACT OF 1933, AS AMENDED (THE "***ACT***"). THEY MAY NOT BE SOLD, OFFERED FOR SALE, PLEDGED OR HYPOTHECATED IN THE ABSENCE OF AN EFFECTIVE REGISTRATION STATEMENT AS TO THE SECURITIES UNDER THE ACT OR AN OPINION OF COUNSEL SATISFACTORY TO THE COMPANY THAT SUCH REGISTRATION IS NOT REQUIRED.

4.6 Accredited Investor Status. The Holder is an "accredited investor" as defined in Regulation D promulgated under the Act.

5. ADJUSTMENT OF EXERCISE PRICE AND NUMBER OF EXERCISE SHARES.

5.1 In the event of changes in the series of equity securities of the Company comprising the Exercise Shares by reason of stock dividends, splits, recapitalizations, reclassifications, combinations or exchanges of shares, separations, reorganizations, liquidations, or the like, the number and class of Exercise Shares available under the Warrant in the aggregate and the Exercise Price shall be correspondingly adjusted to give the Holder of the Warrant, on exercise for the same Aggregate Exercise Price, the total number, class, and kind of shares as the Holder would have owned had the Warrant been exercised prior to the event and had the Holder continued to hold such shares until after the event requiring adjustment; *provided, however,* that such adjustment shall not be made with respect to, and this Warrant shall terminate if not exercised prior to, the events set forth in Section 7 below. For purposes of this Section 5, the "***Aggregate Exercise Price***" shall mean the aggregate Exercise Price payable in connection with the exercise in full of this Warrant. The form of this Warrant need not be changed because of any adjustment in the number of Exercise Shares subject to this Warrant.

5.2 Whenever there is any adjustment pursuant to this Section 5, the Company shall prepare a certificate signed by the Company's chief executive officer setting forth, in reasonable detail, the event requiring the adjustment, the amount of the adjustment, the method by which such adjustment was calculated, and the Exercise Price and number of Exercise Shares issuable upon exercise of the Warrant after giving effect to such adjustment, and shall cause copies of such certificate to be mailed (by certified or registered mail, return receipt required, postage prepaid) within thirty (30) days of such adjustment to the Holder of this Warrant.

6. FRACTIONAL SHARES. No fractional shares shall be issued upon the exercise of this Warrant as a consequence of any adjustment pursuant hereto. All Exercise Shares (including fractions) to be issued upon exercise of this Warrant shall be aggregated for purposes of determining whether the exercise would result in the issuance of any fractional share. If, after aggregation, the exercise would result in the issuance of a fractional share, the Company shall, in lieu of issuance of any fractional share, pay the Holder otherwise entitled to such fraction a sum in cash equal to the product resulting from multiplying the then current fair market value of one Exercise Share by such fraction.

7. EARLY TERMINATION. In the event of, at any time during the Exercise Period, an initial public offering of securities of the Company registered under the Act, or an Acquisition or Asset Transfer, the Company shall provide to the Holder 10 days advance written notice of such public offering, Acquisition or Asset Transfer, and this Warrant shall be automatically exercised in accordance with Section 2.3 unless exercised immediately prior to the date such public offering is closed or the closing of such Acquisition or Asset Transfer.

8. MARKET STAND-OFF AGREEMENT. Holder shall not sell, dispose of, transfer, make any short sale of, grant any option for the purchase of, or enter into any hedging or similar transaction with the same economic effect as a sale, any Common Stock (or other securities) of the Company held by Holder, for a period of time specified by the representative of the underwriters of Common Stock (or other securities) of the Company not to exceed 180 days following the effective date of a registration statement of the Company filed under the Act (or such longer period as necessary to permit compliance with NASD Rule 2711 or NYSE Member

Rule 472 and similar or successor regulatory rules and regulations). Holder agrees to execute and deliver such other agreements as may be reasonably requested by the Company and/or the managing underwriter(s) which are consistent with the foregoing or which are necessary to give further effect thereto. In order to enforce the foregoing covenant, the Company may impose stop-transfer instructions with respect to such Common Stock (or other securities) until the end of such period. The underwriters of the Company's stock are intended third party beneficiaries of this Section 8 and shall have the right, power and authority to enforce the provisions hereof as though they were a party hereto.

9. NO STOCKHOLDER RIGHTS. This Warrant in and of itself shall not entitle the Holder to any voting rights or other rights as a stockholder of the Company.

10. TRANSFER OF WARRANT. Subject to applicable laws and the restriction on transfer set forth on the first page and Section 4.5 of this Warrant, this Warrant and all rights hereunder are transferable, by the Holder in person or by duly authorized attorney, upon delivery of this Warrant and the form of assignment attached hereto to any transferee designated by Holder.

11. LOST, STOLEN, MUTILATED OR DESTROYED WARRANT. If this Warrant is lost, stolen, mutilated or destroyed, the Company may, on such terms as to indemnity or otherwise as it may reasonably impose (which shall, in the case of a mutilated Warrant, include the surrender thereof), issue a new Warrant of like denomination and tenor as the Warrant so lost, stolen, mutilated or destroyed. Any such new Warrant shall constitute an original contractual obligation of the Company, whether or not the allegedly lost, stolen, mutilated or destroyed Warrant shall be at any time enforceable by anyone.

12. CHARGES, TAXES, AND EXPENSES. Issuance of certificates for Exercise Shares upon the exercise of this Warrant shall be made without charge to the Holder for any United States or state of the United States documentary stamp tax or other incidental expense within respect to the issuance of such certificate, all of which taxes and expenses shall be paid by the Company (other than income or similar taxes), and such certificates shall be issued in the name of the Holder.

13. AMENDMENT. Any term of this Warrant may be amended or waived only with the written consent of the Company and the Requisite Purchasers (as defined in the Purchase Agreement). Any amendment, modification or waiver affected in accordance with this Section 13 shall be binding upon the Holder, whether or not the Holder has consented to such amendment, modification or waiver.

14. NOTICES, ETC. All notices required or permitted hereunder shall be in writing and shall be deemed effectively given: (a) upon personal delivery to the party to be notified, (b) when sent by confirmed telex or facsimile if sent during normal business hours of the recipient, if not, then on the next business day, (c) five days after having been sent by registered or certified mail, return receipt requested, postage prepaid, or (d) one day after deposit with a nationally recognized overnight courier, specifying next day delivery, with written verification of receipt. All communications shall be sent to the Company at the address listed on the signature page and to Holder at the address set forth on the Schedule of Purchasers attached to the Purchase

Agreement or at such other address as the Company or Holder may designate by 10 days advance written notice to the other parties hereto.

15. ACCEPTANCE. Receipt of this Warrant by the Holder shall constitute acceptance of and agreement to all of the terms and conditions contained herein.

16. GOVERNING LAW. This Warrant and all rights, obligations and liabilities hereunder shall be governed by and construed under the laws of the State of Delaware, without giving effect to conflicts of laws principles.

[Signature Page Follows]

IN WITNESS WHEREOF, the Company has caused this Warrant to be executed by its duly authorized officer as of the date first written above.

BIONANO GENOMICS, INC.

By: _____

Name: Erik Holmlin

Title: Chief Executive Officer

Address:

9640 Towne Centre Drive, Suite 100
San Diego, CA 92121

Acknowledged and Accepted by:

[HOLDER]

By: _____
Name: _____
Title: _____

[SIGNATURE PAGE TO WARRANT TO PURCHASE SERIES B-1 PREFERRED STOCK]

NOTICE OF EXERCISE

TO: BIONANO GENOMICS, INC.

(1) ☐ The undersigned hereby elects to purchase _____ shares of Series B-1 Preferred Stock (the "***Exercise Shares***") of **BioNano Genomics, Inc.** (the "***Company***") pursuant to the terms of the attached Warrant, and tenders herewith payment of the exercise price in full, together with all applicable transfer taxes, if any.

☐ The undersigned hereby elects to purchase _____ shares of Series B-1 Preferred Stock (the "***Exercise Shares***") of **BioNano Genomics, Inc.** (the "***Company***") pursuant to the terms of the net exercise provisions set forth in Section 2.2 of the attached Warrant, and shall tender payment of all applicable transfer taxes, if any.

(2) Please issue a certificate or certificates representing said Exercise Shares in the name of the undersigned or in such other name as is specified below:

_____
(Name)

_____

_____
(Address)

_____ _____
(Date) (Signature)

_____
(Print name)

ASSIGNMENT FORM

(To assign the foregoing Warrant, execute this form and supply required information. Do not use this form to purchase shares.)

FOR VALUE RECEIVED, the foregoing Warrant and all rights evidenced thereby are hereby assigned to

Name: _____
(Please Print)

Address: _____
(Please Print)

Dated: _____, 20__

Holder's Signature: _____

Holder's Address: _____

NOTE: The signature to this Assignment Form must correspond with the name as it appears on the face of the Warrant, without alteration or enlargement or any change whatever. Officers of corporations and those acting in a fiduciary or other representative capacity should file proper evidence of authority to assign the foregoing Warrant.

Exhibit 4.5

THIS WARRANT AND THE SHARES ISSUABLE HEREUNDER HAVE NOT BEEN REGISTERED UNDER THE SECURITIES ACT OF 1933, AS AMENDED, AND MAY NOT BE SOLD, PLEDGED, OR OTHERWISE TRANSFERRED WITHOUT AN EFFECTIVE REGISTRATION THEREOF UNDER SUCH ACT OR PURSUANT TO RULE 144 OR AN OPINION OF COUNSEL REASONABLY SATISFACTORY TO THE CORPORATION AND ITS COUNSEL, THAT SUCH REGISTRATION IS NOT REQUIRED.

WARRANT TO PURCHASE STOCK

Issuer: BIONANO GENOMICS, INC., a Delaware corporation (the "Company")

Number of Shares: 510,417, as the same may be from time to time adjusted pursuant to Article 2 hereof.

Class of Stock: Series D Convertible Participating Preferred Stock, as the same may be from time to time adjusted pursuant to Article 2 hereof (the "Shares")

Exercise Price: $0.48 per share, as the same may be from time to time adjusted pursuant to Article 2 hereof (the "Exercise Price").

Issue Date: March 8, 2016

Expiration Date: March 8, 2026

THIS WARRANT CERTIFIES THAT, for the agreed upon value of $1.00 and for other good and valuable consideration, WESTERN ALLIANCE BANK, an Arizona corporation ("Holder") is entitled to purchase the number of fully paid and nonassessable Shares of the Company at the Exercise Price per Share set forth, subject to the provisions and upon the terms and conditions set forth in this Warrant.

ARTICLE 1 EXERCISE.

1.1 Method of Exercise. This Warrant is exercisable, in whole or in part, at any time and from time to time on or before the Expiration Date set forth above. Holder may exercise this Warrant by delivering this Warrant and a duly executed Notice of Exercise, in substantially the form attached as Appendix 1, to the principal office of Company. Unless Holder is exercising the conversion right set forth in Section 1.2, Holder shall also deliver to Company a check for the aggregate Exercise Price for Shares being purchased.

1.2 Conversion Right. In lieu of exercising this Warrant as specified in Section 1.1, Holder may from time to time convert this Warrant, in whole or in part, into a number of Shares determined by dividing (a) the aggregate fair market value of Shares or other securities otherwise issuable upon exercise of this Warrant minus the aggregate Exercise Price of such Shares by (b) the fair market value of one Share. The fair market value of Shares shall be determined pursuant to Section 1.3.

1.3 Fair Market Value. If the Shares are traded in a public market, the fair market value of the Shares shall be the closing price of the Shares (or the closing price of the Company's stock into which the Shares are convertible) reported for the business day immediately before Holder delivers its Notice of Exercise to the Company. If the Shares are not traded in a public market, the Board of Directors of Company shall determine fair market value in its reasonable good faith judgment. The foregoing notwithstanding, if Holder advises the Board of Directors in writing that Holder disagrees with such determination, then Company and Holder shall promptly agree upon a reputable valuation firm to undertake such valuation. If the valuation determined by such valuation firm is greater than that determined by the Board of Directors, then all fees and expenses of such valuation firm shall be paid by Company. In all other circumstances, such fees and expenses shall be paid by Holder.

1.4 Delivery of Certificate and New Warrant. Promptly after Holder exercises or converts this Warrant, Company shall deliver to a Holder certificate for Shares acquired and, if this Warrant has not been fully exercised or converted and has not expired, a new Warrant representing Shares not so acquired.

1.5 Replacement of Warrants. On receipt of evidence reasonably satisfactory to Company of the loss, theft, destruction or mutilation of this Warrant and, in the case of loss, theft or destruction, on delivery of an indemnity agreement reasonably satisfactory in form and amount to Company or, in the case of mutilation, on surrender and cancellation of this Warrant, Company at its expense shall execute and deliver, in lieu of this Warrant, a new warrant of like tenor.

1.6 Repurchase on Sale, Merger, or Consolidation of Company. For the purpose of this Warrant, "Acquisition" means any sale, license, or other disposition of all or substantially all of the assets of Company, or any reorganization, consolidation, sale of securities or merger of Company where the holders of Company's securities before the transaction beneficially own less than 50% of the outstanding voting securities of the surviving entity after the transaction. Upon the closing of any Acquisition, the successor entity shall assume the obligations of this Warrant, and this Warrant shall be exercisable for the same securities, cash, and property as would be payable for Shares issuable upon exercise of the unexercised portion of this Warrant as if such Shares were outstanding on the record date for the Acquisition and subsequent closing, and the Exercise Price shall be adjusted accordingly; provided that if pursuant to such Acquisition the entire outstanding class of Shares issuable upon exercise of the unexercised portion of this Warrant are converted into the right to receive consideration and the total consideration payable to the holders of such class of Shares consists entirely of cash, publicly traded securities or any combination thereof, then, upon payment to the Holder of an amount equal to the amount such holder would receive if such holder held Shares issuable upon exercise of the unexercised portion of this Warrant and such Shares were outstanding on the record date for the Acquisition less the aggregate Exercise Price of such Shares, this Warrant shall be cancelled.

ARTICLE 2 ADJUSTMENTS.

2.1 Stock Dividends, Splits, Etc. If Company declares or pays a dividend on its common stock (or Shares if Shares are securities other than common stock) payable in common stock or other securities or other property, subdivides the outstanding common stock into a greater amount of common stock, or, if Shares are securities other than common stock, subdivides Shares in a transaction that increases the amount of common stock into which Shares are convertible, then upon exercise of this Warrant, for each Share acquired, Holder shall receive, without cost to Holder, the total number and kind of securities to which Holder would have been entitled had Holder owned Shares on the record date on which the dividend or subdivision occurred.

2.2 Reclassification, Recapitalization, Exchange or Substitution. Except in the case of an Acquisition to which Section 1.6 is applicable, upon any reclassification, recapitalization, exchange, substitution, or other event that results in a change of the number and/or class of the securities issuable upon exercise or conversion of this Warrant, Holder shall be entitled to receive, upon exercise or conversion of this Warrant, the number and kind of securities and property that Holder would have received for Shares if this Warrant had been exercised immediately before such reclassification, recapitalization, exchange, substitution, or other event. Company or its successor shall promptly issue to Holder a new Warrant for such new securities or other property. The new Warrant shall provide for adjustments which shall be as nearly equivalent as may be practicable to the adjustments provided for in this Article 2 including, without limitation, adjustments to the Exercise Price and to the number of securities or property issuable upon exercise of the new Warrant. The provisions of this Section 2.2 shall similarly apply to successive reclassifications, recapitalizations, exchanges, substitutions, or other events.

2.3 Adjustments for Combinations, Etc. If the outstanding Shares are combined or consolidated, by reclassification or otherwise, into a lesser number of shares, the Exercise Price shall be proportionately increased and the number of Shares as to which this Warrant is exercisable shall be proportionately decreased.

2.4 Adjustments for Diluting Issuances. In the event of the issuance (a "Diluting Issuance") by Company, after the Issue Date of this Warrant, of securities at a price per share less than the then Exercise Price, then the number of shares of common stock issuable upon conversion of the Shares, and the conversion price, shall be adjusted in accordance with those provisions (the "Provisions") of Company's Seventh Amended and Restated Certificate of Incorporation (as the same may be amended from time to time, the "Certificate of Incorporation") which apply to Diluting Issuances with the same effect as though the shares were outstanding at the time of the diluting issuance. Under no circumstances shall the aggregate Exercise Price payable by Holder upon exercise of this Warrant increase as a result of any adjustment arising from a Diluting Issuance.

2.5 Adjustment for Pay-to-Play Transactions. In the event that the Certificate of Incorporation provides, or is amended to so provide, for the amendment or modification of the rights, preferences or privileges of the Shares, or the reclassification, conversion or exchange of the outstanding shares of the Class of Stock, in the event that a holder of shares thereof fails to participate in an equity financing transaction (a

"Pay-to-Play Provision"), and in the event that such Pay-to-Play Provision becomes operative in a transaction occurring after the date hereof, this Warrant shall automatically and without any action required become exercisable for that number and type of shares of equity securities as would have been issued or exchanged, or would have remained outstanding, in respect of the Shares issuable hereunder had this Warrant been exercised in full prior to such event, and had the Holder participated in the equity financing to the maximum extent permitted.

2.6 No Impairment. Company shall not, by amendment of its Certificate of Incorporation or through a reorganization, transfer of assets, consolidation, merger, dissolution, issue, or sale of securities or any other voluntary action, avoid or seek to avoid the observance or performance of any of the terms to be observed or performed under this Warrant by Company, but shall at all times in good faith assist in carrying out of all the provisions of this Article 2 and in taking all such action as may be necessary or appropriate to protect Holder's rights under this Article against impairment. If Company takes any dilutive action affecting Shares or its common stock other than as described above that adversely affects Holder's rights under this Warrant, the Exercise Price shall be adjusted downward and the number of Shares issuable upon exercise of this Warrant shall be adjusted upward in such a manner that such dilutive action is offset and the aggregate Exercise Price of this Warrant is unchanged.

2.7 Fractional Shares. No fractional Shares shall be issuable upon exercise or conversion of this Warrant and the number of Shares to be issued shall be rounded down to the nearest whole Share. If a fractional share interest arises upon any exercise or conversion of this Warrant, Company shall eliminate such fractional share interest by paying Holder an amount computed by multiplying the fractional interest by the fair market value of a full Share (as determined pursuant to Section 1.6 herein).

2.8 Certificate as to Adjustments. Upon each adjustment of the Exercise Price, Company at its expense shall promptly compute such adjustment, and furnish Holder with a certificate of its Chief Financial Officer setting forth such adjustment and the facts upon which such adjustment is based. Company shall, upon written request, furnish Holder a certificate setting forth the Exercise Price in effect upon the date thereof and the series of adjustments leading to such Exercise Price.

ARTICLE 3 COVENANTS OF COMPANY.

3.1 Valid Issuance. Company shall take all steps necessary to insure that all Shares which may be issued upon the exercise of this Warrant, and all securities, if any, issuable upon conversion of Shares, shall, upon issuance, be duly authorized, validly issued, fully paid and nonassessable, and free of any liens and encumbrances except for restrictions on transfer provided for herein or under applicable federal and state securities laws.

3.2 Notice of Certain Events. If Company proposes at any time (a) to declare any dividend or distribution upon its common stock, whether in cash, property, stock, or other securities and whether or not a regular cash dividend; (b) to offer for subscription pro rata to the holders of any class or series of its stock any additional shares of stock of any class or series or other rights; (c) to effect any reclassification or recapitalization of common stock; (d) to effect an Acquisition; or (e) offer holders of registration rights the opportunity to participate in an underwritten public offering of the company's securities for cash, then, in connection with each such event, Company shall give Holder (1) in the case of the matters referred to in (a) and (b) above at least 20 days prior written notice of the date on which a record will be taken for such dividend, distribution, or subscription rights (and specifying the date on which the holders of common stock will be entitled thereto) or for determining rights to vote, if any, in respect of the matters referred to in (c) and (d) above; (2) in the case of the matters referred to in (c) and (d) above at least 20 days prior written notice of the date when the same will take place (and specifying the date on which the holders of common stock will be entitled to exchange their common stock for securities or other property deliverable upon the occurrence of such event); and (3) in the case of the matter referred to in (e) above, the same notice as is given to the holders of such registration rights.

3.3 Information. So long as the Holder holds this Warrant and/or any of the Shares, Company shall deliver to Holder (a) promptly, copies of all notices or other written communications to which Holder would be entitled if it held Shares as to which this Warrant was then exercisable and (b) such other financial statements required under and in accordance with any loan documents between Holder and Company, or if there are no such requirements or if the subject loan(s) are no longer are outstanding, then within 90 days after the end of

each of the first three quarters of each fiscal year, Company's quarterly, unaudited financial statements and within 180 days after the end of each fiscal year, Company's annual, audited financial statements.

3.4 Notice of Expiration. Company shall give Holder written notice of Holder's right to exercise this Warrant in the form attached as Appendix 2 not more than 90 days and not less than 15 days before the Expiration Date and, in the case of an Acquisition to which the proviso of Section 1.6 shall be applicable, 15 days before such Acquisition. If the notice is not so given, the Expiration Date shall automatically be extended until 15 days after the date Company delivers the notice to Holder.

3.5 Registration Rights. The common stock issuable upon conversion of Shares, shall have the same "piggyback" registration rights as are set forth in the Fourth Amended and Restated Investors' Rights Agreement, dated as of March 4, 2016 between Company and its investors, as from time to time in effect (the "Investors' Rights Agreement" — a true copy of which as in effect on the date hereof has been furnished by Company to Holder) and by accepting this Warrant, Holder agrees to be subject to corresponding obligations of the holders of "piggyback" registration rights. Company agrees that no amendments will be made to the Investors' Rights Agreement which would have an adverse impact on Holder's registration rights thereunder.

ARTICLE 4 MISCELLANEOUS.

4.1 Legends. This Warrant and the Shares (and the securities issuable, directly or indirectly, upon conversion of Shares, if any) shall be imprinted with a legend in substantially the following form:

THIS SECURITY HAS NOT BEEN REGISTERED UNDER THE SECURITIES ACT OF 1933, AS AMENDED, AND MAY NOT BE SOLD, PLEDGED OR OTHERWISE TRANSFERRED WITHOUT AN EFFECTIVE REGISTRATION THEREOF UNDER SUCH ACT OR PURSUANT TO RULE 144 OR AN OPINION OF COUNSEL REASONABLY SATISFACTORY TO COMPANY AND ITS COUNSEL THAT SUCH REGISTRATION IS NOT REQUIRED.

4.2 Compliance with Securities Laws on Transfer. This Warrant and the Shares issuable upon exercise of this Warrant (and the securities issuable, directly or indirectly, upon conversion of Shares, if any) may not be transferred or assigned in whole or in part without compliance with applicable federal and state securities laws by the transferor and the transferee (including, without limitation, the delivery of investment representation letters and legal opinions reasonably satisfactory to Company, as reasonably requested by Company). Company shall not require Holder to provide an opinion of counsel if the transfer is to Holder's parent company, Western Alliance Bancorporation, or any other affiliate or successor of Holder, or if there is no material question as to the availability of current information as referenced in Rule 144(c), Holder represents that it has complied with Rule 144(d) and (e) in reasonable detail, the selling broker represents that it has complied with Rule 144(f), and the Company is provided with a copy of Holder's notice of proposed sale.

4.3 Transfer Procedure. After receipt by Holder of the executed Warrant, Holder will transfer all of this Warrant to Holder's parent company, Western Alliance Bancorporation, by execution of an Assignment substantially in the form of Appendix 3. Subject to the provisions of Section 4.2 above and upon providing Company with written notice, Western Alliance Bancorporation and any subsequent Holder may transfer all or part of this Warrant or the Shares issuable upon exercise of this Warrant (or the Shares issuable directly or indirectly, upon conversion of the Shares, if any) to any transferee, provided, however, in connection with any such transfer, Western Alliance Bancorporation or any subsequent Holder will give the Company notice of the portion of this Warrant being transferred with the name, address and taxpayer identification number of the transferee and Holder will surrender this Warrant to the Company for reissuance to the transferee(s) (and Holder if applicable). Unless Company is filing financial information with the SEC pursuant to the Securities Exchange Act of 1934, Company shall have the right to refuse to transfer any portion of this Warrant to any person who directly or indirectly competes with Company.

4.4 Notices. All notices and other communications from Company to Holder, or vice versa, shall be in writing and shall be deemed delivered and effective when given personally or mailed by first-class registered or certified mail, postage prepaid, or by overnight courier, at such address as may have been furnished to Company or Holder, as the case may be, in writing by Company or such Holder from time to time.

4.5 Attorneys Fees. In the event of any dispute between the parties concerning the terms and provisions of this Warrant, the party prevailing in such dispute shall be entitled to collect from the other party all costs incurred in such dispute, including reasonable attorneys' fees.

4.6 Governing Law. This Warrant shall be governed by and construed in accordance with the laws of the State of California, without giving effect to its principles regarding conflicts of law.

4.7 Market Stand-Off Agreement. Holder hereby agrees that it shall not sell, dispose of, transfer, make any short sale of, grant any option for the purchase of, or enter into any hedging or similar transaction with the same economic effect as a sale, any shares of the Company's Common Stock or other securities held by such Holder (other than those included in the registration) during (i) the 180-day period following the effective date of the Company's first underwritten public offering of its Common Stock registered under the Securities Act of 1933, as amended (the "Securities Act") (or such longer period as the underwriters or the Company shall request in order to facilitate compliance with NASD Rule 2711 or NYSE Member Rule 472 or any successor or similar rule or regulation), and (ii) the 90-day period following the effective date of a registration statement of the Company filed under the Securities Act (or such longer period as the underwriters or the Company shall request in order to facilitate compliance with NASD Rule 2711 or NYSE Member Rule 472 or any successor or similar rule or regulation); provided, that, with respect to (i) and (ii) above, all officers and directors of the Company are bound by and have entered into similar agreements. The underwriters of the Company's stock are intended third party beneficiaries of this Section 4.7 and shall have the right, power and authority to enforce the provisions hereof as though they were a party hereto.

[Balance of Page Intentionally Left Blank]

IN WITNESS WHEREOF, Company has caused this Warrant to be duly executed by its authorized officers, all as of the day and year first above written.

COMPANY

BIONANO GENOMICS, INC.

By: _____
Name: _____
Title: _____

APPENDIX 1

Notice of Exercise

[Strike paragraph that does not apply.]

1. The undersigned hereby elects to purchase _____shares of the Common/Series_____ Preferred [strike one] Stock of BIONANO GENOMICS, INC. pursuant to the terms of the attached Warrant, and tenders herewith payment of the purchase price of such shares in full.

1. The undersigned hereby elects to convert the attached Warrant into Shares/cash [strike one] in the manner specified in the Warrant. This conversion is exercised with respect to _____of the Shares covered by the Warrant.

2. Please issue a certificate or certificates representing said shares in the name of the undersigned or in such other name as is specified below:

Name: _____
Address: _____

3. The undersigned represents it is acquiring the shares solely for its own account and not as a nominee for any other party and not with a view toward the resale or distribution thereof except in compliance with applicable securities laws.

_____
(Signature)

_____
(Date)

APPENDIX 2

Notice that Warrant Is About to Expire

[Insert Date of Notice]

To: BRIDGE BANK, A DIVISION OF WESTERN ALLIANCE BANK

Attn:_____
55 Almaden Boulevard
San Jose, California 95113

The Warrant issued to you described below will expire on_____ ,____.

Issuer:	BIONANO GENOMICS, INC.
Issue Date:	March 8, 2016
Class of Security Issuable:	_____
Exercise Price per Share:	$____per share
Number of Shares Issuable:	_____

Procedure for Exercise:

Please contact_____at (__)_____-_____with any questions you may have concerning exercise of the Warrant. This is your only notice of pending expiration.

BIONANO GENOMICS, INC.

By _____
Its: _____

APPENDIX 3

Assignment

For value received, WESTERN ALLIANCE BANK, an Arizona corporation hereby sells, assigns and transfers unto:

Name: WESTERN ALLIANCE BANCORPORATION
Address: 55 Almaden Boulevard
San Jose, California 95113

Tax ID: _____

that certain Warrant to Purchase Stock issued by BIONANO GENOMICS, INC. (the "Company"), on March 8, 2016 (the "Warrant") together with all rights, title and interest therein.

WESTERN ALLIANCE BANK, AN ARIZONA CORPORATION

By: _____
Name: _____
Title: _____

Date: _____

By its execution below, and for the benefit of the Company, Western Alliance Bancorporation agrees to all provisions of the Warrant as of the date hereof.

WESTERN ALLIANCE BANCORPORATION

By: _____
Name: _____
Title: _____

THIS WARRANT AND THE UNDERLYING SECURITIES HAVE NOT BEEN REGISTERED UNDER THE SECURITIES ACT OF 1933, AS AMENDED (THE "ACT"). THEY MAY NOT BE SOLD, OFFERED FOR SALE, PLEDGED OR HYPOTHECATED IN THE ABSENCE OF AN EFFECTIVE REGISTRATION STATEMENT AS TO SUCH SECURITIES UNDER THE ACT OR AN OPINION OF COUNSEL SATISFACTORY TO THE COMPANY THAT SUCH REGISTRATION IS NOT REQUIRED.

BIONANO GENOMICS, INC.

WARRANT TO PURCHASE SERIES D PREFERRED STOCK

PD — [___] **[•], 2016**

VOID AFTER MARCH [•], 2026

THIS CERTIFIES THAT, for value received, **[_____]** (the "***Holder***"), is entitled to subscribe for and purchase from **BIONANO GENOMICS, INC**., a Delaware corporation, with its principal office at 9640 Towne Centre Drive, Suite 100, San Diego, CA 92121 (the "***Company***"), an aggregate of [_____] Exercise Shares at the Exercise Price (each subject to adjustment as provided herein). This Warrant is part of a series of substantially similar warrants issued to certain persons and entities pursuant to the terms of that certain Series D Convertible Participating Preferred Stock and Warrant Purchase Agreement dated as of March [•], 2016, by and among the Company and the purchasers listed therein (as may be amended from time to time, the "***Purchase Agreement***").

1. DEFINITIONS. As used herein, the following terms shall have the following respective meanings:

(a) "***Acquisition***" shall mean (A) any consolidation or merger of the Company with or into any other corporation or other entity or person, or any other corporate reorganization, other than any such consolidation, merger or reorganization in which the stockholders of the Company immediately prior to such consolidation, merger or reorganization, continue to hold at least a majority of the voting power of the surviving entity in substantially the same proportions (or, if the surviving entity is a wholly owned subsidiary, its parent) immediately after such consolidation, merger or reorganization; or (B) any transaction or series of related transactions in which in excess of 50% of the Company's voting power is transferred; provided that an Acquisition shall not include any transaction or series of related transactions solely for bona fide equity financing purposes in which cash is received by the Company or any successor or indebtedness of the Company is cancelled or converted or a combination thereof.

(b) "***Asset Transfer***" shall mean the sale, lease, transfer, exclusive license or other disposition, in a single transaction or series of related transactions, by the Company or any subsidiary of the Company of all or substantially all the assets of the Company and its subsidiaries taken as a whole, or the sale or disposition (whether by merger or otherwise) of one or more subsidiaries of the Company if substantially all of the assets of the Company and its subsidiaries taken as a whole are held by such subsidiary or subsidiaries, except where such sale, lease, transfer, exclusive license or other disposition is to a wholly owned subsidiary of the Company.

(c) "***Exercise Period***" shall mean the period commencing with the date of the Purchase Agreement and ending on March [•], 2026, unless sooner terminated as provided below.

(d) "***Exercise Price***" shall initially mean $0.41 per Exercise Share subject to adjustment pursuant to Section 5 below.

(e) "***Exercise Shares***" shall mean shares of the Company's Series D Preferred Stock issuable upon exercise of this Warrant.

(f) "***Termination Date***" shall mean the earlier of: (i) the date of the expiration of the Exercise Period or (ii) the date of the termination of this Warrant pursuant to Section 7 below.

2. EXERCISE OF WARRANT.

2.1 The rights represented by this Warrant may be exercised in whole or in part at any time during the Exercise Period, by delivery of the following to the Company at its address set forth above (or at such other address as it may designate by notice in writing to the Holder):

(a) An executed Notice of Exercise in the form attached hereto;

(b) Payment of the Exercise Price either (i) in cash or by check, or (ii) by cancellation of indebtedness; and

(c) This Warrant.

Upon the exercise of the rights represented by this Warrant, a certificate or certificates for the Exercise Shares so purchased, registered in the name of the Holder or persons affiliated with the Holder, if the Holder so designates, shall be issued and delivered to the Holder within a reasonable time after the rights represented by this Warrant shall have been so exercised. In the event that this Warrant is being exercised for less than all of the then-current number of Exercise Shares purchasable hereunder, the Company shall, concurrently with the issuance by the Company of the number of Exercise Shares for which this Warrant is then being exercised, issue a new Warrant exercisable for the remaining number of Exercise Shares purchasable hereunder.

The person in whose name any certificate or certificates for Exercise Shares are to be issued upon exercise of this Warrant shall be deemed to have become the holder of record of such shares on the date on which this Warrant was surrendered and payment of the Exercise Price was made, irrespective of the date of delivery of such certificate or certificates, except that, if the date of such surrender and payment is a date when the stock transfer books of the Company are closed, such person shall be deemed to have become the holder of such shares at the close of business on the next succeeding date on which the stock transfer books are open.

2.2 Net Exercise. Notwithstanding any provisions herein to the contrary, if the fair market value of one Exercise Share is greater than the Exercise Price (at the date of calculation as set forth below), in lieu of exercising this Warrant pursuant to Section 2.1, the

Holder may elect to receive Exercise Shares equal to the value (as determined below) of this Warrant (or the portion thereof being cancelled pursuant to this Section 2.2) by surrender of this Warrant at the principal office of the Company together with the properly endorsed Notice of Exercise in which event the Company shall issue to the Holder a number of Exercise Shares computed using the following formula:

$$X = \frac{Y\,(A-B)}{A}$$

Where X = the number of Exercise Shares to be issued to the Holder

Y = the number of Exercise Shares purchasable under the Warrant or, if only a portion of the Warrant is being exercised, that portion of the Warrant being cancelled pursuant to this Section 2.2 (at the date of such calculation)

A = the fair market value of one Exercise Share (at the date of such calculation)

B = Exercise Price (as adjusted to the date of such calculation)

For purposes of the above calculation, the fair market value of one Exercise Share shall be determined by the Company's Board of Directors in good faith; provided, however, that in the event that this Warrant is exercised pursuant to this Section 2.2 in connection with the Company's initial public offering of its Common Stock, the fair market value per share shall be the product of (i) the per share offering price to the public of the Company's initial public offering, and (ii) the number of shares of Common Stock into which each Exercise Share is convertible at the time of such exercise.

2.3 Net Exercise on Termination Date. If this Warrant has not been exercised prior to the Termination Date, this Warrant shall be deemed to have been automatically exercised on the Termination Date pursuant to the "Net Exercise" provisions set forth in Section 2.2 hereof.

3. COVENANTS AS TO EXERCISE SHARES. The Company covenants and agrees that all Exercise Shares that may be issued upon the exercise of the rights represented by this Warrant will, upon issuance, be validly issued and outstanding, fully paid and nonassessable, and free from all taxes, liens and charges with respect to the issuance thereof. The Company further covenants and agrees that the Company will at all times during the Exercise Period, have authorized and reserved, free from preemptive rights, a sufficient number of shares of the series of equity securities comprising the Exercise Shares to provide for the exercise of the rights represented by this Warrant. If at any time during the Exercise Period the number of authorized but unissued shares of such series of the Company's equity securities shall not be sufficient to permit exercise of this Warrant, the Company will take such corporate action as may, in the opinion of its counsel, be necessary to increase its authorized but unissued shares of such series of the Company's equity securities to such number of shares as shall be sufficient for such purposes and a sufficient number of shares of Common Stock to provide for the conversion of Exercise Shares issued upon the exercise of the rights represented by this Warrant, including,

without limitation, engaging in reasonable best efforts to obtain the requisite stockholder approval of any necessary amendment to the Company's Certificate of Incorporation.

4. REPRESENTATIONS OF HOLDER.

4.1 Acquisition of Warrant for Personal Account. The Holder represents and warrants that it is acquiring the Warrant and the Exercise Shares solely for its account for investment and not with a view to or for sale or distribution of said Warrant or Exercise Shares or any part thereof. The Holder also represents that the entire legal and beneficial interests of the Warrant and Exercise Shares the Holder is acquiring is being acquired for, and will be held for, its account only.

4.2 Information and Sophistication. Holder hereby: (i) acknowledges that it has received all the information it has requested from the Company and it considers necessary or appropriate for deciding whether to acquire this Warrant and the Exercise Shares, (ii) represents that it has had an opportunity to ask questions and receive answers from the Company regarding the financial condition of the Company and the risks associated with the acquisition of this Warrant and the Exercise Shares and (iii) further represents that it has such knowledge and experience in financial and business matters that it is capable of evaluating the merits and risk of this investment.

4.3 Ability to Bear Economic Risk. Holder acknowledges that investment in the securities of the Company involves a high degree of risk, and represents that it is able, without materially impairing its financial condition, to hold the Exercise Shares for an indefinite period of time and to suffer a complete loss of its investment.

4.4 Securities Are Not Registered.

(a) The Holder understands that the Warrant and the Exercise Shares have not been registered under the Securities Act of 1933, as amended (the "***Act***"), on the basis that no distribution or public offering of the stock of the Company is to be effected. The Holder realizes that the basis for the exemption may not be present if, notwithstanding its representations, the Holder has a present intention of acquiring the securities for a fixed or determinable period in the future, selling (in connection with a distribution or otherwise), granting any participation in, or otherwise distributing the securities. The Holder has no such present intention.

(b) The Holder recognizes that the Warrant and the Exercise Shares must be held indefinitely unless they are subsequently registered under the Act or an exemption from such registration is available. The Holder recognizes that the Company has no obligation to register the Warrant or the Exercise Shares of the Company, or to comply with any exemption from such registration.

(c) The Holder is aware that neither the Warrant nor the Exercise Shares may be sold pursuant to Rule 144 adopted under the Act unless certain conditions are met, including, among other things, the existence of a public market for the shares, the availability of certain current public information about the Company, the resale following the required holding period under Rule 144 and the number of shares being sold during any three

month period not exceeding specified limitations. Holder is aware that the conditions for resale set forth in Rule 144 have not been satisfied and that the Company presently has no plans to satisfy these conditions in the foreseeable future.

4.5 Disposition of Warrant and Exercise Shares.

(a) The Holder further agrees not to make any disposition of all or any part of the Warrant or Exercise Shares in any event unless and until:

(i) The Company shall have received a letter secured by the Holder from the Securities and Exchange Commission (the "***Commission***") stating that no action will be recommended to the Commission with respect to the proposed disposition;

(ii) There is then in effect a registration statement under the Act covering such proposed disposition and such disposition is made in accordance with said registration statement; or

(iii) The Holder shall have notified the Company of the proposed disposition and shall have furnished the Company with a statement of the circumstances surrounding the proposed disposition, and if reasonably requested by the Company, the Holder shall have furnished the Company with an opinion of counsel, reasonably satisfactory to the Company, for the Holder to the effect that such disposition will not require registration of such Warrant or Exercise Shares under the Act or any applicable state securities laws. The Company agrees that it will not require an opinion of counsel with respect to transactions under Rule 144 of the Act, except in unusual circumstances.

(iv) Notwithstanding the foregoing or anything to the contrary herein, the provisions of this Section 4.5 shall not apply to the proposed disposition of all or any part of this Warrant or Exercise Shares by the Holder to *(x)* any of its current or former stockholders, members, partners or other equity holders or *(y)* any person who is managed by, or has the same management company or investment advisor or similar company of the Holder or *(z)* any of the Holder's affiliates.

(b) The Holder understands and agrees that all certificates evidencing the shares to be issued to the Holder may bear the following legend:

THESE SECURITIES HAVE NOT BEEN REGISTERED UNDER THE SECURITIES ACT OF 1933, AS AMENDED (THE "***ACT***"). THEY MAY NOT BE SOLD, OFFERED FOR SALE, PLEDGED OR HYPOTHECATED IN THE ABSENCE OF AN EFFECTIVE REGISTRATION STATEMENT AS TO THE SECURITIES UNDER THE ACT OR AN OPINION OF COUNSEL SATISFACTORY TO THE COMPANY THAT SUCH REGISTRATION IS NOT REQUIRED.

4.6 Accredited Investor Status. The Holder is an "accredited investor" as defined in Regulation D promulgated under the Act.

5. ADJUSTMENT OF EXERCISE PRICE AND NUMBER OF EXERCISE SHARES.

5.1 In the event of changes in the series of equity securities of the Company comprising the Exercise Shares by reason of stock dividends, splits, recapitalizations, reclassifications, combinations or exchanges of shares, separations, reorganizations, liquidations or the like, the number and class of Exercise Shares available under the Warrant in the aggregate and the Exercise Price shall be correspondingly adjusted to give the Holder of the Warrant, on exercise for the same Aggregate Exercise Price, the total number, class, and kind of shares as the Holder would have owned had the Warrant been exercised prior to the event and had the Holder continued to hold such shares until after the event requiring adjustment; *provided, however,* that such adjustment shall not be made with respect to, and this Warrant shall terminate if not exercised prior to, the events set forth in Section 7 below. For purposes of this Section 5, the "***Aggregate Exercise Price***" shall mean the aggregate Exercise Price payable in connection with the exercise in full of this Warrant. The form of this Warrant need not be changed because of any adjustment in the number of Exercise Shares subject to this Warrant.

5.2 Whenever there is any adjustment pursuant to this Section 5, the Company shall prepare a certificate signed by the Company's chief executive officer setting forth, in reasonable detail, the event requiring the adjustment, the amount of the adjustment, the method by which such adjustment was calculated, and the Exercise Price and number of Exercise Shares issuable upon exercise of the Warrant after giving effect to such adjustment, and shall cause copies of such certificate to be mailed (by certified or registered mail, return receipt required, postage prepaid) within thirty (30) days of such adjustment to the Holder of this Warrant.

6. FRACTIONAL SHARES. No fractional shares shall be issued upon the exercise of this Warrant as a consequence of any adjustment pursuant hereto. All Exercise Shares (including fractions) to be issued upon exercise of this Warrant shall be aggregated for purposes of determining whether the exercise would result in the issuance of any fractional share. If, after aggregation, the exercise would result in the issuance of a fractional share, the Company shall, in lieu of issuance of any fractional share, pay the Holder otherwise entitled to such fraction a sum in cash equal to the product resulting from multiplying the then current fair market value of one Exercise Share by such fraction.

7. EARLY TERMINATION. In the event of, at any time during the Exercise Period, an initial public offering of securities of the Company registered under the Act, or an Acquisition or Asset Transfer, the Company shall provide to the Holder 10 days advance written notice of such public offering, Acquisition or Asset Transfer, and this Warrant shall be automatically exercised in accordance with Section 2.3 unless exercised immediately prior to the date such public offering is closed or the closing of such Acquisition or Asset Transfer.

8. MARKET STAND-OFF AGREEMENT. Holder shall not sell, dispose of, transfer, make any short sale of, grant any option for the purchase of, or enter into any hedging or similar transaction with the same economic effect as a sale, any Common Stock (or other securities) of the Company held by Holder, for a period of time specified by the representative of the underwriters of Common Stock (or other securities) of the Company not to exceed 180 days following the effective date of a registration statement of the Company filed under the Act (or such longer period as necessary to permit compliance with NASD Rule 2711 or NYSE Member

Rule 472 and similar or successor regulatory rules and regulations). Holder agrees to execute and deliver such other agreements as may be reasonably requested by the Company and/or the managing underwriter(s) which are consistent with the foregoing or which are necessary to give further effect thereto. In order to enforce the foregoing covenant, the Company may impose stop-transfer instructions with respect to such Common Stock (or other securities) until the end of such period. The underwriters of the Company's stock are intended third party beneficiaries of this Section 8 and shall have the right, power and authority to enforce the provisions hereof as though they were a party hereto.

9. NO STOCKHOLDER RIGHTS. This Warrant in and of itself shall not entitle the Holder to any voting rights or other rights as a stockholder of the Company.

10. TRANSFER OF WARRANT. Subject to applicable laws and the restriction on transfer set forth on the first page and Section 4.5 of this Warrant, this Warrant and all rights hereunder are transferable, by the Holder in person or by duly authorized attorney, upon delivery of this Warrant and the form of assignment attached hereto to any transferee designated by Holder.

11. LOST, STOLEN, MUTILATED OR DESTROYED WARRANT. If this Warrant is lost, stolen, mutilated or destroyed, the Company may, on such terms as to indemnity or otherwise as it may reasonably impose (which shall, in the case of a mutilated Warrant, include the surrender thereof), issue a new Warrant of like denomination and tenor as the Warrant so lost, stolen, mutilated or destroyed. Any such new Warrant shall constitute an original contractual obligation of the Company, whether or not the allegedly lost, stolen, mutilated or destroyed Warrant shall be at any time enforceable by anyone.

12. CHARGES, TAXES, AND EXPENSES. Issuance of certificates for Exercise Shares upon the exercise of this Warrant shall be made without charge to the Holder for any United States or state of the United States documentary stamp tax or other incidental expense within respect to the issuance of such certificate, all of which taxes and expenses shall be paid by the Company (other than income or similar taxes), and such certificates shall be issued in the name of the Holder.

13. AMENDMENT. Any term of this Warrant may be amended or waived only with the written consent of the Company and the Requisite Holders (as defined in the Purchase Agreement). Any amendment, modification or waiver affected in accordance with this Section 13 shall be binding upon the Holder, whether or not the Holder has consented to such amendment, modification or waiver.

14. NOTICES, ETC. All notices required or permitted hereunder shall be in writing and shall be deemed effectively given: (a) upon personal delivery to the party to be notified, (b) when sent by confirmed telex or facsimile if sent during normal business hours of the recipient, if not, then on the next business day, (c) five days after having been sent by registered or certified mail, return receipt requested, postage prepaid, or (d) one day after deposit with a nationally recognized overnight courier, specifying next day delivery, with written verification of receipt. All communications shall be sent to the Company at the address listed on the signature page and to Holder at the address set forth on the Schedule of Purchasers attached to the Purchase

Agreement or at such other address as the Company or Holder may designate by 10 days advance written notice to the other parties hereto.

15. ACCEPTANCE. Receipt of this Warrant by the Holder shall constitute acceptance of and agreement to all of the terms and conditions contained herein.

16. GOVERNING LAW. This Warrant and all rights, obligations and liabilities hereunder shall be governed by and construed under the laws of the State of Delaware, without giving effect to conflicts of laws principles.

[Signature Page Follows]

IN WITNESS WHEREOF, the Company has caused this Warrant to be executed by its duly authorized officer as of the date first written above.

BIONANO GENOMICS, INC.

By: _____

Name: Erik Holmlin

Title: Chief Executive Officer

Address:

9640 Towne Centre Drive, Suite 100
San Diego, CA 92121

Acknowledged and Accepted by:

[_____**]**

By: _____

Name: _____

Title: _____

NOTICE OF EXERCISE

TO: BIONANO GENOMICS, INC.

(1) ☐ The undersigned hereby elects to purchase _____ shares of Series D Preferred Stock (the "***Exercise Shares***") of **BioNano Genomics, Inc.** (the "***Company***") pursuant to the terms of the attached Warrant, and tenders herewith payment of the exercise price in full, together with all applicable transfer taxes, if any.

☐ The undersigned hereby elects to purchase _____ shares of Series D Preferred Stock (the "***Exercise Shares***") of **BioNano Genomics, Inc.** (the "***Company***") pursuant to the terms of the net exercise provisions set forth in Section 2.2 of the attached Warrant, and shall tender payment of all applicable transfer taxes, if any.

(2) Please issue a certificate or certificates representing said Exercise Shares in the name of the undersigned or in such other name as is specified below:

_____
(Name)

_____
(Address)

_____ _____
(Date) (Signature)

_____
(Print name)

ASSIGNMENT FORM

(To assign the foregoing Warrant, execute this form and supply required information. Do not use this form to purchase shares.)

FOR VALUE RECEIVED, the foregoing Warrant and all rights evidenced thereby are hereby assigned to

Name: _____
(Please Print)

Address: _____
(Please Print)

Dated: _____, 20__

Holder's Signature: _____

Holder's Address: _____

NOTE: The signature to this Assignment Form must correspond with the name as it appears on the face of the Warrant, without alteration or enlargement or any change whatever. Officers of corporations and those acting in a fiduciary or other representative capacity should file proper evidence of authority to assign the foregoing Warrant.

Exhibit 4.7

THIS WARRANT AND THE SHARES ISSUABLE HEREUNDER HAVE NOT BEEN REGISTERED UNDER THE SECURITIES ACT OF 1933, AS AMENDED, AND MAY NOT BE SOLD, PLEDGED, OR OTHERWISE TRANSFERRED WITHOUT AN EFFECTIVE REGISTRATION THEREOF UNDER SUCH ACT OR PURSUANT TO RULE 144 OR AN OPINION OF COUNSEL REASONABLY SATISFACTORY TO THE CORPORATION AND ITS COUNSEL, THAT SUCH REGISTRATION IS NOT REQUIRED.

WARRANT TO PURCHASE STOCK

Issuer: BIONANO GENOMICS, INC., a Delaware corporation (the "Company")

Number of Shares: 291,667, as the same may be from time to time adjusted pursuant to Article 2 hereof.

Class of Stock: Series D-1 Convertible Participating Preferred Stock, as the same may be from time to time adjusted pursuant to Article 2 hereof (the "Shares")

Exercise Price: $0.48 per share, as the same may be from time to time adjusted pursuant to Article 2 hereof (the "Exercise Price").

Issue Date: December 9, 2016

Expiration Date: December 9, 2026

THIS WARRANT CERTIFIES THAT, for the agreed upon value of $1.00 and for other good and valuable consideration, WESTERN ALLIANCE BANK, an Arizona corporation ("Holder") is entitled to purchase the number of fully paid and nonassessable Shares of the Company at the Exercise Price per Share set forth, subject to the provisions and upon the terms and conditions set forth in this Warrant.

ARTICLE 1 EXERCISE.

1.1 Method of Exercise. This Warrant is exercisable, in whole or in part, at any time and from time to time on or before the Expiration Date set forth above. Holder may exercise this Warrant by delivering this Warrant and a duly executed Notice of Exercise, in substantially the form attached as Appendix 1, to the principal office of Company. Unless Holder is exercising the conversion right set forth in Section 1.2, Holder shall also deliver to Company a check for the aggregate Exercise Price for Shares being purchased.

1.2 Conversion Right. In lieu of exercising this Warrant as specified in Section 1.1, Holder may from time to time convert this Warrant, in whole or in part, into a number of Shares determined by dividing (a) the aggregate fair market value of Shares or other securities otherwise issuable upon exercise of this Warrant minus the aggregate Exercise Price of such Shares by (b) the fair market value of one Share. The fair market value of Shares shall be determined pursuant to Section 1.3.

1.3 Fair Market Value. If the Shares are traded in a public market, the fair market value of the Shares shall be the closing price of the Shares (or the closing price of the Company's stock into which the Shares are convertible) reported for the business day immediately before Holder delivers its Notice of Exercise to the Company. If the Shares are not traded in a public market, the Board of Directors of Company shall determine fair market value in its reasonable good faith judgment. The foregoing notwithstanding, if Holder advises the Board of Directors in writing that Holder disagrees with such determination, then Company and Holder shall promptly agree upon a reputable valuation firm to undertake such valuation. If the valuation determined by such valuation firm is greater than that determined by the Board of Directors, then all fees and expenses of such valuation firm shall be paid by Company. In all other circumstances, such fees and expenses shall be paid by Holder.

1.4 Delivery of Certificate and New Warrant. Promptly after Holder exercises or converts this Warrant, Company shall deliver to a Holder certificate for Shares acquired and, if this Warrant has not been fully exercised or converted and has not expired, a new Warrant representing Shares not so acquired.

1.5 Replacement of Warrants. On receipt of evidence reasonably satisfactory to Company of the loss, theft, destruction or mutilation of this Warrant and, in the case of loss, theft or destruction, on delivery of an indemnity agreement reasonably satisfactory in form and amount to Company or, in the case of

mutilation, on surrender and cancellation of this Warrant, Company at its expense shall execute and deliver, in lieu of this Warrant, a new warrant of like tenor.

1.6 Repurchase on Sale, Merger, or Consolidation of Company. For the purpose of this Warrant, "Acquisition" means any sale, license, or other disposition of all or substantially all of the assets of Company, or any reorganization, consolidation, sale of securities or merger of Company where the holders of Company's securities before the transaction beneficially own less than 50% of the outstanding voting securities of the surviving entity after the transaction. Upon the closing of any Acquisition, the successor entity shall assume the obligations of this Warrant, and this Warrant shall be exercisable for the same securities, cash, and property as would be payable for Shares issuable upon exercise of the unexercised portion of this Warrant as if such Shares were outstanding on the record date for the Acquisition and subsequent closing, and the Exercise Price shall be adjusted accordingly; provided that if pursuant to such Acquisition the entire outstanding class of Shares issuable upon exercise of the unexercised portion of this Warrant are converted into the right to receive consideration and the total consideration payable to the holders of such class of Shares consists entirely of cash, publicly traded securities or any combination thereof, then, upon payment to the Holder of an amount equal to the amount such holder would receive if such holder held Shares issuable upon exercise of the unexercised portion of this Warrant and such Shares were outstanding on the record date for the Acquisition less the aggregate Exercise Price of such Shares, this Warrant shall be cancelled.

ARTICLE 2 ADJUSTMENTS.

2.1 Stock Dividends, Splits, Etc. If Company declares or pays a dividend on its common stock (or Shares if Shares are securities other than common stock) payable in common stock or other securities or other property, subdivides the outstanding common stock into a greater amount of common stock, or, if Shares are securities other than common stock, subdivides Shares in a transaction that increases the amount of common stock into which Shares are convertible, then upon exercise of this Warrant, for each Share acquired, Holder shall receive, without cost to Holder, the total number and kind of securities to which Holder would have been entitled had Holder owned Shares on the record date on which the dividend or subdivision occurred.

2.2 Reclassification, Recapitalization, Exchange or Substitution. Except in the case of an Acquisition to which Section 1.6 is applicable, upon any reclassification, recapitalization, exchange, substitution, or other event that results in a change of the number and/or class of the securities issuable upon exercise or conversion of this Warrant, Holder shall be entitled to receive, upon exercise or conversion of this Warrant, the number and kind of securities and property that Holder would have received for Shares if this Warrant had been exercised immediately before such reclassification, recapitalization, exchange, substitution, or other event. Company or its successor shall promptly issue to Holder a new Warrant for such new securities or other property. The new Warrant shall provide for adjustments which shall be as nearly equivalent as may be practicable to the adjustments provided for in this Article 2 including, without limitation, adjustments to the Exercise Price and to the number of securities or property issuable upon exercise of the new Warrant. The provisions of this Section 2.2 shall similarly apply to successive reclassifications, recapitalizations, exchanges, substitutions, or other events.

2.3 Adjustments for Combinations, Etc. If the outstanding Shares are combined or consolidated, by reclassification or otherwise, into a lesser number of shares, the Exercise Price shall be proportionately increased and the number of Shares as to which this Warrant is exercisable shall be proportionately decreased.

2.4 Adjustments for Diluting Issuances. In the event of the issuance (a "Diluting Issuance") by Company, after the Issue Date of this Warrant, of securities at a price per share less than the then Exercise Price, then the number of shares of common stock issuable upon conversion of the Shares, and the conversion price, shall be adjusted in accordance with those provisions (the "Provisions") of Company's Eighth Amended and Restated Certificate of Incorporation (as the same may be amended from time to time, the "Certificate of Incorporation") which apply to Diluting Issuances with the same effect as though the shares were outstanding at the time of the diluting issuance. Under no circumstances shall the aggregate Exercise Price payable by Holder upon exercise of this Warrant increase as a result of any adjustment arising from a Diluting Issuance.

2.5 Adjustment for Pay-to-Play Transactions. In the event that the Certificate of Incorporation provides, or is amended to so provide, for the amendment or modification of the rights, preferences or privileges of the Shares, or the reclassification, conversion or exchange of the outstanding shares of the Class of Stock, in the event that a holder of shares thereof fails to participate in an equity financing transaction (a "Pay-to-Play Provision"), and in the event that such Pay-to-Play Provision becomes operative in a transaction occurring after the date hereof, this Warrant shall automatically and without any action required become exercisable for that number and type of shares of equity securities as would have been issued or exchanged, or would have remained outstanding, in respect of the Shares issuable hereunder had this Warrant been exercised in full prior to such event, and had the Holder participated in the equity financing to the maximum extent permitted.

2.6 No Impairment. Company shall not, by amendment of its Certificate of Incorporation or through a reorganization, transfer of assets, consolidation, merger, dissolution, issue, or sale of securities or any other voluntary action, avoid or seek to avoid the observance or performance of any of the terms to be observed or performed under this Warrant by Company, but shall at all times in good faith assist in carrying out of all the provisions of this Article 2 and in taking all such action as may be necessary or appropriate to protect Holder's rights under this Article against impairment. If Company takes any dilutive action affecting Shares or its common stock other than as described above that adversely affects Holder's rights under this Warrant, the Exercise Price shall be adjusted downward and the number of Shares issuable upon exercise of this Warrant shall be adjusted upward in such a manner that such dilutive action is offset and the aggregate Exercise Price of this Warrant is unchanged.

2.7 Fractional Shares. No fractional Shares shall be issuable upon exercise or conversion of this Warrant and the number of Shares to be issued shall be rounded down to the nearest whole Share. If a fractional share interest arises upon any exercise or conversion of this Warrant, Company shall eliminate such fractional share interest by paying Holder an amount computed by multiplying the fractional interest by the fair market value of a full Share (as determined pursuant to Section 1.6 herein).

2.8 Certificate as to Adjustments. Upon each adjustment of the Exercise Price, Company at its expense shall promptly compute such adjustment, and furnish Holder with a certificate of its Chief Financial Officer setting forth such adjustment and the facts upon which such adjustment is based. Company shall, upon written request, furnish Holder a certificate setting forth the Exercise Price in effect upon the date thereof and the series of adjustments leading to such Exercise Price.

ARTICLE 3 COVENANTS OF COMPANY.

3.1 Valid Issuance. Company shall take all steps necessary to insure that all Shares which may be issued upon the exercise of this Warrant, and all securities, if any, issuable upon conversion of Shares, shall, upon issuance, be duly authorized, validly issued, fully paid and nonassessable, and free of any liens and encumbrances except for restrictions on transfer provided for herein or under applicable federal and state securities laws.

3.2 Notice of Certain Events. If Company proposes at any time (a) to declare any dividend or distribution upon its common stock, whether in cash, property, stock, or other securities and whether or not a regular cash dividend; (b) to offer for subscription pro rata to the holders of any class or series of its stock any additional shares of stock of any class or series or other rights; (c) to effect any reclassification or recapitalization of common stock; (d) to effect an Acquisition; or (e) offer holders of registration rights the opportunity to participate in an underwritten public offering of the company's securities for cash, then, in connection with each such event, Company shall give Holder (1) in the case of the matters referred to in (a) and (b) above at least 20 days prior written notice of the date on which a record will be taken for such dividend, distribution, or subscription rights (and specifying the date on which the holders of common stock will be entitled thereto) or for determining rights to vote, if any, in respect of the matters referred to in (c) and (d) above; (2) in the case of the matters referred to in (c) and (d) above at least 20 days prior written notice of the date when the same will take place (and specifying the date on which the holders of common stock will be entitled to exchange their common stock for securities or other property deliverable upon the occurrence of such event); and (3) in the case of the matter referred to in (e) above, the same notice as is given to the holders of such registration rights.

3.3 Information. So long as the Holder holds this Warrant and/or any of the Shares, Company shall deliver to Holder (a) promptly, copies of all notices or other written communications to which Holder would be entitled if it held Shares as to which this Warrant was then exercisable and (b) such other financial statements required under and in accordance with any loan documents between Holder and Company, or if there are no such requirements or if the subject loan(s) are no longer are outstanding, then within 90 days after the end of each of the first three quarters of each fiscal year, Company's quarterly, unaudited financial statements and within 180 days after the end of each fiscal year, Company's annual, audited financial statements.

3.4 Notice of Expiration. Company shall give Holder written notice of Holder's right to exercise this Warrant in the form attached as Appendix 2 not more than 90 days and not less than 15 days before the Expiration Date and, in the case of an Acquisition to which the proviso of Section 1.6 shall be applicable, 15 days before such Acquisition. If the notice is not so given, the Expiration Date shall automatically be extended until 15 days after the date Company delivers the notice to Holder.

3.5 Registration Rights. The common stock issuable upon conversion of Shares, shall have the same "piggyback" registration rights as are set forth in the Fifth Amended and Restated Investors' Rights Agreement, dated as of August 5, 2016 between Company and its investors, as from time to time in effect (the "Investors' Rights Agreement" — a true copy of which as in effect on the date hereof has been furnished by Company to Holder) and by accepting this Warrant, Holder agrees to be subject to corresponding obligations of the holders of "piggyback" registration rights. Company agrees that no amendments will be made to the Investors' Rights Agreement which would have an adverse impact on Holder's registration rights thereunder.

ARTICLE 4 MISCELLANEOUS.

4.1 Legends. This Warrant and the Shares (and the securities issuable, directly or indirectly, upon conversion of Shares, if any) shall be imprinted with a legend in substantially the following form:

THIS SECURITY HAS NOT BEEN REGISTERED UNDER THE SECURITIES ACT OF 1933, AS AMENDED, AND MAY NOT BE SOLD, PLEDGED OR OTHERWISE TRANSFERRED WITHOUT AN EFFECTIVE REGISTRATION THEREOF UNDER SUCH ACT OR PURSUANT TO RULE 144 OR AN OPINION OF COUNSEL REASONABLY SATISFACTORY TO COMPANY AND ITS COUNSEL THAT SUCH REGISTRATION IS NOT REQUIRED.

4.2 Compliance with Securities Laws on Transfer. This Warrant and the Shares issuable upon exercise of this Warrant (and the securities issuable, directly or indirectly, upon conversion of Shares, if any) may not be transferred or assigned in whole or in part without compliance with applicable federal and state securities laws by the transferor and the transferee (including, without limitation, the delivery of investment representation letters and legal opinions reasonably satisfactory to Company, as reasonably requested by Company). Company shall not require Holder to provide an opinion of counsel if the transfer is to Holder's parent company, Western Alliance Bancorporation, or any other affiliate or successor of Holder, or if there is no material question as to the availability of current information as referenced in Rule 144(c), Holder represents that it has complied with Rule 144(d) and (e) in reasonable detail, the selling broker represents that it has complied with Rule 144(f), and the Company is provided with a copy of Holder's notice of proposed sale.

4.3 Transfer Procedure. After receipt by Holder of the executed Warrant, Holder will transfer all of this Warrant to Holder's parent company, Western Alliance Bancorporation, by execution of an Assignment substantially in the form of Appendix 3. Subject to the provisions of Section 4.2 above and upon providing Company with written notice, Western Alliance Bancorporation and any subsequent Holder may transfer all or part of this Warrant or the Shares issuable upon exercise of this Warrant (or the Shares issuable directly or indirectly, upon conversion of the Shares, if any) to any transferee, provided, however, in connection with any such transfer, Western Alliance Bancorporation or any subsequent Holder will give the Company notice of the portion of this Warrant being transferred with the name, address and taxpayer identification number of the transferee and Holder will surrender this Warrant to the Company for reissuance to the transferee(s) (and Holder if applicable). Unless Company is filing financial information with the SEC pursuant to the Securities Exchange Act of 1934, Company shall have the right to refuse to transfer any portion of this Warrant to any person who directly or indirectly competes with Company.

4.4 Notices. All notices and other communications from Company to Holder, or vice versa, shall be in writing and shall be deemed delivered and effective when given personally or mailed by first-class registered or certified mail, postage prepaid, or by overnight courier, at such address as may have been furnished to Company or Holder, as the case may be, in writing by Company or such Holder from time to time.

4.5 Attorneys Fees. In the event of any dispute between the parties concerning the terms and provisions of this Warrant, the party prevailing in such dispute shall be entitled to collect from the other party all costs incurred in such dispute, including reasonable attorneys' fees.

4.6 Governing Law. This Warrant shall be governed by and construed in accordance with the laws of the State of California, without giving effect to its principles regarding conflicts of law.

4.7 Market Stand-Off Agreement. Holder hereby agrees that it shall not sell, dispose of, transfer, make any short sale of, grant any option for the purchase of, or enter into any hedging or similar transaction with the same economic effect as a sale, any shares of the Company's Common Stock or other securities held by such Holder (other than those included in the registration) during (i) the 180-day period following the effective date of the Company's first underwritten public offering of its Common Stock registered under the Securities Act of 1933, as amended (the "Securities Act") (or such longer period as the underwriters or the Company shall request in order to facilitate compliance with NASD Rule 2711 or NYSE Member Rule 472 or any successor or similar rule or regulation), and (ii) the 90-day period following the effective date of a registration statement of the Company filed under the Securities Act (or such longer period as the underwriters or the Company shall request in order to facilitate compliance with NASD Rule 2711 or NYSE Member Rule 472 or any successor or similar rule or regulation); provided, that, with respect to (i) and (ii) above, all officers and directors of the Company are bound by and have entered into similar agreements. The underwriters of the Company's stock are intended third party beneficiaries of this Section 4.7 and shall have the right, power and authority to enforce the provisions hereof as though they were a party hereto.

[Balance of Page Intentionally Left Blank]

IN WITNESS WHEREOF, Company has caused this Warrant to be duly executed by its authorized officers, all as of the day and year first above written.

COMPANY

BIONANO GENOMICS, INC.

By: */s/ R. Erik Holmlin*
Name: R. Erik Holmlin
Title: CEO

APPENDIX 1

Notice of Exercise

[Strike paragraph that does not apply.]

1. The undersigned hereby elects to purchase _____ shares of the Common/Series _____ Preferred [strike one] Stock of BIONANO GENOMICS, INC. pursuant to the terms of the attached Warrant, and tenders herewith payment of the purchase price of such shares in full.

1. The undersigned hereby elects to convert the attached Warrant into Shares/cash [strike one] in the manner specified in the Warrant. This conversion is exercised with respect to _____ of the Shares covered by the Warrant.

2. Please issue a certificate or certificates representing said shares in the name of the undersigned or in such other name as is specified below:

Name: _____
Address: _____

_____

3. The undersigned represents it is acquiring the shares solely for its own account and not as a nominee for any other party and not with a view toward the resale or distribution thereof except in compliance with applicable securities laws.

_____
(Signature)

_____
(Date)

APPENDIX 2

Notice that Warrant Is About to Expire

[Insert Date of Notice]

To: BRIDGE BANK, A DIVISION OF WESTERN ALLIANCE BANK
Attn:_____
55 Almaden Boulevard
San Jose, California 95113

The Warrant issued to you described below will expire on _____, ____.

Issuer:	BIONANO GENOMICS, INC.
Issue Date:	December 9, 2016
Class of Security Issuable:	_____
Exercise Price per Share:	$_____ per share
Number of Shares Issuable:	_____
Procedure for Exercise:	

Please contact _____ at (____) ____-____ with any questions you may have concerning exercise of the Warrant. This is your only notice of pending expiration.

BIONANO GENOMICS, INC.

By _____
Its: _____

APPENDIX 3

Assignment

For value received, WESTERN ALLIANCE BANK, an Arizona corporation hereby sells, assigns and transfers unto:

Name:	WESTERN ALLIANCE BANCORPORATION
Address:	55 Almaden Boulevard
	San Jose, California 95113
Tax I D:	_____

that certain Warrant to Purchase Stock issued by BIONANO GENOMICS, INC. (the "Company"), on December 9, 2016 (the "Warrant") together with all rights, title and interest therein.

WESTERN ALLIANCE BANK, AN ARIZONA CORPORATION

By: _____
Name: _____
Title: _____

Date: _____

By its execution below, and for the benefit of the Company, Western Alliance Bancorporation agrees to all provisions of the Warrant as of the date hereof.

WESTERN ALLIANCE BANCORPORATION

By: _____
Name: _____
Title: _____

Exhibit 10.1

FIFTH AMENDED AND RESTATED INVESTORS' RIGHTS AGREEMENT

August 5, 2016

To each of the Purchasers named in Exhibit A of the Series D-1 Convertible Participating Preferred Stock Purchase Agreement of even date herewith (collectively, and whether or not a single person or entity, the "Series D-1 Investors") and each of the other signatories hereto.

This will confirm that in consideration of the Series D-1 Investors' agreement on the date hereof to purchase shares of Series D-1 Convertible Participating Preferred Stock, par value $0.0001 per share (the "Series D-1 Preferred Stock"), of BioNano Genomics, Inc., a Delaware corporation and successor to BioNanomatrix, LLC (the "Company"), pursuant to the Series D-1 Convertible Participating Preferred Stock Purchase Agreement of even date herewith (as the same may be amended from time to time, the "Purchase Agreement") between the Company and the Series D-1 Investors and as an inducement to the Series D-1 Investors to consummate the transactions contemplated by the Purchase Agreement, the Company, the Series D-1 Investors and the other signatories hereto hereby agree as follows:

1. Certain Definitions. Any capitalized term used herein and not otherwise defined herein shall have the meaning ascribed to such term in the Eighth Amended and Restated Certificate of Incorporation of the Company, as the same may be amended from time to time (the "Charter"). In addition, as used in this Agreement (as defined below), the following terms shall have the following respective meanings:

"Affiliate" or "Affiliates" shall mean, with respect to any Person, an individual, firm, corporation, partnership, association, limited liability company, trust or any other entity who, directly or indirectly, controls, is controlled by or is under common control with such Person, including, without limitation, any partner, officer, director, member or employee of such Person and any venture capital fund now or hereafter existing that is controlled by or under common control with one or more general partners or shares the same management company with such Person.

"Agreement" shall mean this Fifth Amended and Restated Investors' Rights Agreement, as the same may be amended from time to time.

"Business Day" shall mean any day that is not a Saturday, Sunday or other day on which commercial banks located in the State of Delaware are authorized or required to be closed.

"Commission" shall mean the U.S. Securities and Exchange Commission or any other federal agency at the time administering the Securities Act.

"Common Stock" shall mean the Common Stock, par value $0.0001 per share, of the Company.

"Exchange Act" shall mean the Securities Exchange Act of 1934, as amended, or any successor federal statute, and the rules and regulations of the Commission thereunder, all as the same shall be in effect at the time.

"Founder" shall mean Han Cao.

"Investor Affiliate" or "Investor Affiliates" shall mean any person (i) who is an "affiliated person" of an Investor, as that term is defined in the Investment Company Act of 1940, as amended, (ii) who is a current or former partner, member or stockholder of an Investor, or (iii) who is managed by, or has the same management company or investment advisor or similar company, as an Investor.

"Investor" or "Investors" shall mean the Series A Investors, the Series B Investors, the Series B-1 Investors, the Series C Investors, the Series D Investors and the Series D-1 Investors, as well as any additional persons or entities becoming parties hereto in accordance with the terms hereof as an "Investor."

"Key Employee" or "Key Employees" shall mean and include the president, chief executive officer, chief financial officer, chief operating officer, chief technology officer, and any senior vice president of operations, finance, research, development, or sales or marketing.

"LC" shall mean LC Fund VI, L.P., LC Parallel Fund VI, L.P., LC HealthCare Fund I, and their Affiliates.

"Person" or "Persons" shall mean an individual, corporation, partnership, limited liability company, joint venture, trust, or unincorporated organization, or a government or any agency or political subdivision thereof.

"Preferred Stock" shall mean the Preferred Stock, par value $0.0001 per share, of the Company, and includes the Series A Preferred Stock, the Series B Preferred Stock, the Series B-1 Preferred Stock, the Series C Preferred Stock, the Series D Preferred Stock, and the Series D-1 Preferred Stock.

"Qualified Public Offering" shall mean the closing of the sale of shares of Common Stock to the public (i) in which the price per share paid by the public (prior to the deduction of underwriting discounts and registration expenses) multiplied by the fully-diluted outstanding shares of the Company immediately prior to such closing (inclusive of options, warrants, other convertible securities and shares reserved under any equity plan) is no less than $150,000,000 and (ii) resulting in at least $30,000,000 in gross proceeds to the Company (prior to the deduction of underwriting discounts and registration expenses), in a firm-commitment underwritten public offering pursuant to an effective registration statement under the Securities Act.

"Registrable Securities" shall mean (i) the Common Stock issuable or issued upon conversion of the Preferred Stock; (ii) any Common Stock issued or issuable upon conversion, exchange and/or exercise of any capital stock, options, warrants or convertible securities of the Company acquired by the Investors prior to or after the date hereof; (iii) solely for the purposes of Section 5 (and any analogous provisions) the Common Stock held by the Founder; and (iv) any Common Stock issued as (or issuable upon the conversion or exercise of any warrant, right or other security which is issued as) a dividend or other distribution with respect to, or in exchange for or in replacement of, the shares referenced in clause (i), (ii) and (iii) above; excluding in all cases, however, any Registrable Securities (a) sold to or through a broker or

dealer or underwriter in a public distribution or a public securities transaction, (b) sold in a transaction exempt from the registration and prospectus delivery requirements of the Securities Act under Section 4(1) thereof so that all transfer restrictions and restrictive legends with respect thereto are removed upon the consummation of such sale, (c) registered under the Securities Act pursuant to an effective registration statement filed thereunder, (d) publicly sold pursuant to Rule 144 under the Securities Act, (e) any shares of Common Stock described in this definition, if such shares of Common Stock could be sold under Rule 144 under the Securities Act, during any ninety (90) day period, or (f) sold in a transaction in which the rights granted under Sections 4, 5 or 6 hereof are not assigned in accordance with this Agreement.

"Securities Act" shall mean the Securities Act of 1933, as amended, or any successor federal statute, and the rules and regulations of the Commission thereunder, all as the same shall be in effect at the time.

"Series A Investors" shall mean the holders of Series A Preferred Stock party hereto and any additional persons or entities that become parties hereto.

"Series A Preferred Stock" shall mean the Series A Convertible Participating Preferred Stock of the Company, par value $0.0001 per share.

"Series B Investors" shall mean the holders of Series B Preferred Stock party hereto and any additional persons or entities that become parties hereto.

"Series B Preferred Stock" shall mean the Series B Convertible Participating Preferred Stock of the Company, par value $0.0001 per share.

"Series B-1 Investors" shall mean the holders of Series B-1 Preferred Stock party hereto and any additional persons or entities that become parties hereto.

"Series B-1 Preferred Stock" shall mean the Series B-1 Convertible Participating Preferred Stock of the Company, par value $0.0001 per share.

"Series C Investors" shall mean the holders of Series C Preferred Stock party hereto and any additional persons or entities that become parties hereto.

"Series C Preferred Stock" shall mean the Series C Convertible Participating Preferred Stock of the Company, par value $0.0001 per share.

"Series D Investors" shall mean the holders of Series D Preferred Stock party hereto and any additional persons or entities that become parties hereto.

"Series D Preferred Stock" shall mean the Series D Convertible Participating Preferred Stock of the Company, par value $0.0001 per share.

"Violation" means any loss, claim, damage or liability (joint or several) to which a party hereto may become subject under the Securities Act, the Exchange Act or other federal or state law, insofar as such loss, claim, damage or liability (or any action in respect thereof) arises out of or is based upon: (i) any untrue statement or alleged untrue statement of a material fact

contained in any registration statement of the Company, including any preliminary prospectus or final prospectus contained therein or any amendments or supplements thereto; (ii) an omission or alleged omission to state therein a material fact required to be stated therein, or necessary to make the statements therein not misleading; or (iii) any violation or alleged violation by any other party hereto of the Securities Act, the Exchange Act, any state securities law or any rule or regulation promulgated under the Securities Act, the Exchange Act or any state securities law.

2. Restrictive Legend. Each certificate representing Preferred Stock or Registrable Securities shall, except as otherwise provided in Section 3, be stamped or otherwise imprinted with a legend substantially in the following form:

"THE SECURITIES REPRESENTED BY THIS CERTIFICATE HAVE NOT BEEN REGISTERED UNDER THE SECURITIES ACT OF 1933 OR APPLICABLE STATE SECURITIES LAWS. THESE SECURITIES HAVE BEEN ACQUIRED FOR INVESTMENT AND NOT WITH A VIEW TO DISTRIBUTION OR RESALE, AND MAY NOT BE SOLD, MORTGAGED, PLEDGED, HYPOTHECATED OR OTHERWISE TRANSFERRED WITHOUT AN EFFECTIVE REGISTRATION STATEMENT FOR SUCH SECURITIES UNDER THE SECURITIES ACT OF 1933 AND APPLICABLE STATE SECURITIES LAWS, OR AN OPINION OF COUNSEL SATISFACTORY TO THE COMPANY THAT SUCH TRANSFER IS EXEMPT FROM THE REGISTRATION PROVISIONS OF THE SECURITIES ACT OF 1933 AND APPLICABLE STATE SECURITIES LAWS."

3. Notice of Proposed Transfer. Subject in all events to the restrictions set forth in the Fifth Amended and Restated Stockholders Agreement dated as of the date hereof (the "Stockholders Agreement") regarding the transfer of capital stock, prior to any proposed sale, assignment, transfer or pledge (other than a pledge in favor of the Company) of any Preferred Stock or Registrable Securities (other than under the circumstances described in Sections 4, 5 or 6), the holder thereof shall give written notice to the Company of its intention to effect such sale, assignment, transfer or pledge. Each such notice shall describe the manner of the proposed sale, assignment, transfer or pledge in sufficient detail and, unless waived in writing by the Company, shall be accompanied by an opinion of counsel reasonably satisfactory to the Company to the effect that the proposed sale, assignment, transfer or pledge may be effected without registration under the Securities Act and any applicable state securities laws, whereupon the holder of such stock shall be entitled to transfer such stock in accordance with the terms of its notice delivered by the holder of such stock to the Company; provided, however, that no such opinion of counsel shall be required for a transfer made in accordance with all applicable securities laws (a) to one or more partners or members or retired partners or retired members (or to the estate of any such parties) of an Investor (in the case of an Investor that is a partnership or a limited liability company, as the case may be), (b) to an Investor Affiliate, (c) to a wholly-owned subsidiary of an Investor, or (d) by an Investor to its stockholders (in the case of an Investor that is a corporation). Each certificate for Preferred Stock or Registrable Securities transferred as above provided shall bear the legend set forth in Section 2, except that such certificate shall not bear such legend if (i)

such transfer is in accordance with the provisions of Rule 144 (or any other rule permitting public sale without registration under the Securities Act) or (ii) the opinion of counsel referred to above is to the further effect that the transferee and any subsequent transferee (other than an affiliate of the Company) would be entitled to transfer such securities in a public sale without registration under the Securities Act.

4. Required Registration.

(a) Any time after the earlier of (i) twelve (12) months following a Qualified Public Offering and (ii) the date that is four (4) years after the date of this Agreement, the holders of at least 66-2/3% of the shares of Preferred Stock then outstanding (or shares of Common Stock issued upon conversion of the shares of Preferred Stock or a combination thereof) may request the Company to register under the Securities Act all or any portion of the shares of Registrable Securities held by such requesting holder or holders for sale in the manner specified in such notice; provided, however, that the shares of Registrable Securities for which registration has been requested shall be at least 20% of the shares of Registrable Securities then held by such requesting holder or holders (or a lesser percentage if the anticipated gross receipts from the offering would exceed $40,000,000).

(b) Following receipt of any notice under this Section 4, the Company shall, within twenty (20) days of receipt thereof, notify all holders of Registrable Securities and Preferred Stock from whom notice has not been received and such holders shall then be entitled within thirty (30) days thereafter to request the Company to include in the requested registration all or any portion of their shares of Registrable Securities. The Company shall use its reasonable best efforts to register under the Securities Act, for public sale in accordance with the method of disposition described in paragraph (a) above, the number of shares of Registrable Securities specified in such notice (and in all notices received by the Company from other holders within thirty (30) days after the giving of such notice by the Company). The Company shall be obligated to register Registrable Securities pursuant to this Section 4 on two (2) occasions only; provided, however, that such obligation shall be deemed satisfied only when (i) a registration statement covering all shares (or such lesser number as permitted by Section 4(d) below) of Registrable Securities specified in notices received as aforesaid (and not subsequently withdrawn) for sale in accordance with the method of disposition specified by the requesting holders shall have become effective and remain effective for the period of distribution contemplated thereby (unless such requesting holders request that such registration statement be withdrawn, in which case such obligation of the Company shall be deemed satisfied unless such requesting holders pay all Registration Expenses (as defined in Section 8) incurred in connection with the withdrawn registration statement), and (ii) where such registration statement has become effective, if such method of disposition is a firm commitment underwritten public offering, and all such shares shall have been sold to the underwriters pursuant thereto (not including shares eligible for sale pursuant to the underwriters' over-allotment option). The Company shall not be obligated to effect, or to take any action to effect, any registration pursuant to this Section 4: (i) during the period within ninety (90) days after the effective date of a registration pursuant to Section 4 or Section 6 hereof, or in which the holders of Registrable Securities shall have been entitled to join pursuant to Section 5; (ii) if the shares of Registrable Securities to be registered may be immediately registered on Form S-3; or (iii) during the period

within twelve (12) months after the closing of an initial public offering of Common Stock by the Company.

(c) The Company shall be entitled to include in any registration statement referred to in this Section 4 shares of Common Stock to be sold by the Company for its own account, except as and to the extent that, in the opinion of the managing underwriter, such inclusion would adversely affect the marketing of the Registrable Securities to be sold. Subject to Section 14(h) and except for registration statements on Form S-4, S-8 or any successor thereto, the Company will not file with the Commission any other registration statement with respect to its Common Stock, whether for its own account or that of other stockholders, from the date of receipt of a notice from requesting holders requesting sale pursuant to an underwritten offering pursuant to this Section 4 until thirty (30) days after the date such registration statement is declared effective. The right of any holder to include such holder's Registrable Securities in an underwritten registration shall be conditioned upon such holder's participation in such underwriting and the inclusion of such holder's Registrable Securities in the underwriting to the extent provided herein. All holders proposing to distribute their securities through such underwriting shall (together with the Company) enter into an underwriting agreement in reasonable and customary form with the underwriter or underwriters selected for such underwriting.

(d) If in the opinion of the managing underwriter the inclusion of all of the Registrable Securities requested to be registered under this Section 4 would adversely affect the marketing of such shares, shares to be sold by the holders of Registrable Securities shall be excluded only after any shares to be sold by the Company and any other parties including shares for sale in such registration have been excluded, in such manner that the shares to be sold shall be allocated among the requesting holders pro rata based on their ownership of Registrable Securities. In the event the number of shares to be sold by requesting holders of Registrable Securities pursuant to an underwritten registration under this Section 4 is reduced pursuant to this Section 4(d), such registration shall still count towards satisfaction of the Company's obligation to register shares under this Section provided that such registration includes at least 40% of the shares of Registrable Securities so requested to be included by the requesting holders.

5. Incidental Registration. If the Company at any time (other than pursuant to Section 4 or Section 6), proposes to register any of its securities under the Securities Act for sale to the public, whether for its own account or for the account of other security holders or both (except with respect to registration statements on Forms S-4, S-8 or another form not available for registering the Registrable Securities for sale to the public), each such time it will give written notice to all holders of outstanding Registrable Securities (including, solely for purpose of this Section 5, the Founder) of its intention so to do. Upon the written request of any such holder, received by the Company within thirty (30) days after the giving of any such notice by the Company, to register any of its Registrable Securities, the Company will use its reasonable best efforts to cause the Registrable Securities as to which registration shall have been so requested to be included in the securities to be covered by the registration statement proposed to be filed by the Company, all to the extent requisite to permit the sale or other disposition by the holder of such Registrable Securities so registered. In the event that any registration pursuant to this Section 5 shall be, in whole or in part, an underwritten public offering of Common Stock, the number of shares of Registrable Securities to be included in such an underwriting may be

reduced (pro rata among the requesting holders based upon the number of shares of Registrable Securities owned by such holders) if and to the extent that the managing underwriter shall be of the opinion that such inclusion would adversely affect the marketing of the securities to be sold by the Company therein, provided, however, that such number of shares of Registrable Securities shall not be reduced if any shares are to be included in such underwriting for the account of any person other than the Company or requesting holders of Registrable Securities. Notwithstanding the foregoing, the Company may withdraw any registration statement referred to in this Section 5 without thereby incurring any liability to the holders of Registrable Securities.

6. Registration on Form S-3. If at any time (i) a holder or holders of Registrable Securities request that the Company file a registration statement on Form S-3 or any successor thereto for a public offering of all or any portion of the shares of Registrable Securities held by such requesting holder or holders, and (ii) the Company is a registrant entitled to use Form S-3 or any successor thereto to register such shares, then the Company shall use its reasonable best efforts to register under the Securities Act on Form S-3 or any successor thereto, for public sale in accordance with the method of disposition specified in such notice, the number of shares of Registrable Securities specified in such notice; provided, however, that the shares of Registrable Securities for which registration has been requested have a reasonably anticipated aggregate offering price to the public of at least $3,000,000. Whenever the Company is required by this Section 6 to use its reasonable best efforts to effect the registration of Registrable Securities, each of the procedures and requirements of Section 4 (including but not limited to the requirement that the Company notify all holders of Registrable Securities from whom notice has not been received and provide them with the opportunity to participate in the offering) shall apply to such registration, provided, however, that there shall be no limitation on the number of registrations on Form S-3 which may be requested and obtained under this Section 6.

7. Registration Procedures. If and whenever the Company is required by the provisions of Sections 4, 5 or 6 to use its reasonable best efforts to effect the registration of any shares of Registrable Securities under the Securities Act, the Company will, as expeditiously as reasonably possible under the circumstances:

(a) prepare and file with the Commission a registration statement (which, in the case of an underwritten public offering pursuant to Section 4, shall be on Form S-1 or other form of general applicability satisfactory to the managing underwriter selected as therein provided) with respect to such securities and use its reasonable best efforts to cause such registration statement to become and remain effective for the period of the distribution contemplated thereby (determined as hereinafter provided);

(b) prepare and file with the Commission such amendments and supplements to such registration statement and the prospectus used in connection therewith as may be necessary to keep such registration statement effective for the period specified in paragraph (a) above and comply with the provisions of the Securities Act with respect to the disposition of all Registrable Securities covered by such registration statement in accordance with the sellers' intended method of disposition set forth in such registration statement for such period;

(c) furnish to each seller of Registrable Securities and to each underwriter such number of copies of the registration statement and the prospectus included therein

(including each preliminary and final prospectus) and such other documents as such persons reasonably may request in order to facilitate the public sale or other disposition of the Registrable Securities covered by such registration statement;

(d) use commercially reasonable efforts to register or qualify the Registrable Securities covered by such registration statement under the securities or "blue sky" laws of such jurisdictions as the sellers of Registrable Securities or, in the case of an underwritten public offering, the managing underwriter reasonably shall request, provided, however, that the Company shall not be required in connection therewith or as a condition thereto to qualify to do business in any states or jurisdictions in which it is not, at the time, so qualified, or otherwise subject itself to general taxation in any such states or jurisdictions;

(e) use its reasonable best efforts to list the Registrable Securities covered by such registration statement to be listed on a national securities exchange or trading system and each securities exchange and trading system on which similar securities issued by the Company are then listed (if any);

(f) provide a transfer agent and registrar for all Registrable Securities registered pursuant hereunder and a CUSIP number for all such Registrable Securities, in each case not later than the effective date of such registration;

(g) promptly notify each seller of Registrable Securities and each underwriter under such registration statement, at any time when a prospectus relating thereto is required to be delivered under the Securities Act, of the happening of any event of which the Company has knowledge as a result of which the prospectus contained in such registration statement, as then in effect, includes an untrue statement of a material fact or omits to state a material fact required to be stated therein or necessary to make the statements therein not misleading in light of the circumstances then existing. The holders of Registrable Securities covered by such registration statement agree upon receipt of such notice forthwith to cease making offers and sales of Registrable Securities pursuant to such registration statement or deliveries of the prospectus contained therein for any purpose until the Company has prepared and furnished such amendment or supplement to the prospectus as may be necessary so that, as thereafter delivered to purchasers of such Registrable Securities, such prospectus shall not include an untrue statement of a material fact or omit to state a material fact required to be stated therein or necessary to make the statements therein not misleading in the light of the circumstances then existing. The Company shall promptly prepare and furnish such amendment or supplement to the prospectus to each such seller of Registrable Securities and each such underwriter;

(h) if the offering is underwritten use its reasonable best efforts to furnish on the date that Registrable Securities are first delivered to the underwriters for sale pursuant to such registration: (i) an opinion dated such date of counsel representing the Company for the purposes of such registration, addressed to the underwriters stating that such registration statement has become effective under the Securities Act and that (A) to the knowledge of such counsel, no stop order suspending the effectiveness thereof has been issued and no proceedings for that purpose have been instituted or are pending or contemplated under the Securities Act, (B) the registration statement, the related prospectus and each amendment or supplement thereof comply as to form in all material respects with the requirements of the Securities Act (except that

such counsel need not express any opinion as to financial statements contained therein) and (C) to such other effects as reasonably may be requested by counsel for the underwriters or by such seller or its counsel and (ii) a letter dated such date from the independent public accountants retained by the Company, addressed to the underwriters, stating that they are independent registered public accounting firm within the meaning of the Securities Act and that, in the opinion of such accountants, the financial statements of the Company included in the registration statement or the prospectus, or any amendment or supplement thereof, comply as to form in all respects with the applicable accounting requirements of the Securities Act, and such letter shall additionally cover such other financial matters (including information as to the period ending no more than five (5) Business Days prior to the date of such letter) with respect to such registration as such underwriters reasonably may request;

(i) make available for inspection by each seller of Registrable Securities, any underwriter participating in any distribution pursuant to such registration statement, and any attorney, accountant or other agent retained by such seller or underwriter, all relevant financial and other records, pertinent corporate documents and properties of the Company, and cause the Company's officers, directors and employees to supply all information reasonably requested by any such seller, underwriter, attorney, accountant or agent in connection with such registration statement, provided such parties agree to keep such information confidential;

(j) advise each selling holder of Registrable Securities, promptly after it shall receive notice or obtain knowledge thereof, of the issuance of any stop order by the Commission suspending the effectiveness of such registration statement or the initiation or threatening of any proceeding for such purpose and promptly use all commercially reasonable efforts to prevent the issuance of any stop order or to obtain its withdrawal if such stop order should be issued;

(k) cooperate with the selling holders of Registrable Securities and the managing underwriters, if any, to facilitate the timely preparation and delivery of certificates representing Registrable Securities to be sold, such certificates to be in such denominations and registered in such names as such holders or the managing underwriters may request at least two (2) Business Days prior to any sale of Registrable Securities;

(l) permit any holder of Registrable Securities, which holder, in the sole and exclusive judgment, exercised in good faith, of such holder, might be deemed to be a controlling person of the Company, to participate in good faith in the preparation of such registration or comparable statement; and

(m) use its commercially reasonable efforts to prevent the issuance, and, if issued, to obtain the withdrawal, of any order suspending the effectiveness of any registration statement at the earliest possible time.

For purposes of Section 7(a) and 7(b) and of Section 4(b), the period of distribution of Registrable Securities in a firm commitment underwritten public offering shall be deemed to extend until the earlier of such time as each underwriter has completed the distribution of all securities purchased by it, and one hundred eighty (180) days after the effective date thereof. The period of distribution of Registrable Securities in any other

registration shall be deemed to extend until the earlier of the sale of all Registrable Securities covered thereby and one hundred eighty (180) days after the effective date thereof.

In connection with each registration hereunder, the sellers of Registrable Securities will furnish to the Company in writing such information with respect to themselves and the proposed distribution by them as reasonably shall be requested by the Company or as shall be necessary in order to assure compliance with federal and applicable state securities laws.

In connection with each registration pursuant to Sections 4, 5 or 6 covering an underwritten public offering, the Company and each seller of Registrable Securities agrees to enter into a written agreement with the managing underwriter selected in the manner herein provided in such form and containing such provisions as are reasonable and customary in the securities business for such an arrangement between such underwriter and companies of the Company's size and investment stature.

Any managing underwriter engaged by the Company in any registration made pursuant to Sections 4 or 6 shall require the approval in writing of the holders of a majority of the Preferred Stock requesting such registration.

It shall be a condition precedent to the obligations of the Company to take any action pursuant to Sections 4, 5, 6 or 7 with respect to the Registrable Securities of any selling holder that such holder shall furnish to the Company such information regarding itself, the Registrable Securities held by it, and the intended method of disposition of such securities as shall be reasonably necessary to effect the registration of such holder's Registrable Securities.

8. Expenses. All expenses incurred by the Company in complying with Sections 4, 5, 6 or 7, including, without limitation, all registration and filing fees, printing expenses, fees and disbursements of counsel and independent public accountants for the Company, fees and expenses (including counsel fees) incurred in connection with complying with state securities or "blue sky" laws, fees of the National Association of Securities Dealers, Inc., fees of transfer agents and registrars, costs of insurance, and reasonable and documented fees and disbursements of one counsel for the sellers of Registrable Securities (which shall not exceed $50,000 per registration) ("Agreed Counsel Fees"), but excluding any Selling Expenses, are called "Registration Expenses." All underwriting discounts and selling commissions applicable to the sale of Registrable Securities and the fees and expenses of any counsel to the sellers other than the Agreed Counsel Fees are called "Selling Expenses."

(a) The Company will pay all Registration Expenses in connection with each registration under Sections 4, 5 or 6. All Selling Expenses in connection with each registration under Sections 4, 5 or 6 shall be borne by the participating sellers (including the Company to the extent the Company shall be a participating seller) in proportion to the number of shares sold by each, or by such participating sellers as they may otherwise agree in writing.

(b) The Company will not be required to pay for Registration Expenses of any registration proceeding begun pursuant to Sections 4, 5 or 6, the request of which has been subsequently withdrawn by the initiating holders of Registrable Securities, unless (i) the withdrawal is based upon material adverse information concerning the Company which was not

provided to the initiating holders at the time of such request, or (ii) the holders of a majority of Registrable Securities agree to forfeit their right to one requested registration pursuant to Sections 4 or 6, as applicable (in which event such right shall be forfeited by all holders). If the holders are required to pay the Registration Expenses, such expenses shall be borne by the holders of the securities (including Registrable Securities) requesting such registration in proportion to the number of securities for which such registration is requested or as otherwise agreed in writing by such holders. If the Company is required to pay the Registration Expenses of a withdrawn offering pursuant to clause (i) above, then the holders of Registrable Securities shall not forfeit their rights to a registration pursuant to Sections 4 or 6, as applicable.

9. Indemnification and Contribution.

(a) In the event of a registration of any of the Registrable Securities under the Securities Act pursuant to Sections 4, 5 or 6, the Company will indemnify, defend and hold harmless each seller of such Registrable Securities thereunder (each, a "Selling Holder"), the partners, members, officers, directors, managers and stockholders of each such Selling Holder, legal counsel and accountants for each Selling Holder, any underwriter (as defined in the Securities Act) for such Selling Holder and each Person, if any, who controls such Selling Holder or underwriter within the meaning of the Securities Act or the Exchange Act, against any Violation, and the Company will pay to each such Selling Holder, underwriter, controlling Person or other aforementioned Person any legal or other expenses incurred thereby in connection with investigating or defending any Violation as such expenses are incurred; provided, however, that the indemnity agreement contained in this subsection 9(a) shall not apply to: (x) amounts paid in settlement of any such Violation if such settlement is effected without the consent of the Company (which consent shall not be unreasonably withheld, conditioned or delayed), (y) any such Violation solely to the extent that it arises out of or is based upon and in conformity with written information furnished expressly for use in connection with such registration by such Selling Holder, underwriter, controlling Person or other aforementioned Person or (z) any such Violation solely to the extent that it arises out of or is based upon such Selling Holder's, underwriter's, controlling Person's or other aforementioned Person's failure to deliver a copy of the registration statement or prospectus or any amendments or supplements thereto or such Selling Holder's, underwriter's, controlling Person's or other aforementioned Person's failure to cease making offers and sales of Registrable Securities pursuant to a registration statement or deliveries of the prospectus contained therein in accordance with Section 7(g) hereof.

(b) Each Selling Holder, severally and not jointly, will indemnify, defend and hold harmless the Company, each of its directors, each of its officers who has signed the registration statement, each Person, if any, who controls the Company within the meaning of the Securities Act, legal counsel and accountants for the Company, any underwriter (as defined in the Securities Act), any other Selling Holder selling securities in such registration statement and any controlling Person of any such underwriter or other Selling Holder, against any Violation, in each case solely to the extent that such Violation arises out of or is based upon actions or omissions made in reliance upon and in conformity with written information furnished by such Selling Holder expressly for use in connection with such registration; and each such Selling Holder will pay to the Company and each other aforementioned Person any legal or other expenses reasonably incurred thereby in connection with investigating or defending any

Violation as such expenses are incurred; provided, however, that the indemnity agreement contained in this subsection 9(b) shall not apply to amounts paid in settlement of any such Violation if such settlement is effected without the consent of such Selling Holder, which consent shall not be unreasonably withheld; and provided further, that, in no event shall any indemnity under this subsection 9(b) exceed the proceeds from the offering (net of any Selling Expenses) received by such Selling Holder, except in the case of fraud or willful misconduct by such Selling Holder.

(c) Promptly after receipt by an indemnified party hereunder of notice of the commencement of any action, such indemnified party shall, if a claim in respect thereof is to be made against the indemnifying party hereunder, notify the indemnifying party in writing thereof, but the omission so to notify the indemnifying party shall not relieve it from any liability which it may have to such indemnified party other than under this Section 9 and shall only relieve it from any liability which it may have to such indemnified party under this Section 9 if and to the extent the indemnifying party is prejudiced by such omission. In case any such action shall be brought against any indemnified party and it shall notify the indemnifying party of the commencement thereof, the indemnifying party shall be entitled to participate in and, to the extent it shall wish, to assume and undertake the defense thereof with counsel reasonably satisfactory to such indemnified party, and, after notice from the indemnifying party to such indemnified party of its election so to assume and undertake the defense thereof, and the indemnifying party shall not be liable to such indemnified party under this Section 9 for any legal expenses subsequently incurred by such indemnified party in connection with the defense thereof other than reasonable costs of investigation and of liaison with counsel so selected, provided, however, that, if the defendants in any such action include both the indemnified party and the indemnifying party and the indemnified party shall have reasonably concluded that there may be reasonable defenses available to it which are different from or additional to those available to the indemnifying party or if the interests of the indemnified party reasonably may reasonably be deemed to conflict with the interests of the indemnifying party, the indemnified party shall have the right to select a separate counsel reasonably satisfactory to the indemnifying party and to assume such legal defenses and otherwise to participate in the defense of such action, with the reasonable expenses and fees of up to one such separate counsel for all indemnified parties with respect to such action and other reasonable expenses related to such participation to be reimbursed by the indemnifying party as incurred.

(d) In order to provide for just and equitable contribution to joint liability under the Securities Act in any case in which either (i) any party otherwise entitled to indemnification pursuant to this Section 9 (the "Indemnified Party") makes a claim for indemnification pursuant to this Section 9 but it is judicially determined (by the entry of a final judgment or decree by a court of competent jurisdiction and the expiration of time to appeal or the denial of the last right of appeal) that such indemnification may not be enforced in such case notwithstanding the fact that this Section 9 provides for indemnification in such case, or (ii) contribution under the Securities Act may be required on the part of any such Indemnified Party in circumstances for which indemnification is provided under this Section 9; then, and in each such case, the Company and such holder will contribute to the aggregate losses, claims, damages or liabilities to which they may be subject (after contribution from others) in such proportion as is appropriate to reflect the relative fault of the party otherwise required to provide indemnification (the "Indemnifying Party") on the one hand, and of the Indemnified Party on the

other, taking into account any other relevant equitable considerations. The relative fault of the parties shall be determined by reference to, among other things, whether the untrue or alleged untrue statement of a material fact or the omission to state a material fact relates to information supplied by the Indemnifying Party or by the Indemnified Party and the parties' relative intent, knowledge, access to information and opportunity to correct such statement or omission; provided, however, that, in any such case, (A) no such holder will be required to contribute any amount in excess of the net proceeds (exclusive of applicable taxes and net of any Selling Expenses) received by such holder from the sale of all Registrable Securities offered by it pursuant to such registration statement; and (B) no person or entity guilty of fraudulent misrepresentation (within the meaning of Section 11(f) of the Securities Act) will be entitled to contribution from any person or entity who was not guilty of such fraudulent misrepresentation.

(e) The Company shall indemnify, defend and hold harmless each Investor and their respective direct and indirect subsidiaries and affiliates and their respective officers, directors, managers, employees, stockholders, members, partners, agents, controlling persons and other representatives (collectively, the "Investor Indemnitees") against any and all Losses of such Investor Indemnitee resulting from or arising out of any third party or governmental action or claim based upon the Investor Indemnitee's status as a security holder of the Company (including, without limitation, any and all Losses arising under the Securities Act, the Exchange Act, or similar securities law, any other federal or state statute, rule, regulation or law, or otherwise, which relate directly or indirectly to the registration, purchase, sale or ownership of any securities of the Company or to any fiduciary obligation owed with respect thereto), including, without limitation, in connection with any third party or governmental action or claim relating to any action taken or omitted to be taken or alleged to have been taken or omitted to have been taken by such Investor Indemnitee as a security holder. Notwithstanding the foregoing, the Company shall not be obligated to indemnify or hold harmless any Investor Indemnitee under this Section 9(e) against any Losses resulting from or arising out of any third party or governmental action or claim if it has been finally determined by a court or other trier of fact of competent jurisdiction that such Losses were the result of (i) any action or omission made by the Investor Indemnitee in bad faith or (ii) any criminal action on the part of such Investor Indemnitee. For purposes of this Section 9(e), "Losses" means all losses, claims (including any claim by a third party), damages, liabilities, reasonable expenses (including reasonable fees, disbursements and other charges of counsel incurred by the Investor Indemnitee in connection with any claim, action, suit or proceeding, including any action between the Investor Indemnitee and the Company or between the Investor Indemnitee and any third party). In connection with the obligation of the Company to indemnify for expenses as set forth in this Section 9(e), the Company shall reimburse each Investor Indemnitee as promptly as practical after the receipt by the Company of a written statement or statements from an Investor Indemnitee requesting such reimbursement for all such reasonable expenses (including reasonable expenses of investigation and reasonable fees, disbursements and other charges of counsel in connection with any claim, action, suit or proceeding) as they are incurred by such Investor.

Unless otherwise superseded by an underwriting agreement entered into in connection with an underwritten public offering, the obligations of the Company and the Selling Holders under this Section 9 shall survive the completion of any offering of Registrable Securities in a registration statement under this Section 9, and otherwise and shall survive the termination of this Agreement.

10. Changes in Common Stock or Preferred Stock. If, and as often as, there is any change in the Common Stock or the Preferred Stock by way of a stock split, stock dividend, combination or reclassification, or through a merger, consolidation, reorganization or recapitalization, or performance-based adjustment or by any other means, appropriate adjustment shall be made in the provisions hereof so that the rights and privileges granted hereby shall continue with respect to the Common Stock and the Preferred Stock as so changed. All shares of capital stock held or acquired by an "affiliated person" of an Investor, as that term is defined in the Investment Company Act of 1940, as amended, shall be aggregated together for the purpose of determining the availability of any rights under this Agreement.

11. Rule 144 Reporting. With a view to making available the benefits of certain rules and regulations of the Commission which may at any time permit the sale of the Registrable Securities to the public without registration, at all times after ninety (90) days after any registration statement covering a public offering of securities of the Company under the Securities Act shall have become effective or following registration under Section 12 of the Exchange Act, the Company agrees to use reasonable best efforts to:

(a) make and keep public information available, as those terms are understood and defined in Rule 144 under the Securities Act;

(b) use its reasonable best efforts to file with the Commission in a timely manner all reports and other documents required of the Company under the Securities Act and the Exchange Act; and

(c) furnish or make available to each holder of Registrable Securities forthwith upon request a written statement by the Company as to its compliance with the reporting requirements of such Rule 144 and of the Securities Act and the Exchange Act, a copy of the most recent annual or quarterly report of the Company, and such other reports and documents so filed by the Company as such holder may reasonably request in availing itself of any rule or regulation of the Commission allowing such holder to sell any Registrable Securities without registration.

12. Preemptive Right.

(a) Preemptive Right. The Company shall not issue, sell or exchange, agree or obligate itself to issue, sell or exchange, or reserve or set aside for issuance, sale or exchange, any (i) shares of Common Stock, (ii) any other equity security of the Company, including without limitation, Preferred Stock, (iii) any debt security of the Company (other than debt with no equity feature) including without limitation, any debt security which by its terms is convertible into or exchangeable for any equity security of the Company, (iv) any security of the Company that is a combination of debt and equity, or (v) any option, warrant or other right to subscribe for, purchase or otherwise acquire any such equity security or any debt security of the Company specified in (i)-(iv) above, unless in each case the Company shall have first offered to sell a portion of such securities (the "Offered Securities") to each Investor who holds at least 5% of the then outstanding shares of Preferred Stock (each an "Offeree" and collectively, the "Offerees") as follows: each Offeree shall have the right (but not an obligation) to purchase (x) up to that portion of the Offered Securities as the number of shares of capital stock then held by

such Offeree (assuming for such purposes exercise, conversion and exchange of all outstanding options, warrants or convertible securities of the Company exercisable, convertible and/or exchangeable into shares of Common Stock) bears to the total number of the outstanding shares of capital stock of the Company (assuming for such purposes exercise, conversion and exchange of all outstanding options, warrants or convertible securities of the Company exercisable, convertible and/or exchangeable into shares of Common Stock) (the "Basic Amount"), and (y) such additional portion of the Offered Securities as such Offeree shall indicate it will purchase should the other Offerees subscribe for less than their respective Basic Amounts (the "Undersubscription Amount"), at a price and on such other terms as shall have been specified by the Company in writing delivered to such Offeree (the "Offer"), which Offer by its terms shall remain open and irrevocable for a period of thirty (30) days from receipt thereof. The Offer shall disclose the identity of the proposed transferee, the Offered Securities proposed to be sold, and the terms and conditions (including price) of the proposed sale.

(b) Notice of Acceptance. Notice of each Offeree's intention to accept, in whole or in part, any Offer made pursuant to Section 12(a) shall be evidenced by a writing signed by such Offeree and delivered to the Company prior to the end of the thirty (30) day period of such Offer, setting forth such of the Offeree's Basic Amount as such Offeree elects to purchase and, if such Offeree shall elect to purchase all of its Basic Amount, such Undersubscription Amount as such Offeree shall elect to purchase (the "Notice of Acceptance"). If the Basic Amounts subscribed for by all Offerees are less than the total Offered Securities available for purchase by all Offerees, then each Offeree who has set forth an Undersubscription Amount in its Notice of Acceptance shall be entitled to purchase, in addition to the Basic Amount subscribed for, the full Undersubscription Amount it has subscribed for; provided, however, that should the Undersubscription Amounts subscribed for exceed the difference between the Offered Securities available for purchase by all Offerees and the Basic Amounts subscribed for (the "Available Undersubscription Amount"), each Offeree who has subscribed for any Undersubscription Amount shall be entitled to purchase only that portion of the Available Undersubscription Amount as the Undersubscription Amount subscribed for by such Offeree bears to the total Undersubscription Amounts subscribed for by all Offerees, subject to rounding by the Board of Directors to the extent it reasonably deems necessary.

(c) Conditions to Acceptances and Purchase.

(i) Permitted Sales of Remaining Securities. The Company shall have ninety (90) days after the expiration of the period set forth in Section 12(a) to close the sale of all or any part of such Offered Securities as to which a Notice of Acceptance has not been given by the Offerees (the "Remaining Securities") to the Person or Persons specified in the Offer, but only in all material respects upon terms and conditions, including, without limitation, price and interest rates, which are no more favorable, in the aggregate, to such other Person or Persons or less favorable to the Company than those set forth in the Offer.

(ii) Reduction in Amount of Offered Securities. In the event the Company shall propose to sell less than all the Remaining Securities (any such sale to be in the manner and on the terms specified in Section 12(c)(i) above), then each Offeree may, at its sole option and in its sole discretion, reduce the number of Offered Securities specified in its respective Notices of Acceptance to an amount which shall be not less than the amount of the

Offered Securities which the Offeree elected to purchase pursuant to Section 12(b) multiplied by a fraction, (i) the numerator of which shall be the amount of Offered Securities which the Company actually proposes to sell, and (ii) the denominator of which shall be the amount of all Offered Securities. In the event that any Offeree so elects to reduce the number or amount of Offered Securities specified in its respective Notices of Acceptance, the Company may not sell or otherwise dispose of more than the reduced amount of the Offered Securities until a portion of such securities have again been offered to the Offerees in accordance with Section 12(a).

(iii) Closing. Upon the closing, which shall include full payment to the Company, of the sale to such other Person or Persons of all or less than all the Remaining Securities, the Offerees shall purchase from the Company, and the Company shall sell to the Offerees, the number of Offered Securities specified in the Notices of Acceptance, as may be reduced pursuant to this Section 12, upon the terms and conditions specified in the Offer.

(d) Further Sale. In each case, any Offered Securities not purchased by the Offerees or other Person or Persons in accordance with Section 12(c) may not be sold or otherwise disposed of until such securities are again offered to the Offerees under the procedures specified in Sections 12(a), 12(b) and 12(c).

(e) Termination of Preemptive Right. The rights of the Offerees under this Section 12 shall terminate immediately prior to, but subject to, the consummation of a firm-commitment underwritten public offering of Common Stock pursuant to an effective registration statement filed under the Securities Act; provided, however, that the rights of the Offerees pursuant to this Section 12 may be waived as to all of such Offerees holding Preferred Stock by the affirmative vote or written consent of the holders of at least 66-2/3% of the shares of Preferred Stock (the "Requisite Holders"), and any such waiver shall be binding on all Offerees holding shares of Preferred Stock with respect to their Preferred Stock, even if any of such Offerees do not execute such waiver and irrespective of whether one or more Offerees participates in the purchase of the Offered Securities; provided further, however, that, with respect to any such waiver of rights pursuant to this Section 12(e), if the Offerees voting in favor or consenting to such waiver subsequently participate in the purchase of the Offered Securities for which such waiver was obtained, then the remaining Offerees not providing such waiver will be granted the right to participate in the purchase of the Offered Securities, on a pro-rata basis amongst all the Offerees participating in such sale.

(f) Exception. The rights under this Section 12 shall not apply to any Exempted Securities, or to any Common Stock issued after the date hereof in connection with a Qualified Public Offering.

The exercise or non-exercise by an Investor of its rights pursuant to this Section 12 shall be without prejudice to its rights under this Section 12 with respect to future sales of Offered Securities.

13. Covenants of the Company and the Investors.

(a) Affirmative Covenants of the Company. Without limiting any other covenants and provisions hereof, and except to the extent the following covenants and provisions

of this Section 13(a) are waived in writing in any instance by the Requisite Holders, the Company covenants and agrees that until the consummation of a Qualified Public Offering, so long as any shares of Preferred Stock are outstanding, it will perform and observe the following covenants and provisions:

(i) Maintenance of Insurance. Maintain from responsible and reputable insurance companies or associations (x) a term life insurance policy on the life of Erik Holmlin (the "CEO") in the amount of at least $2,000,000, and (y) a term life insurance policy on the life of Han Cao (the "CSO") in the amount of at least $1,000,000, in each case, so long as such person remains an employee of the Company and the proceeds of which will be payable to the order of the Company. The Company will not cause or permit any assignment of the proceeds of the life insurance policy specified in the first sentence of this paragraph and will not borrow against such policies. In addition, the Company will maintain Directors and Officers insurance from a responsible and reputable insurance company or association and in an amount and on terms satisfactory to the Requisite Holders.

(ii) Inspection. Permit, upon reasonable request and prior notice, each holder of not less than 5% of the Preferred Stock (each such holder, as applicable, a "Major Investor"), or an agent or representative thereof, to examine and make copies of and extracts from the books of account of, and visit and inspect the properties of the Company and any subsidiary, to discuss the affairs, finances and accounts of the Company and any subsidiary with any of its officers, directors or Key Employees and independent accountants, and consult with and advise the management of the Company and any subsidiary as to their affairs, finances and accounts, all at reasonable times during the Company's normal business hours.

(iii) Indemnification. As promptly as practicable following the election of a director, enter into a director indemnification agreement in a usual and customary form with each such director, and as mutually agreed upon between the Company and such director.

(iv) Meetings of Directors. Call meetings of the Company's Board of Directors at least once every two (2) months, unless the Board of Directors unanimously shall determine otherwise. Ensure that a meeting of the Board of Directors may be called by any two (2) directors or by the holders of at least 20% of the Preferred Stock.

(v) Expenses of Directors. Promptly reimburse in full, each director of the Company who is not an employee of the Company for all of his or her reasonable and documented out-of-pocket expenses incurred in attending each meeting of the Board of Directors of the Company or any committee thereof, and for attendance at or participation in any other activities (including without limitation meetings, trade shows and conferences) which are required and/or requested by the Board of Directors in connection with such director's service on the Board of Directors.

(vi) Stock Options. All stock option grants and sales of stock to employees, officers, consultants, advisors and service providers of the Company shall be pursuant to a stock plan approved by the Board of Directors and shall be approved by the Board of Directors or a Compensation Committee thereof. Unless otherwise approved by the Board of Directors, (a) the exercise price of all such stock options and the sale price of all such sales shall

be no less than the fair market value of the Common Stock underlying such options or shares being sold, as applicable, as of the respective dates of grant or sale, as determined by the Board of Directors or Compensation Committee of the Board of Directors, and (b) all such options, stock or stock rights shall vest over a four (4) year period as follows: after 12 months of employment or service, as applicable, 25% shall vest; the remainder shall vest quarterly over the following 36 months (the terms set forth in (a) and (b) above, the "Vesting Terms").

(vii) Audit and Compensation Committees. The Company will maintain an Audit Committee of the Board of Directors and a Compensation Committee of the Board of Directors. All committees of the Board of Directors, including without limitation, the Audit and Compensation Committees, shall each include at least one (1) director appointed by LC.

(viii) Proprietary Information and Inventions Agreements. The Company shall cause each employee of the Company to enter into a Proprietary Information and Inventions Agreement in a form and substance satisfactory to the Board of Directors and each consultant of the Company shall have entered a consulting agreement containing similar terms regarding proprietary information and invention assignment as are set forth in the Proprietary Information and Inventions Assignment Agreement approved by the Board of Directors.

(ix) Real Property Holding Corporation. The Company shall operate in a manner such that it will not become a "United States real property holding corporation" as such term is defined in Section 897(c)(2) of the Internal Revenue Code of 1986, as amended (the "Code"), and the regulations thereunder.

(x) Small Business Stock. The Company covenants and agrees that so long as any of the Preferred Stock, or the Common Stock into which such Preferred Stock is converted, are held by an Investor (or a transferee of such Investor) in whose hands such Preferred Stock or Common Stock are eligible to qualify as Qualified Small Business Stock as defined in Section 1202(c) of the Code, it will use commercially reasonable efforts to (i) comply with any applicable filing or reporting requirements imposed by the Code on issuers of Qualified Small Business Stock; (ii) execute and deliver to each Investor, from time to time, such forms, documents, schedules and other instruments as may be reasonably requested thereby to cause such Preferred Stock, or the Common Stock into which they are converted, to qualify as Qualified Small Business Stock; and (iii) use reasonable best efforts to ensure (x) the Company continues to meet the requirements of a "qualified small business" as defined in Section 1202(d) of the Code and the Preferred Stock (or Common Stock into which such Preferred Shares are converted) qualify as Qualified Small Business Stock as defined in Section 1202(c) of the Code provided that clause (iii) shall not apply to any failure of the Preferred Stock (or Common Stock into which such Preferred Shares are converted) by reason of (A) Section 1202(c)(3)(A) of the Code or (B) any redemption described in Section 1202(c)(3)(B) of the Code if, in the case of sub-clause (B), the Investor holding any Qualified Small Business Stock participates in such redemption.

(xi) Good Faith. The Company will not, by any voluntary action, avoid or seek to avoid the observance or performance of any of the terms to be performed hereunder by the Company, but will at all times in good faith assist in the carrying out of all of the provisions

of this Agreement and in the taking of all such actions as may be necessary, appropriate in order to protect the rights of the parties hereunder against impairment.

(xii) Fees and Expenses. In connection with a Qualified Public Offering, the Company will reimburse up to $50,000 of expenses for one legal counsel representing the holders of Registrable Securities in connection therewith.

(b) Negative Covenants of the Company. Without limiting any other covenants and provisions hereof, the Company covenants and agrees that until the consummation of a Qualified Public Offering, so long as any shares of Preferred Stock are outstanding, it shall not take any of the following actions without the approval of the Board of Directors (including the affirmative consent of at least one (1) director appointed by LC), either directly or indirectly, by amendment, merger, consolidation, via a subsidiary or otherwise:

(i) Hire, fire or change the compensation of the CEO or the CSO;

(ii) Make any loans or advances to employees, except in the ordinary course of business as part of travel advances consistent with the Company's expenses and reimbursement policies;

(iii) Approve or make any material changes to the Company's business plan or annual budget;

(iv) License or transfer technology, other than in the ordinary course of business;

(v) Enter into any consulting, license, loan or lease agreements obligating the Company to make payments in excess of an aggregate of $250,000 per agreement in any calendar year; or

(vi) Agree to any of the foregoing.

(c) Reporting Requirements.

(i) Financial Statements and Notices of Certain Events. Until the earlier of (a) such time as the Company becomes subject to the reporting requirements of the Exchange Act, or (b) such time as no shares of Preferred Stock remain outstanding, the Company will furnish the following to each Major Investor:

(1) Monthly Reports: as soon as available and in any event within thirty (30) days after the end of each calendar month, unaudited financial statements of the Company and any subsidiaries as of the end of such month, including a consolidated (if applicable) balance sheet and statement of income and cash flows of the Company and any subsidiaries for such month and for the period commencing at the end of the previous fiscal year and ending with the end of such month, setting forth in each case in comparative form the corresponding figures for the corresponding period of the preceding fiscal year, and including comparisons to monthly budgets, cash flow analysis for such month, a schedule showing each expenditure of a capital nature during such month and the Company's current headcount, and a

summary discussion of the Company's principal and leading business indicators, all in reasonable detail and prepared in accordance with generally accepted accounting principles consistently applied (subject to year-end audit adjustments and the absence of footnotes);

(2) Quarterly Reports: as soon as available and in any event within forty-five (45) days after the end of each quarter of each fiscal year of the Company, unaudited financial statements of the Company and any subsidiaries as of the end of such quarter, including a consolidated (if applicable) balance sheet and statement of income and cash flows of the Company and any subsidiaries for such quarter and for the period commencing at the end of the previous fiscal year and ending with the end of such quarter, setting forth in each case in comparative form the corresponding figures for the corresponding period of the preceding fiscal year, and including comparisons to quarterly budgets, cash flow analysis for such quarter, a schedule showing each expenditure of a capital nature during such quarter and the Company's current headcount, a summary discussion of the Company's principal and leading business indicators, and a management report of the Company's principal functional areas summarizing the operations and business outlook of the Company, all in reasonable detail and prepared in accordance with generally accepted accounting principles consistently applied (subject to year-end audit adjustments and the absence of footnotes);

(3) Annual Reports: as soon as available and in any event within one hundred eighty (180) days after the end of each fiscal year of the Company, a copy of the annual audit report for such year for the Company and any subsidiaries, including therein a consolidated (if applicable) balance sheet of the Company and any subsidiaries as of the end of such fiscal year and a consolidated statement of income and cash flows of the Company and any subsidiaries for such fiscal year, setting forth in each case in comparative form the corresponding figures for the preceding fiscal year, all such consolidated statements to be duly certified by independent public accountants of recognized national standing approved by the Audit Committee;

(4) Notice of Adverse Changes: in each case, within ten (10) days of the CEO having actual knowledge of an occurrence, notice (which may be oral) of any material adverse change in the business, operations, affairs or condition (financial or otherwise) of the Company, of any material default under any material loan, lease or other material agreement to which the Company is a party, or of any material violation of applicable law by the Company;

(5) Written Reports: promptly after available and in any event within thirty (30) days after receipt, delivery or publication thereof, (a) any written reports submitted to the Company by independent public accountants in connection with an annual or interim audit of the books of the Company and any subsidiaries made by such accountants, including without limitation, each audit response letter and accountant management letter, (b) any material document (other than tax returns or patent or other intellectual property filings or applications) filed with a government department, commission, board, bureau, agency or instrumentality, domestic or foreign, including without limitation, the Environmental Protection Agency, the Internal Revenue Service or the Commission, and (c) regularly prepared written reports prepared by the Company to comply with any bank loan agreements;

(6) Notice of Proceedings: within five (5) Business Days after receipt of filing, notice (including copies of any publicly available pleadings) of all material actions, suits, litigations and proceedings pending or, to the knowledge of the Company, threatened against the Company, or, to the knowledge of the Company, against any officer, director, Key Employee or holder of more than 5% of the capital stock of the Company relating to such person's performance of duties for the Company or relating to his stock ownership in the Company, as applicable, including, without limiting their generality, actions pending or, to the knowledge of the Company, threatened involving the prior employment of any of the Company's officers or employees in their use in connection with the Company's business of any information or techniques allegedly proprietary to any of their former employers;

(7) Business Plan and Budget: as soon as available and in any event at least thirty (30) days prior to the end of each fiscal year (or such later date as is approved by the Board of Directors), a business plan and annual budget of the Company for the following fiscal year prepared on a monthly basis, including balance sheets, income statements and statements of cash flow for such months and, promptly after prepared, any other budgets or revised budgets prepared by the Company.

(d) Confidentiality. Each Investor agrees that it will, and will cause its employees, representatives and agents (including any observers) to, keep confidential and, except to the extent required by applicable law, not disclose or divulge any confidential, proprietary or secret information which such Investor may obtain from the Company pursuant to any rights granted hereunder and which is not generally available to the public unless such information is or becomes known to the Investor from a source other than the Company that is not known to such Investor to be under a confidentiality obligation with respect to such information, or is or becomes publicly known, or unless the Company gives its written consent to such Investor's release of such information, except that no such written consent shall be required (and the Investor shall be free to release such information to such recipient) if such information is to be provided to the Investor's counsel or accountant, or, with respect to non-technical information, including financial information, to an officer, director, employee, partner or member of such Investor or its Affiliates, provided that, in each case, the Investor shall inform the recipient of the confidential nature of such information, and shall obtain the recipient's agreement to treat the information as confidential. Nothing in this Section 13(d) shall be construed as a representation that an Investor or its Affiliates will not develop or acquire information that is the same as or similar to the Company's confidential information, provided that such party does not do so in breach of this Section 13(d).

(e) Successor Indemnification. If the Company or any of its successors or assignees consolidates with or merges into any other Person and is not the continuing or surviving corporation or entity of such consolidation or merger, then to the extent necessary, proper provision shall be made so that the successors and assignees of the Company assume the obligations of the Company with respect to indemnification of members of the Board of Directors as in effect immediately before such transaction, whether such obligations are contained in the Company's Bylaws, the Charter, or elsewhere, as the case may be.

14. Miscellaneous.

(a) All covenants and agreements contained in this Agreement by or on behalf of any of the parties hereto shall bind and inure to the benefit of the respective successors and permitted assigns of the parties hereto (including without limitation transferees of any Preferred Stock or Registrable Securities), whether so expressed or not, hereto; provided, however, that the rights and obligations of each Investor hereunder may only be assigned by such Investor to an Investor Affiliate or to a Person to which at least 100,000 shares of Registrable Securities (such minimum number of shares to be adjusted for any stock splits, stock dividends, recapitalizations or similar events) are transferred by such Investor; and provided, further, however, that the transferee provides written notice of such assignment to the Company and becomes a party to this Agreement by executing and delivering an instrument of accession in the form of Schedule II agreeing to be bound by and subject to the terms of this Agreement as an Investor hereunder. Each such Person shall thereafter be deemed an Investor for all purposes hereunder.

(b) In case any one or more of the provisions contained in this Agreement shall for any reason be held to be invalid, illegal or unenforceable in any respect, such invalidity, illegality or unenforceability shall not affect any other provision of this Agreement and such invalid, illegal and unenforceable provision shall be reformed and construed so that it will be valid, legal, and enforceable to the maximum extent permitted by law.

(c) All notices and other communications required or permitted to be given pursuant to this Agreement shall be in writing signed by the sender, and shall be deemed duly given (i) on the date delivered if personally delivered, (ii) on the date sent by telecopier with automatic confirmation by the transmitting machine showing the proper number of pages were transmitted without error, (iii) on the Business Day after being sent by Federal Express or another recognized overnight mail service which utilizes a written form of receipt for next day or next Business Day delivery, (iv) two (2) Business Days after mailing, if mailed by United States postage-prepaid certified or registered mail, return receipt requested, or (v) one Business Day following the delivery of a duly transmitted electronic mail, in each case addressed to the applicable party at the address set forth below:

(1) if to the Company or any officer thereof, then at the Company's principal office addressed to the attention of the President and the Secretary, or to the attention of the specific officer, as the case may be, provided that for any notice provided to the Company or any officer of the Company hereunder, a copy (which shall not constitute notice) must also be sent to: Cooley LLP, 4401 Eastgate Mall, San Diego, CA 92121, Attention: Thomas A. Coll, Esq., Telecopier: (858) 550-6420, Telephone No.: (858) 550-6013; or

(2) if to any Investor, to such Investor's address as set forth on Schedule I or any Instrument of Accession hereto, as applicable;

or to such other address as any party hereto may advise the other parties in writing given in like manner.

(d) This Agreement and any and all matters arising directly or indirectly herefrom ("Agreement Matters") shall be governed by and construed and enforced in accordance with the internal laws of the State of Delaware applicable to agreements made and to be performed entirely in that state, without giving effect to the conflict of law principles of any

jurisdiction. Each of the parties hereto hereby (i) irrevocably consents and submits to the sole exclusive jurisdiction of the United States District Court for the District of Delaware and any state court in the State of Delaware (and of the appropriate appellate courts from any of the foregoing) in connection with any suit, arbitration, mediation, action or other proceeding (each a "Proceeding") directly or indirectly arising out of or relating to any Agreement Matter, provided that a party to this Agreement shall be entitled to enforce an order or judgment of such court in any United States or foreign court having jurisdiction over the other party hereto; (ii) irrevocably waives, to the fullest extent permitted by law, any objection that it may now or hereafter have to the laying of the venue of any such Proceeding in any such court or that any such Proceeding which is brought in any such court has been brought in an inconvenient forum; (iii) waives, to the fullest extent permitted by law, any immunity from jurisdiction of any such court or from any legal process therein; and (iv) agrees that service of any summons, complaint, notice or other process relating to such Proceeding may be effected in the manner provided for the giving of notice hereunder. EACH OF THE PARTIES HERETO HEREBY WAIVES ANY RIGHT IT MAY HAVE TO A TRIAL BY JURY IN RESPECT OF ANY CLAIM BASED UPON, ARISING OUT OF OR IN CONNECTION WITH ANY AGREEMENT MATTERS.

(e) This Agreement may not be amended or modified, and no provision hereof may be waived, without the written consent of (i) the Company and (ii) the Requisite Holders; provided, however, that notwithstanding the foregoing, any provision hereof may be waived by the benefiting party on behalf of itself, without the consent of any other party.

(f) This Agreement may be executed in two or more counterparts, each of which shall be deemed an original, but all of which together shall constitute one and the same instrument. This Agreement may be executed by facsimile signature(s) or other electronic means which shall be binding on the party delivering the same, to be followed by delivery of originally executed signature pages. Any amendment, termination or waiver effected in accordance with this Section 14(f) shall be binding on each party and all of such party's successors and permitted assigns, whether or not any such party, successor or assignee entered into or approved such amendment, termination or waiver. No delay or omission to exercise any right, power or remedy accruing to any party under this Agreement, upon any breach or default of any other party under this Agreement, shall impair any such right, power or remedy of such non-breaching or non-defaulting party nor shall it be construed to be a waiver of any such breach or default, or an acquiescence therein, or of any similar breach or default thereafter occurring; nor shall any waiver of any single breach or default be deemed a waiver of any other breach or default theretofore or thereafter occurring. Any waiver, permit, consent or approval of any kind or character on the part of any party of any breach or default under this Agreement, or any waiver on the part of any party of any provisions or conditions of this Agreement, must be in writing and shall be effective only to the extent specifically set forth in such writing. All remedies, either under this Agreement or by law or otherwise afforded to any party, shall be cumulative and not alternative.

(g) The headings contained in this Agreement are for reference purposes only and shall not in any way affect the meaning or interpretation of this Agreement.

(h) The obligations of the Company to register shares of Registrable Securities under Sections 4, 5 or 6 shall terminate as to any holder of Registrable Securities on

the earliest of (i) the fifth (5th) anniversary of the date of a Qualified Public Offering, (ii) the closing of a Deemed Liquidation Event, and (iii) such time following the consummation of a firm-commitment underwritten public offering of Common Stock pursuant to an effective registration statement filed under the Securities Act when all of the Registrable Securities could be sold without restriction under Rule 144 promulgated under the Securities Act in a 3-month period.

(i) Notwithstanding anything else contained herein to the contrary, the Company's obligation to file a registration statement, or cause such registration statement to become and remain effective, may be suspended for a period or periods not to exceed ninety (90) days in any 12-month period if in the Company's good faith judgment upon the advice of counsel it (i) would materially impede, delay, interfere with or otherwise or otherwise adversely affect any pending financing, registration of securities, acquisitions, corporate reorganization or other significant transaction involving the Company or (ii) it would require disclosure of non- public material information that the Company has a bona fide business purpose for preserving as confidential, and it is therefore essential to defer the filing of such registration statement.

(j) The Company will grant the holders of shares of Preferred Stock any pre-emptive rights or registration rights granted to subsequent purchasers of the Company's equity securities to the extent such pre-emptive rights or registration rights are superior, in good faith judgment of the Board of Directors, to those granted to the holders of shares of Preferred Stock hereunder. The Company shall not grant any "piggy-back" registration rights to any holders of shares of the Company that are superior, in good faith judgment of the Board of Directors, to those "piggy-back" registration rights of the holders of shares of Preferred Stock without the written consent of the Requisite Holders.

(k) In the event that after the date of this Agreement, the Company issues additional shares of Preferred Stock to any Person who is not already a party hereto, as a condition to the issuance of such shares the Company shall require that any purchaser of Preferred Stock become a party to this Agreement by executing and delivering an instrument of accession in the form of Schedule II agreeing to be bound by and subject to the terms of this Agreement as an Investor hereunder. Each such Person shall thereafter be deemed an Investor for all purposes hereunder.

(l) Notwithstanding anything set forth herein to the contrary, the joinder of any Person who is not already a party to this Agreement and executes an instrument of accession in substantially the form of Schedule II shall not be deemed an amendment to this Agreement.

(m) Notwithstanding anything to the contrary contained herein, if the Company issues additional shares of Series D-1 Preferred Stock after the date hereof pursuant to the Purchase Agreement, any purchaser of such shares of Series D-1 Preferred Stock may become a party to this Agreement by executing and delivering to the Company an additional counterpart signature page to this Agreement and thereafter shall be deemed a "Series D-1 Investor" for all purposes hereunder and Schedule I hereto shall be amended by the Company to add information regarding additional "Series D-1 Investors" and parties to this Agreement or to modify the information set forth therein.

(n) This Agreement constitutes the entire agreement among the parties with respect to the subject matter hereof and supersedes all prior and/or contemporaneous agreements and understandings, whether oral or written, between them or any of them as to such subject matter. This Agreement amends and restates in its entirety that certain BioNano Genomics, Inc. (formerly BioNanomatrix, Inc.) Fourth Amended and Restated Investors' Rights Agreement dated March 4, 2016, in accordance with Section 14(e) thereof.

[Remainder of Page Intentionally Left Blank]

Please indicate your acceptance of the foregoing by signing and returning the enclosed counterpart of this letter, whereupon this Agreement shall be a binding agreement between the Company and you.

Very truly yours,

THE COMPANY:

BIONANO GENOMICS, INC.

By: _____

Name: Erik Holmlin
Title: Chief Executive Officer

IN WITNESS WHEREOF, the undersigned have executed this Fifth Amended and Restated Investors' Rights Agreement as of the day and year first above written.

INVESTOR:

LC FUND VI, L.P.

By: _____
Name:
Title:

IN WITNESS WHEREOF, the undersigned have executed this Fifth Amended and Restated Investors' Rights Agreement as of the day and year first above written.

INVESTOR:

LC PARALLEL FUND VI, L.P.

By: _____
Name:
Title:

IN WITNESS WHEREOF, the undersigned have executed this Fifth Amended and Restated Investors' Rights Agreement as of the day and year first above written.

INVESTORS:

DOMAIN PARTNERS VIII, L.P.

By: One Palmer Square Associates VIII, L.L.C., its General Partner

By: _____
Name:
Title:

DP VIII ASSOCIATES, L.P.

By: One Palmer Square Associates VIII, L.L.C., its General Partner

By: _____
Name:
Title:

IN WITNESS WHEREOF, the undersigned have executed this Fifth Amended and Restated Investors' Rights Agreement as of the day and year first above written.

INVESTOR:

NOVARTIS BIOVENTURES LTD.

By: _____
Name:
Title:

By: _____
Name:
Title:

SCHEDULE I

BIONANO GENOMICS, INC.
9640 Towne Centre Drive, Suite 100
San Diego, CA 92121

SCHEDULE OF INVESTORS

SERIES A INVESTORS:

Battelle Memorial Institute

BVP GP, LLC

Innovation Valley Partners, LP

Ben Franklin Technology Partners
of Southeastern Pennsylvania

Steve Chazen

SERIES B INVESTORS:

Battelle Memorial Institute

BVP GP, LLC

Innovation Valley Partners, LP

Edward Ericson

Michael Kochersperger

Domain Partners VIII, L.P.

DP VIII Associates, L.P.

Steve Chazen

Gund Investment LLC

Han Cao

SERIES B-1 INVESTORS:

Battelle Memorial Institute

BVP GP, LLC

Innovation Valley Partners, LP

Domain Partners VIII, L.P.

DP VIII Associates, L.P.

Gund Investment LLC

Peter B. Dervan

Robert Austin

SERIES C INVESTORS:

LC Fund VI, L.P.

LC Parallel Fund VI, L.P.

Battelle Memorial Institute

BVP GP, LLC

Innovation Valley Partners, LP

Domain Partners VIII, L.P.

DP VIII Associates, L.P.

Gund Investment LLC

Robert Austin

Han Cao

Steve Chazen

Peter B. Dervan

Michael Kochersperger

Monashee Investment Management, LLC

Federated Kaufmann Fund

Federated Kaufmann Fund II

Shrewsbury Capital Partners LLC

NOVARTIS BIOVENTURES LTD.

with copies to:

Campbell Murray and Christine Brennan
Novartis Venture Fund

and

Albert L. Sokol, Partner
Edwards Wildman Palmer LLP

SERIES D INVESTORS:

LC Fund VI, L.P.

LC Parallel Fund VI, L.P.

Domain Partners VIII, L.P.

DP VIII Associates, L.P.

NOVARTIS BIOVENTURES LTD.

with copies to:

Campbell Murray and Christine Brennan
Novartis Venture Fund

and

Albert L. Sokol, Partner
Edwards Wildman Palmer LLP

Monashee Investment Management, LLC

BVP GP, LLC

Innovation Valley Partners, LP

Shrewsbury Capital Partners LLC

Robert Austin

Ben Franklin Technology Partners
of Southeastern Pennsylvania

Han Cao

Steve Chazen

Peter B. Dervan

Michael Kochersperger

SERIES D-1 INVESTORS:

LC Fund VI, L.P.

LC Parallel Fund VI, L.P.

LC Healthcare Fund I, L.P.

Praise Alliance International Limited

Alexandria Venture Investments, LLC

Full Succeed International Limited

Ascender Prosperity Capital Co., Ltd

AriMed International Ltd.

HybriBio Limited

Domain Partners VIII, L.P.

DP VIII Associates, L.P.

NOVARTIS BIOVENTURES LTD.

with copies to:

Campbell Murray and Christine Brennan
Novartis Venture Fund

and

Albert L. Sokol, Partner
Edwards Wildman Palmer LLP

Monashee Investment Management, LLC

Han Cao

BVP GP, LLC

Steve Chazen

Peter B. Dervan

Michael Kochersperger

Robert Austin

SCHEDULE II

BIONANO GENOMICS, INC.

INSTRUMENT OF ACCESSION

The undersigned, , as a condition precedent to becoming the owner or holder of record of ( ) shares of the Series Convertible Participating Preferred Stock, par value $0.0001 per share, of BioNano Genomics, Inc., a Delaware corporation and successor to BioNanomatrix, LLC (the "Company"), hereby agrees to become an Investor under that certain Fifth Amended and Restated Investors' Rights Agreement dated as of August 5, 2016 by and among the Company and certain stockholders of the Company, as amended to date (the "Investors' Rights Agreement"). This Instrument of Accession shall take effect and shall become an integral part of, and the undersigned shall become a party to and bound by, said Investors' Rights Agreement immediately upon execution and delivery to the Company of this Instrument.

IN WITNESS WHEREOF, this INSTRUMENT OF ACCESSION has been duly executed by or on behalf of the undersigned, as a sealed instrument under the laws of the State of Delaware, as of the date below written.

Signature:

(Print Name)

Address:

Date:

Accepted:

BIONANO GENOMICS, INC.

By:
Name:
Title:

BIONANO GENOMICS, INC.

AMENDED AND RESTATED

2006 EQUITY COMPENSATION PLAN

1.

BIONANO GENOMICS, INC.

AMENDED AND RESTATED

2006 EQUITY COMPENSATION PLAN

MOST RECENTLY AMENDED BY THE BOARD OF DIRECTORS: MARCH 1, 2016
AMENDMENT APPROVED BY THE STOCKHOLDERS: MARCH 3, 2016

TERMINATION DATE: SEPTEMBER 11, 2018

The purpose of the BioNano Genomics, Inc. Amended and Restated 2006 Equity Compensation Plan (the "Plan") is to provide (i) designated employees of BioNano Genomics, Inc. (the "Company") and its subsidiaries, (ii) certain consultants and advisors who perform services for the Company or its subsidiaries and (iii) non-employee members of the Board of Directors of the Company (the "Board") with the opportunity to receive grants of incentive stock options, nonqualified stock options, stock awards, stock units, stock appreciation rights and other equity-based awards. The Company believes that the Plan will encourage the participants to contribute materially to the growth of the Company, thereby benefiting the Company's members, and will align the economic interests of the participants with those of the members.

SECTION 1 Administration

(a) Board. The Plan shall be administered and interpreted by the Board or by a committee consisting of members of the Board, which shall be appointed by the Board. However, the Board shall approve and administer all grants made to non-employee directors. The committee may delegate authority to one or more subcommittees, as it deems appropriate. To the extent the Board, committee or subcommittee administers the Plan, references in the Plan to the "Board" shall be deemed to refer to such committee or subcommittee.

(b) Board Authority. The Board shall have the sole authority to (i) determine the individuals to whom grants shall be made under the Plan, (ii) determine the type, size and terms of the grants to be made to each such individual, (iii) determine the time when the grants will be made and the duration of any applicable exercise or restriction period, including the criteria for exercisability and the acceleration of exercisability, (iv) amend the terms of any previously issued grant, and (v) deal with any other matters arising under the Plan.

(c) Board Determinations. The Board shall have full power and authority to administer and interpret the Plan, to make factual determinations and to adopt or amend such rules, regulations, agreements and instruments for implementing the Plan and for the conduct of its business as it deems necessary or advisable, in its sole discretion. The Board's interpretations of the Plan and all determinations made by the Board pursuant to the powers vested in it hereunder shall be conclusive and binding on all persons having any interest in the Plan or in any awards granted hereunder. All powers of the Board shall be executed in its sole discretion, in the best interest of the Company, not as a fiduciary, and in keeping with the objectives of the Plan and need not be uniform as to similarly situated individuals.

SECTION 2 Grants

Awards under the Plan may consist of grants of incentive stock options as described in Section 5 ("Incentive Stock Options"), nonqualified stock options as described in Section 5 ("Nonqualified Stock Options") (Incentive Stock Options and Nonqualified Stock Options are collectively referred to as "Options"), stock awards as described in Section 6 ("Stock Awards"), stock units as described in Section 7 ("Stock Units"), stock appreciation rights ("SARs") as described in Section 8, and other equity-based awards as described in Section 9 ("Other Equity Awards") (collectively referred to herein as "Grants"). All Grants shall be subject to the terms and conditions set forth herein and to such other terms and conditions consistent with this Plan as the Board deems appropriate and as are specified in writing by the Board to the individual in a grant instrument or an amendment to the grant instrument (the "Grant Instrument"). All Grants shall be made conditional upon the Grantee's (as defined below) acknowledgement, in writing or by acceptance of the Grant, that all decisions and determinations of the Board shall be final and binding on the Grantee, the Grantee's beneficiaries and any other person having or claiming an interest under such Grant. The Board shall approve the form and provisions of each Grant Instrument. Grants under a particular Section of the Plan need not be uniform as among the Grantees.

SECTION 3 Shares Subject to the Plan

(a) Shares Authorized. Subject to adjustment as described below, the aggregate number of shares of common stock of the Company ("Company Stock") that may be issued or transferred under the Plan is 218,791,131.

(b) Determination of Authorized Shares. The shares may be authorized but unissued shares of Company Stock or reacquired shares of Company Stock. If and to the extent Options or SARs granted under the Plan terminate, expire, or are canceled, forfeited, exchanged or surrendered without having been exercised or if any Stock Awards, Stock Units, or Other Equity Awards are forfeited, the shares subject to such Grants shall again be available for purposes of the Plan.

(c) Adjustments. If there is any change in the number or kind of shares of Company Stock outstanding (i) by reason of a stock dividend, spinoff, recapitalization, stock split, or combination or exchange of shares, (ii) by reason of a merger, reorganization or consolidation, (iii) by reason of a reclassification or change in par value, or (iv) by reason of any other extraordinary or unusual event affecting the outstanding Company Stock as a class without the Company's receipt of consideration, or if the value of outstanding shares of Company Stock is substantially reduced as a result of a spinoff or the Company's payment of an extraordinary dividend or distribution, the maximum number of shares of Company Stock available for issuance under the Plan, the maximum number of shares of Company Stock for which any individual may receive Grants in any year, the kind and number of shares covered by outstanding Grants, the kind and number of shares issued and to be issued under the Plan, and the price per share or the applicable market value of such Grants shall be equitably adjusted by the Board to reflect any increase or decrease in the number of, or change in the kind or value of, the issued shares of Company Stock to preclude, to the extent practicable, the enlargement or dilution of rights and benefits under the Plan and such outstanding Grants; provided, however, that any

fractional shares resulting from such adjustment shall be eliminated. In addition, in the event of a Change of Control of the Company, the provisions of Section 13 of the Plan shall apply. Any adjustments to outstanding Grants shall be consistent with section 409A or 424 of the Internal Revenue Code of 1986, as amended (the "Code"), to the extent applicable. Any adjustments determined by the Board shall be final, binding and conclusive.

SECTION 4 Eligibility for Participation

(a) Eligible Persons. All employees of the Company and its subsidiaries, including Employees who are officers or members of the Board ("Employees"), and members of the Board who are not Employees ("Non-Employee Directors") shall be eligible to participate in the Plan. Consultants and advisors who perform services for the Company or any of its subsidiaries including managers who provide consulting or advisory services ("Key Advisors") shall be eligible to participate in the Plan if the Key Advisors render bona fide services to the Company or its subsidiaries, the services are not in connection with the offer and sale of securities in a capital-raising transaction and the Key Advisors do not directly or indirectly promote or maintain a market for the Company's securities.

(b) Selection of Grantees. The Board shall select the Employees, Non-Employee Directors and Key Advisors to receive Grants and shall determine the number of shares of Company Stock subject to a particular Grant in such manner as the Board determines. Employees, Key Advisors and Non-Employee Directors who receive Grants under this Plan shall hereinafter be referred to as "Grantees."

SECTION 5 Options

The Board may grant Options to an Employee, Non-Employee Director or Key Advisor, upon such terms as the Board deems appropriate. The following provisions are applicable to Options:

(a) Number of Shares. The Board shall determine the number of shares of Company Stock that will be subject to each Grant of Options to Employees, Non-Employee Directors and Key Advisors.

(b) Type of Option and Price.

(i) The Board may grant Incentive Stock Options that are intended to qualify as "incentive stock options" within the meaning of section 422 of the Code or Nonqualified Stock Options that are not intended so to qualify or any combination of Incentive Stock Options and Nonqualified Stock Options, all in accordance with the terms and conditions set forth herein. Incentive Stock Options may be granted only to Employees. Nonqualified Stock Options may be granted to Employees, Non-Employee Directors and Key Advisors.

(ii) The purchase price (the "Exercise Price") of Company Stock subject to an Option shall be determined by the Board and must be equal to or greater than the Fair Market Value (as defined below) of a share of Company Stock on the date the Option is granted. However, an Incentive Stock Option may not be granted to an Employee who, at the time of grant, owns stock possessing more than 10% of the total combined voting power of all classes of

stock of the Company or any subsidiary of the Company, unless the Exercise Price per share is not less than 110% of the Fair Market Value of Company Stock on the date of grant.

(iii) "Fair Market Value" of Company Stock means, unless the Board determines otherwise with respect to a particular Grant, (i) if the principal trading market for the Company Stock is a national securities exchange, the last reported sale price of Company Stock on the relevant date or (if there were no trades on that date) the latest preceding date upon which a sale was reported, (ii) if the Company Stock is not principally traded on such exchange, the mean between the last reported "bid" and "asked" prices of Company Stock on the relevant date, as reported on the OTC Bulletin Board, or (iii) if the Company Stock is not publicly traded or, if publicly traded, is not so reported, the Fair Market Value per share shall be as determined by the Board through the reasonable application of any reasonable valuation method authorized under the Code.

(c) Option Term. The Board shall determine the term of each Option. The term of any Option shall not exceed ten years from the date of grant. However, an Incentive Stock Option that is granted to an Employee who, at the time of grant, owns stock possessing more than 10% of the total combined voting power of all classes of stock of the Company, or any subsidiary of the Company, may not have a term that exceeds five years from the date of grant.

(d) Exercisability of Options.

(i) Options shall become exercisable in accordance with such terms and conditions, consistent with the Plan, as may be determined by the Board and specified in the Grant Instrument. The Board may accelerate the exercisability of any or all outstanding Options at any time for any reason.

(ii) The Board may provide in a Grant Instrument that the Grantee may elect to exercise part or all of an Option before it otherwise has become exercisable. Any shares so purchased shall be restricted shares and shall be subject to a repurchase right in favor of the Company during a specified restriction period, with the repurchase price equal to the lesser of (A) the Exercise Price or (B) the Fair Market Value of such shares at the time of repurchase, or such other restrictions as the Board deems appropriate.

(e) Grants to Non-Exempt Employees. Notwithstanding the foregoing, Options granted to persons who are non-exempt employees under the Fair Labor Standards Act of 1938, as amended, may not be exercisable for at least six months after the date of grant (except that such Options may become exercisable, as determined by the Board, upon the Grantee's death, Disability (as defined below) or retirement, or upon a Change of Control or other circumstances permitted by applicable regulations).

(f) Termination of Employment, Disability or Death.

(i) Except as provided below, an Option may only be exercised while the Grantee is employed by, or providing service to, the Employer (as defined below) as an Employee, Key Advisor or member of the Board.

(ii) In the event that a Grantee ceases to be employed by, or provide service to, the Employer for any reason other than Disability, death, or termination for Cause (as defined below), any Option which is otherwise exercisable by the Grantee shall terminate unless exercised within 90 days after the date on which the Grantee ceases to be employed by, or provide service to, the Employer (or within such other period of time as may be specified by the Board), but in any event no later than the date of expiration of the Option term. Except as otherwise provided by the Board, any of the Grantee's Options that are not otherwise exercisable as of the date on which the Grantee ceases to be employed by, or provide service to, the Employer shall terminate as of such date.

(iii) In the event the Grantee ceases to be employed by, or provide service to, the Employer on account of a termination for Cause by the Employer, any Option held by the Grantee shall terminate as of the date the Grantee ceases to be employed by, or provide service to, the Employer. In addition, notwithstanding any other provisions of this Section 5, if the Board determines that the Grantee has engaged in conduct that constitutes Cause at any time while the Grantee is employed by, or providing service to, the Employer or after the Grantee's termination of employment or service, any Option held by the Grantee shall immediately terminate and the Grantee shall automatically forfeit all shares underlying any exercised portion of an Option for which the Company has not yet delivered the share certificates, upon refund by the Company of the Exercise Price paid by the Grantee for such shares. Upon any exercise of an Option, the Company may withhold delivery of share certificates pending resolution of an inquiry that could lead to a finding resulting in a forfeiture.

(iv) In the event the Grantee ceases to be employed by, or provide service to, the Employer on account of the Grantee's Disability, any Option which is otherwise exercisable by the Grantee shall terminate unless exercised within one year after the date on which the Grantee ceases to be employed by, or provide service to, the Employer (or within such other period of time as may be specified by the Board), but in any event no later than the date of expiration of the Option term. Except as otherwise provided by the Board, any of the Grantee's Options which are not otherwise exercisable as of the date on which the Grantee ceases to be employed by, or provide service to, the Employer shall terminate as of such date.

(v) If the Grantee dies while employed by, or providing service to, the Employer or within 90 days after the date on which the Grantee ceases to be employed or provide service on account of a termination specified in Section 5(f)(ii) above (or within such other period of time as may be specified by the Board), any Option that is otherwise exercisable by the Grantee shall terminate unless exercised within one year after the date on which the Grantee ceases to be employed by, or provide service to, the Employer (or within such other period of time as may be specified by the Board or in the Grantee's employment agreement, if any), but in any event no later than the date of expiration of the Option term. Except as otherwise provided by the Board, any of the Grantee's Options that are not otherwise exercisable as of the date on which the Grantee ceases to be employed by, or provide service to, the Employer shall terminate as of such date.

(vi) For purposes of the Plan:

(A) The term "Employer" shall mean the Company and its subsidiary companies, as determined by the Board.

(B) "Employed by, or provide service to, the Employer" shall mean employment or service as an Employee, Key Advisor or member of the Board (so that, for purposes of exercising Options and satisfying conditions with respect to other Grants, a Grantee shall not be considered to have terminated employment or service until the Grantee ceases to be an Employee, Key Advisor and member of the Board), unless the Board determines otherwise.

(C) "Disability" shall mean a Grantee's becoming disabled within the meaning of section 22(e)(3) of the Code, within the meaning of the Employer's long-term disability plan applicable to the Grantee, or as otherwise determined by the Board.

(D) "Cause" shall mean, except to the extent otherwise specified by the Board, a finding by the Board that the Grantee (i) has materially breached his or her employment or service contract with the Employer, which breach has not been remedied by the Grantee after written notice has been provided to the Grantee of such breach, (ii) has engaged in disloyalty to the Employer, including, without limitation, fraud, embezzlement, theft, commission of a felony or proven dishonesty, (iii) has disclosed trade secrets or confidential information of the Employer to persons not entitled to receive such information, (iv) has breached any written non-competition or non-solicitation agreement between the Grantee and the Employer or (v) has engaged in such other behavior detrimental to the interests of the Employer as the Board determines.

(g) Exercise of Options. A Grantee may exercise an Option that has become exercisable, in whole or in part, by delivering a notice of exercise to the Company. The Grantee shall pay the Exercise Price for an Option as specified by the Board (i) in cash, (ii) with the approval of the Board, by delivering shares of Company Stock owned by the Grantee (including Company Stock acquired in connection with the exercise of an Option, subject to such restrictions as the Board deems appropriate) and having a Fair Market Value on the date of exercise equal to the Exercise Price or by attestation (on a form prescribed by the Board) to ownership of shares of Company Stock having a Fair Market Value on the date of exercise equal to the Exercise Price, (iii) after a Public Offering (as defined in Section 20) of the Company's stock, payment through a broker in accordance with procedures permitted by Regulation T of the Federal Reserve Board, or (iv) by such other method as the Board may approve. Shares of Company Stock used to exercise an Option shall have been held by the Grantee for the requisite period of time to avoid adverse accounting consequences to the Company with respect to the Option. The Grantee shall pay the Exercise Price and the amount of any withholding tax due (pursuant to Section 10) at such time as may be specified by the Board.

(h) Limits on Incentive Stock Options. Each Incentive Stock Option shall provide that, if the aggregate Fair Market Value of the stock on the date of the grant with respect to which Incentive Stock Options are exercisable for the first time by a Grantee during any calendar year, under the Plan or any other stock option plan of the Company or a subsidiary, exceeds $100,000, then the Option, as to the excess, shall be treated as a Nonqualified Stock Option. An Incentive Stock Option shall not be granted to any person who is not an Employee of the Company.

SECTION 6 Stock Awards

The Board may issue or transfer shares of Company Stock to an Employee, Non-Employee Director or Key Advisor under a Stock Award, upon such terms as the Board deems appropriate. The following provisions are applicable to Stock Awards:

(a) General Requirements. Shares of Company Stock issued or transferred pursuant to Stock Awards may be issued or transferred for cash consideration or for no cash consideration, and may be subject to restrictions or no restrictions, as determined by the Board. The Board may, but shall not be required to, establish conditions under which restrictions on Stock Awards shall lapse over a period of time or according to such other criteria as the Board deems appropriate, including, without limitation, restrictions based upon the achievement of specific performance goals. Any period of time during which the Stock Awards will remain subject to restrictions will be designated in the Grant Instrument as the "Restriction Period."

(b) Number of Shares. The Board shall determine the number of shares of Company Stock to be issued or transferred pursuant to a Stock Award and the restrictions applicable to such shares.

(c) Requirement of Employment or Service. Unless the Board determines otherwise, if the Grantee ceases to be employed by, or provide service to, the Employer during a period designated in the Grant Instrument as the Restriction Period, or if other specified conditions are not met, the Stock Award shall terminate and be forfeited as to all shares covered by the Grant as to which the restrictions have not lapsed, and those shares of Company Stock must be immediately returned to the Company. The Board may, however, provide for complete or partial exceptions to this requirement as it deems appropriate.

(d) Restrictions on Transfer and Legend on Stock Certificate. During the Restriction Period, a Grantee may not sell, assign, transfer, pledge or otherwise dispose of the shares of a Stock Award except to a successor under Section 11(a). Each certificate for a share of a Stock Award shall contain a legend giving appropriate notice of the restrictions in the Grant. The Grantee shall be entitled to have the legend removed from the stock certificate covering the shares subject to restrictions when all restrictions on such shares have lapsed. The Board may determine that the Company will not issue certificates for Stock Awards until all restrictions on such shares have lapsed, or that the Company will retain possession of certificates for shares of Stock Awards until all restrictions on such shares have lapsed.

(e) Right to Vote and to Receive Dividends. Unless the Board determines otherwise, during the Restriction Period, the Grantee shall have the right to vote shares of Stock Awards and to receive any dividends or other distributions paid on such shares, subject to any restrictions deemed appropriate by the Board, including, without limitation, the achievement of specific performance goals.

(f) Lapse of Restrictions. All restrictions imposed on Stock Awards shall lapse upon the expiration of the applicable Restriction Period and the satisfaction of all conditions imposed by the Board. The Board may determine, as to any or all Stock Awards, that the restrictions shall lapse without regard to any Restriction Period.

SECTION 7 Stock Units

The Board may grant Stock Units representing one or more shares of Company Stock to an Employee, Non-Employee Director or Key Advisor, upon such terms and conditions as the Board deems appropriate. The following provisions are applicable to Stock Units:

(a) Crediting of Units. Each Stock Unit shall represent the right of the Grantee to receive an amount based on the value of a share of Company Stock, if specified conditions are met. All Stock Units shall be credited to bookkeeping accounts established on the Company's records for purposes of the Plan.

(b) Terms of Stock Units. The Board may grant Stock Units that are payable if specified performance goals or other conditions are met, or under other circumstances. Stock Units may be paid at the end of a specified performance period or other period, or payment may be deferred to a date authorized by the Board. The Board shall determine the number of Stock Units to be granted and the requirements applicable to such Stock Units.

(c) Requirement of Employment or Service. Unless the Board determines otherwise, if the Grantee ceases to be employed by, or provide service to, the Employer during a specified period, or if other conditions established by the Board are not met, the Grantee's Stock Units shall be forfeited. The Board may, however, provide for complete or partial exceptions to this requirement as it deems appropriate.

(d) Payment With Respect to Stock Units. Payments with respect to Stock Units may be made in cash, in Company Stock, or in a combination of the two, as determined by the Board.

SECTION 8 Stock Appreciation Rights

The Board may grant SARs to an Employee, Non-Employee Director or Key Advisor separately or in tandem with any Option. The following provisions are applicable to SARs:

(a) Base Amount. The Board shall establish the base amount of the SAR at the time the SAR is granted. The base amount of each SAR shall not be less than the Fair Market Value of a share of Company Stock on the date of Grant of the SAR.

(b) Tandem SARs. In the case of tandem SARs, the number of SARs granted to a Grantee that shall be exercisable during a specified period shall not exceed the number of shares of Company Stock that the Grantee may purchase upon the exercise of the related Option during such period. Upon the exercise of an Option, the SARs relating to the Company Stock covered by such Option shall terminate. Upon the exercise of SARs, the related Option shall terminate to the extent of an equal number of shares of Company Stock.

(c) Exercisability. An SAR shall be exercisable during the period specified by the Board in the Grant Instrument and shall be subject to such vesting and other restrictions as may be specified in the Grant Instrument. The Board may accelerate the exercisability of any or all outstanding SARs at any time for any reason. SARs may only be exercised while the Grantee is employed by, or providing service to, the Employer or during the applicable period after

termination of employment or service as described in Section 5(e) above. A tandem SAR shall be exercisable only during the period when the Option to which it is related is also exercisable.

(d) Grants to Non-Exempt Employees. Notwithstanding the foregoing, SARs granted to persons who are non-exempt employees under the Fair Labor Standards Act of 1938, as amended, may not be exercisable for at least six months after the date of grant (except that such SARs may become exercisable, as determined by the Board, upon the Grantee's death, Disability or retirement, or upon a Change of Control or other circumstances permitted by applicable regulations).

(e) Value of SARs. When a Grantee exercises SARs, the Grantee shall receive in settlement of such SARs an amount equal to the value of the stock appreciation for the number of SARs exercised. The stock appreciation for an SAR is the amount by which the Fair Market Value of the underlying Company Stock on the date of exercise of the SAR exceeds the base amount of the SAR as described in subsection (a).

(f) Form of Payment. The appreciation in an SAR shall be paid in shares of Company Stock, cash or any combination of the foregoing, as the Board shall determine. For purposes of calculating the number of shares of Company Stock to be received, shares of Company Stock shall be valued at their Fair Market Value on the date of exercise of the SAR.

SECTION 9 Other Equity Awards

The Board may grant Other Equity Awards, which are awards (other than those described in Sections 5, 6, 7 and 8 of the Plan) that are based on, measured by or payable in Company Stock, including, without limitation, stock appreciation rights, to any Employee, Non-Employee Director or Key Advisor, on such terms and conditions as the Board shall determine. Other Equity Awards may be awarded subject to the achievement of performance goals or other conditions and may be payable in cash, Company Stock or any combination of the foregoing, as the Board shall determine.

SECTION 10 Withholding of Taxes

(a) Required Withholding. All Grants under the Plan shall be subject to applicable federal (including FICA), state and local tax withholding requirements. The Employer may require that the Grantee or other person receiving or exercising Grants pay to the Employer the amount of any federal, state or local taxes that the Employer is required to withhold with respect to such Grants, or the Employer may deduct from other wages paid by the Employer the amount of any withholding taxes due with respect to such Grants.

(b) Election to Withhold Shares. If the Board so permits, a Grantee may elect to satisfy the Employer's tax withholding obligation with respect to Grants paid in Company Stock by having shares withheld up to an amount that does not exceed the minimum applicable withholding tax rate for federal (including FICA), state and local tax liabilities. The election must be in a form and manner prescribed by the Board and may be subject to the prior approval of the Board.

SECTION 11 Transferability of Grants

(a) Nontransferability of Grants. Except as provided below, only the Grantee may exercise rights under a Grant during the Grantee's lifetime. A Grantee may not transfer those rights except (i) by will or by the laws of descent and distribution or (ii) with respect to Grants other than Incentive Stock Options, if permitted in any specific case by the Board, pursuant to a domestic relations order or otherwise as permitted by the Board. When a Grantee dies, the personal representative or other person entitled to succeed to the rights of the Grantee may exercise such rights. Any such successor must furnish proof satisfactory to the Company of his or her right to receive the Grant under the Grantee's will or under the applicable laws of descent and distribution.

(b) Transfer of Nonqualified Stock Options. Notwithstanding the foregoing, the Board may provide, in a Grant Instrument, that a Grantee may transfer Nonqualified Stock Options to family members, or one or more trusts or other entities for the benefit of or owned by family members, consistent with the applicable securities laws, according to such terms as the Board may determine; provided that the Grantee receives no consideration for the transfer of an Option and the transferred Option shall continue to be subject to the same terms and conditions as were applicable to the Option immediately before the transfer.

SECTION 12 Right of First Refusal; Repurchase Right

(a) Offer. Prior to a Public Offering, if at any time an individual desires to sell, encumber, or otherwise dispose of shares of Company Stock that were distributed to him or her under this Plan and that are transferable, the individual may do so only pursuant to a bona fide written offer, and the individual shall first offer the shares to the Company by giving the Company written notice disclosing: (i) the name of the proposed transferee of the Company Stock, (ii) the certificate number and number of shares of Company Stock proposed to be transferred or encumbered, (iii) the proposed price, (iv) all other terms of the proposed transfer, and (v) a written copy of the proposed offer. Within 60 days after receipt of such notice, the Company shall have the option to purchase all or part of such Company Stock at the price and on the terms described in the written notice; provided that the Company may pay such price in installments over a period not to exceed four years, at the discretion of the Board.

(b) Sale. In the event the Company (or a stockholder, as described below) does not exercise the option to purchase Company Stock, as provided above, the individual shall have the right to sell, encumber, or otherwise dispose of the shares of Company Stock described in subsection (a) at the price and on the terms of the transfer set forth in the written notice to the Company, provided such transfer is effected within 15 days after the expiration of the option period. If the transfer is not effected within such period, the Company must again be given an option to purchase, as provided above.

(c) Assignment of Rights. The Board, in its sole discretion, may waive the Company's right of first refusal and repurchase right under this Section 12. If the Company's right of first refusal or repurchase right is so waived, the Board may, in its sole discretion, assign such right to the remaining stockholders of the Company in the same proportion that each stockholder's stock ownership bears to the stock ownership of all the stockholders of the

Company, as determined by the Board. To the extent that a stockholder has been given such right and does not purchase his or her allotment, the other stockholders shall have the right to purchase such allotment on the same basis.

(d) Purchase by the Company. Prior to a Public Offering, if a Grantee ceases to be employed by, or provide service to, the Employer, the Company shall have the right to purchase all or part of any Company Stock distributed to the Grantee under this Plan at its then current Fair Market Value (as defined in Section 5(b)) or at such other price as may be established in the Grant Instrument; provided, however, that such repurchase shall be made in accordance with applicable accounting rules to avoid adverse accounting treatment.

(e) Public Offering. On and after a Public Offering, the Company shall have no further right to purchase shares of Company Stock under this Section 12. The requirements of this Section 12 shall lapse and cease to be effective upon a Public Offering.

(f) Stockholder's Agreement. Notwithstanding the provisions of this Section 12, if the Board requires that a Grantee execute a stockholder's agreement with respect to any Company Stock distributed pursuant to this Plan, which contains a right of first refusal or repurchase right, the provisions of this Section 12 shall not apply to such Company Stock, unless the Board determines otherwise.

SECTION 13 Change of Control of the Company

(a) Change of Control. As used herein, a "Change of Control" shall be deemed to have occurred if:

(i) Any "person," as such term is used in sections 13(d) and 14(d) of Securities Exchange Act of 1934, as amended (the "Exchange Act") (other than a person who is a stockholder of the Company on the effective date of the Plan) becomes a "beneficial owner" (as defined in Rule 13d-3 under the Exchange Act), directly or indirectly, of securities of the Company representing more than 50% of the voting power of the then outstanding securities of the Company; provided that a Change of Control shall not be deemed to occur as a result of a transaction in which the Company becomes a subsidiary of another corporation and in which the stockholders of the Company, immediately prior to the transaction, will beneficially own, immediately after the transaction, shares entitling such stockholders to more than 50% of all votes to which all stockholders of the parent corporation would be entitled in the election of directors; or

(ii) The consummation of (i) a merger or consolidation of the Company with another corporation where the stockholders of the Company, immediately prior to the merger or consolidation, will not beneficially own, immediately after the merger or consolidation, shares entitling such stockholders to more than 50% of all votes to which all stockholders of the surviving corporation would be entitled in the election of directors, (ii) a sale or other disposition of all or substantially all of the assets of the Company, or (iii) a liquidation or dissolution of the Company.

(b) Other Definition. The Board may modify the definition of Change of Control for a particular Grant as the Board deems appropriate to comply with section 409A of the Code or otherwise.

SECTION 14 Consequences of a Change of Control

(a) Acceleration. Upon a Change of Control, unless the Board determines otherwise, (i) all outstanding Options and SARs shall accelerate and become fully exercisable, and (ii) all outstanding Stock Awards, Stock Units and Other Equity Awards shall become fully vested and shall be payable on terms determined by the Board.

(b) Other Alternatives. In the event of a Change of Control, the Board may take any of the following actions with respect to any or all outstanding Grants: the Board may (i) determine that all outstanding Options and SARs that are not exercised shall be assumed by, or replaced with comparable options by the surviving corporation (or a parent or subsidiary of the surviving corporation), and other outstanding Grants that remain in effect after the Change of Control shall be converted to similar grants of the surviving corporation (or a parent or subsidiary of the surviving corporation), (ii) require that Grantees surrender their outstanding Options and SARs in exchange for one or more payments, in cash or Company Stock as determined by the Board, in an amount, if any, equal to the amount by which the then Fair Market Value of the shares of Company Stock subject to the Grantee's unexercised Options and SARs exceeds the Exercise Price or base amount of the Options and SARs, on such terms as the Board determines, or (iii) after giving Grantees an opportunity to exercise their outstanding Options and SARs, terminate any or all unexercised Options and SARs at such time as the Board deems appropriate. Such assumption, surrender or termination shall take place as of the date of the Change of Control or such other date as the Board may specify.

SECTION 15 Limitations on Issuance or Transfer of Shares

(a) Stockholder's Agreement. The Board may require that a Grantee execute a stockholder's agreement, with such terms as the Board deems appropriate, with respect to any Company Stock issued or distributed pursuant to this Plan.

(b) Limitations on Issuance or Transfer of Shares. No Company Stock shall be issued or transferred in connection with any Grant hereunder unless and until all legal requirements applicable to the issuance or transfer of such Company Stock have been complied with to the satisfaction of the Board. The Board shall have the right to condition any Grant made to any Grantee hereunder on such Grantee's undertaking in writing to comply with such restrictions on his or her subsequent disposition of such shares of Company Stock as the Board shall deem necessary or advisable, and certificates representing such shares may be legended to reflect any such restrictions. Certificates representing shares of Company Stock issued or transferred under the Plan will be subject to such stop-transfer orders and other restrictions as may be required by applicable laws, regulations and interpretations, including any requirement that a legend be placed thereon.

(c) Lock-Up Period. If so requested by the Company or any representative of the underwriters (the "Managing Underwriter") in connection with any underwritten offering of

securities of the Company, a Grantee (including any successor or assigns) shall not sell or otherwise transfer any shares or other securities of the Company during the 30-day period preceding and the 180-day period following the effective date of a registration statement filed by the Company for such underwriting (or such shorter period as may be requested by the Managing Underwriter and agreed to by the Company) (the "Market Standoff Period"). The Company may impose stop-transfer instructions with respect to securities subject to the foregoing restrictions until the end of such Market Standoff Period.

SECTION 16 Amendment and Termination of the Plan

(a) Amendment. The Board may amend or terminate the Plan at any time; provided, however, that the Board shall not amend the Plan without stockholder approval if such approval is required in order to comply with the Code or to other applicable law.

(b) Termination of Plan. The Plan shall terminate on the day immediately preceding the tenth anniversary of its effective date, unless the Plan is terminated earlier by the Board or is extended by the Board with the approval of the stockholders.

(c) Termination and Amendment of Outstanding Grants. A termination or amendment of the Plan that occurs after a Grant is made shall not materially impair the rights of a Grantee unless the Grantee consents or unless the Board acts under Section 22(b). The termination of the Plan shall not impair the power and authority of the Board with respect to an outstanding Grant. Whether or not the Plan has terminated, an outstanding Grant may be terminated or amended under Section 22(b) or may be amended by agreement of the Company and the Grantee consistent with the Plan.

(d) Governing Document. The Plan shall be the controlling document. No other statements, representations, explanatory materials or examples, oral or written, may amend the Plan in any manner. The Plan shall be binding upon and enforceable against the Company and its successors and assigns.

SECTION 17 Funding of the Plan

This Plan shall be unfunded. The Company shall not be required to establish any special or separate fund or to make any other segregation of assets to assure the payment of any Grants under this Plan. In no event shall interest be paid or accrued on any Grant, including unpaid installment of Grants.

SECTION 18 Rights of Participants

Nothing in this Plan shall entitle any Employee, Non-Employee Director, Key Advisor or other person to any claim or right to be granted a Grant under this Plan. Neither this Plan nor any action taken hereunder shall be construed as giving any individual any rights to be retained by or in the employ of the Employer or any other employment rights.

SECTION 19 No Fractional Shares

No fractional shares of Company Stock shall be issued or delivered pursuant to the Plan or any Grant. The Board shall determine whether cash, other awards or other property shall be issued or paid in lieu of such fractional shares or whether such fractional shares or any rights thereto shall be forfeited or otherwise eliminated.

SECTION 20 Effective Date of the Plan

(a) Effective Date. The Plan was originally effective as of September 28, 2006 and the amended and restated Plan is effective as of September 12, 2008.

(b) Public Offering. The provisions of the Plan that refer to a Public Offering shall be effective, if at all, upon the initial registration of the Company Stock under section 12(g) of the Exchange Act, and shall remain effective thereafter for so long as such stock is so registered.

SECTION 21 Miscellaneous

(a) Grants in Connection with Corporate Transactions and Otherwise. Nothing contained in this Plan shall be construed to (i) limit the right of the Board to make Grants under this Plan in connection with the acquisition, by purchase, lease, merger, consolidation or otherwise, of the business or assets of any corporation, firm or association, including Grants to employees thereof who become Employees, or for other proper corporate purposes, or (ii) limit the right of the Company to grant stock options or make other awards outside of this Plan. Without limiting the foregoing, the Board may make a Grant to an employee, director or advisor of another corporation who becomes an Employee, Non-Employee Director or Key Advisor by reason of a corporate merger, consolidation, acquisition of stock or property, reorganization or liquidation involving the Company, the parent or any of their subsidiaries in substitution for a stock option or stock awards grant made by such corporation. The terms and conditions of the substitute grants may vary from the terms and conditions required by the Plan and from those of the substituted stock incentives. The Board shall prescribe the provisions of the substitute grants.

(b) Compliance with Law. The Plan, the exercise of Options and the obligations of the Company to issue or transfer shares of Company Stock under Grants shall be subject to all applicable laws and to approvals by any governmental or regulatory agency as may be required. It is the intent of the Company that the Plan and Incentive Stock Options granted under the Plan comply with the applicable provisions of section 422 of the Code and that, to the extent applicable, Grants made under the Plan comply with the requirements of section 409A of the Code and the regulations thereunder. To the extent that any legal requirement as set forth in the Plan ceases to be required under applicable law, the Board may determine that such Plan provision shall cease to apply. The Board may revoke any Grant if it is contrary to law or modify a Grant or the Plan to bring a Grant or the Plan into compliance with any applicable law or regulation.

(c) Employees Subject to Taxation Outside the United States. With respect to Grantees who are subject to taxation in countries other than the United States, the Board may make Grants on such terms and conditions as the Board deems appropriate to comply with the laws of the applicable countries, and the Board may create such procedures, addenda and

subplans and make such modifications as may be necessary or advisable to comply with such laws.

(d) Governing Law. The validity, construction, interpretation and effect of the Plan and Grant Instruments issued under the Plan shall be governed and construed by and determined in accordance with the laws of the state of Delaware without giving effect to the conflict of laws provisions thereof.

BioNano Genomics, Inc.
Amended and Restated 2006 Equity Compensation Plan
NOTICE OF STOCK OPTION GRANT

[Optionholder name and address]

You have been granted an option to purchase **COMMON** Stock of **BioNano Genomics, Inc.** (the "Company") as follows:

Board Approval Date:	_____
Grant ID:	_____
Grant Date:	_____
Vesting Start Date:	_____
Total Number of Shares Granted:	_____
Exercise Price Per Share:	$_____
Total Exercise Price:	$_____
Expiration Date:	_____
Type of Option Grant:	Nonstatutory Stock Option (NSO)
Vesting Schedule:	_____
Exercise Schedule:	_____
Termination Period:	The vested shares of this Option may be exercised after termination of your continuous service as an Employee, Key Advisor or member of the Board ("Continuous Service Status") except as set out the Option Agreement (but in no event later than the Expiration Date specified in Section 2 of the Option Agreement). Optionee is responsible for keeping track of these exercise periods following termination for any reason of his or her service relationship with the Company. The Company will not provide further notice of such periods.
Exercise Payment Methods	By one or a combination of the following items (described in the Option Agreement): By cash or check Pursuant to a Regulation T Program promulgated by the U.S. Federal Reserve Board if the shares are publicly traded
Transferability:	This Option may not be transferred.

By clicking the "ACCEPT" button below, you and the Company agree that this option is granted under and governed by the terms and conditions of the BioNano Genomics, Inc. Amended and Restated 2006 Equity Compensation Plan (the "Plan"), the Option Agreement and any ancillary documents, all of which you can access through a link from this Notice of Grant and made a part of this document. Before you may electronically sign this Notice of Grant, you must click on and review the linked Plan, Option Agreement and any ancillary documents. **PLEASE BE SURE TO READ THE OPTION AGREEMENT, WHICH CONTAINS THE SPECIFIC TERMS AND CONDITIONS OF THIS OPTION, INCLUDING INFORMATION CONCERNING CANCELLATION AND TERMINATION OF THIS OPTION.**

PLEASE SEE NEXT PAGE OF THIS 2 PAGE NOTICE

Choice # 3 (continued)

By clicking the "ACCEPT" button below, you agree to the following:

I acknowledge and agree that:

(a) I have been able to access and view the Notice of Grant, the Plan, the Option Agreement and understand that all rights and obligations with respect to these Shares are set forth in the Notice of Grant, the Plan and the Option Agreement;

(b) I agree to all terms and conditions contained in the Notice of Grant, the Plan and the Option Agreement;

(c) as of the date hereof, the Notice of Grant, the Plan and the Option Agreement set forth the entire understanding between the Company and me regarding the acquisition of the Shares and supersedes all prior oral and written agreements with respect thereto;

(d) the exercise of this Option shall be conditional on me entering into a Joint Election with my employer in such form as approved by HM Revenue & Customs for the transfer of any liability to employer's Class 1 National Insurance contributions which may arise in respect of my Option;

(e) my rights to any Shares underlying the Option will be earned only as I provide services to the Company over time, that the grant of the Option is not as consideration for services I rendered to the Company prior to my Vesting Commencement Date, and that nothing in this Notice or the attached documents confers upon me any right to continue my Continuous Service Status with the Company for any period of time, nor does it interfere in any way with my right or the Company's right to terminate that relationship at any time, for any reason, with or without cause; and

(f) I consent to receive the Notice of Grant, the Plan, the Option Agreement and any other ancillary documents by electronic delivery and to participate in the Plan through an on line or electronic system established and maintained by the Company or another third party designated by the Company.

It is recommended that you print a copy of your Grant Notice and all documents linked to this page for your records.

BioNano Genomics, Inc.

Chief Financial Officer

BIONANO GENOMICS, INC.

AMENDED AND RESTATED

2006 EQUITY COMPENSATION PLAN

OPTION AGREEMENT
(INCENTIVE STOCK OPTION OR NONQUALIFIED STOCK OPTION GRANT)

The BioNano Genomics, Inc. Amended and Restated 2006 Equity Compensation Plan (the "Plan") provides for the grant of stock options to purchase shares of common stock of BioNano Genomics, Inc. (the "Company").

Pursuant to a Stock Option Grant Notice ("Grant Notice") and this Option Agreement (together with the Grant Notice, the "Grant Instrument"), the Company has granted the Grantee (as indicated on the Grant Notice) an option (the "Option") under its Plan to purchase the number of shares of the Company's common stock indicated in the Grant Notice (the "Shares") at the exercise price indicated in the Grant Notice. The Option is granted as an inducement for the Grantee to promote the best interests of the Company and its stockholders.

Provided the Grantee timely and properly accepts the Grant Notice in accordance with the terms set forth therein, the Option is effective as of the date of grant set forth in the Grant Notice (the "Date of Grant"). By accepting the Grant Notice, the Grantee agrees to be bound by the terms of the Grant Instrument and the Plan and further agrees that all the decisions and determinations of the Board pursuant to the Plan shall be final and binding.

If there is any conflict between the terms in the Grant Instrument and the terms of the Plan, the terms of the Plan will control. Capitalized terms not explicitly defined in this Option Agreement or in the Grant Notice but defined in the Plan will have the same definitions as in the Plan.

The details of the Option, in addition to those set forth in the Grant Notice and the Plan, are as follows:

1. Vesting and Exercise of Option.

(a) The Option shall generally become exercisable pursuant to the vesting schedule set forth on the Grant Notice, provided that the Grantee continues to be employed by, or providing service to, the Employer (as defined in the Plan) as an Employee, Key Advisor or member of the Board on the applicable vesting date. If the vesting would produce fractional Shares, the number of Shares for which the Option becomes vested shall be rounded down to the nearest whole Share.

(b) If permitted in your Grant Notice and subject to the provisions of the Option, Grantee may elect at any time that is both (i) during the period of time Grantee continues to be employed by, or providing service to, the Employer as an Employee, Key Advisor or member of

the Board and (ii) during the term of the Option, to exercise all or part of the Option, including the unvested portion of the Option; *provided*, *however*, that:

(i) a partial exercise of the Option will be deemed to cover first vested shares of Common Stock and then the earliest vesting installment of unvested shares of Common Stock;

(ii) any shares of Common Stock so purchased from installments that have not vested as of the date of exercise will be subject to the purchase option in favor of the Company as described in the Company's form of Early Exercise Stock Purchase Agreement and the Plan;

(iii) Grantee will enter into the Company's form of Early Exercise Stock Purchase Agreement with a vesting schedule that will result in the same vesting as if no early exercise had occurred; and

(iv) if the Option is an incentive stock option (an "Incentive Stock Option") under section 422 of the Internal Revenue Code of 1986, as amended (the "Code"), then, to the extent that the aggregate Fair Market Value (determined at the Date of Grant) of the shares of Common Stock with respect to which the Option plus all other Incentive Stock Options Grantee holds are exercisable for the first time by Grantee during any calendar year (under all plans of the Company and its affiliates) exceeds one hundred thousand dollars ($100,000), the Option(s) or portions thereof that exceed such limit (according to the order in which they were granted) will be treated as Nonqualified Stock Options.

2. Term of Option.

(a) The Option shall have a term of ten years from the Date of Grant and shall terminate at the expiration of that period, unless it is terminated at an earlier date pursuant to the provisions of this Agreement or the Plan.

(b) The Option shall automatically terminate upon the happening of the first of the following events:

(i) The expiration of the 90-day period after the Grantee ceases to be employed by, or provide service to, the Employer, if the termination is for any reason other than Disability (as defined in the Plan), death or Cause (as defined in the Plan).

(ii) The expiration of the one-year period after the Grantee ceases to be employed by, or provide service to, the Employer on account of the Grantee's Disability.

(iii) The expiration of the one-year period after the Grantee ceases to be employed by, or provide service to, the Employer, if the Grantee dies while employed by, or providing service to, the Employer or within 90 days after the Grantee ceases to be so employed or provide services on account of a termination described in subparagraph (i) above.

(iv) The date on which the Grantee ceases to be employed by, or provide service to, the Employer for Cause. In addition, notwithstanding the prior provisions of this Paragraph 3, if the Grantee engages in conduct that constitutes Cause after the Grantee's employment or service terminates, the Option shall immediately terminate.

Notwithstanding the foregoing, in no event may the Option be exercised after the date that is immediately before the tenth anniversary of the Date of Grant. Any portion of the Option that is not exercisable at the time the Grantee ceases to be employed by, or provide service to, the Employer shall immediately terminate.

3. Exercise Procedures.

(a) Subject to the provisions of Paragraphs 1 and 2 above, the Grantee may exercise part or all of the exercisable Option by giving the Company notice of intent to exercise by (i) delivering a notice of exercise in such form designated by the Company (or a third party designated by the Company, if applicable) (the "Exercise Notice") or completing such other document and/or procedures designated by the Company for exercise, specifying the number of Shares as to which the Option is to be exercised and the method of payment and (ii) paying the exercise price and any applicable withholding taxes to the Company's Secretary, stock plan administrator or such other person as the Company may designate, together with such additional documents as the Company may then require. Payment of the exercise price shall be made in accordance with procedures established by the Board from time to time based on type of payment being made but, in any event, prior to issuance of the Shares. The Grantee shall pay the exercise price (i) in cash, (ii) with the approval of the Board, by delivering Shares of the Company, which shall be valued at their Fair Market Value (as defined in the Plan) on the date of delivery, or by attestation (on a form prescribed by the Board) to ownership of Shares having a Fair Market Value on the date of exercise equal to the exercise price, (iii) after a Public Offering (as defined by the Plan), by payment through a broker in accordance with procedures permitted by Regulation T of the Federal Reserve Board or (iv) by such other method as the Board may approve. The Board may impose from time to time such limitations as it deems appropriate on the use of Shares to exercise the Option.

(b) The obligation of the Company to deliver Shares upon exercise of the Option shall be subject to all applicable laws, rules, and regulations and such approvals by governmental agencies as may be deemed appropriate by the Board, including such actions as Company counsel shall deem necessary or appropriate to comply with relevant securities laws and regulations. The Company may require that the Grantee (or other person exercising the Option after the Grantee's death) represent that the Grantee is purchasing Shares for the Grantee's own account and not with a view to or for sale in connection with any distribution of the Shares, or such other representation as the Board deems appropriate.

(c) All obligations of the Company under this Agreement shall be subject to the rights of the Company as set forth in the Plan to withhold amounts required to be withheld for any taxes, if applicable. Subject to Board approval, the Grantee may elect to satisfy any tax withholding obligation of the Employer with respect to the Option by having Shares withheld up

to an amount that does not exceed the minimum applicable withholding tax rate for federal (including FICA), state and local tax liabilities.

4. Designation as Incentive Stock Option. If the Grant Notice indicates this Option is an Incentive Stock Option, the following provisions shall apply.

(a) If the aggregate fair market value of the stock on the date of the grant with respect to which Incentive Stock Options are exercisable for the first time by the Grantee during any calendar year, under the Plan or any other stock option plan of the Company or a parent or subsidiary, exceeds $100,000, then the Option, as to the excess, shall be treated as a nonqualified stock option that does not meet the requirements of section 422. If and to the extent that the Option fails to qualify as an Incentive Stock Option under the Code, the Option shall remain outstanding according to its terms as a nonqualified stock option.

(b) The Grantee understands that favorable Incentive Stock Option tax treatment is available only if the Option is exercised while the Grantee is an employee of the Company or a parent or subsidiary of the Company or within a period of time specified in the Code after the Grantee ceases to be an employee. The Grantee understands that the Grantee is responsible for the income tax consequences of the Option, and, among other tax consequences, the Grantee understands that he or she may be subject to the alternative minimum tax under the Code in the year in which the Option is exercised. The Grantee will consult with his or her tax adviser regarding the tax consequences of the Option.

(c) The Grantee agrees that the Grantee shall immediately notify the Company in writing if the Grantee sells or otherwise disposes of any Shares acquired upon the exercise of the Option and such sale or other disposition occurs on or before the later of (i) two years after the Date of Grant or (ii) one year after the exercise of the Option. The Grantee also agrees to provide the Company with any information requested by the Company with respect to such sale or other disposition.

5. Change of Control. The provisions of the Plan applicable to a Change of Control shall apply to the Option, and, in the event of a Change of Control, the Board may take such actions as it deems appropriate pursuant to the Plan.

6. Right of First Refusal; Repurchase Right; Stockholder's Agreement. As a condition of receiving this Option, the Grantee hereby agrees that all Shares issued under the Plan shall be subject to a right of first refusal and repurchase right as described in the Plan, and the Board may require that the Grantee (or other person exercising the Option) execute a stockholder's agreement, in such form as the Board determines, with respect to all Shares issued upon the exercise of the Option before a Public Offering.

7. Restrictions on Exercise. Only the Grantee may exercise the Option during the Grantee's lifetime. After the Grantee's death, the Option shall be exercisable (subject to the limitations specified in the Plan) solely by the legal representatives of the Grantee, or by the person who acquires the right to exercise the Option by will or by the laws of descent and distribution, to the extent that the Option is exercisable pursuant to this Agreement. If the Option is not an Incentive

Stock Option, the foregoing provisions of this section shall apply, except as the Board otherwise permits pursuant to the Plan. Notwithstanding the foregoing, if the Option is a nonnqualified stock option, the foregoing provisions of this section shall apply, except to the extent the Board otherwise permits pursuant to the Plan.

8. Grant Subject to Plan Provisions. This grant is made pursuant to the Plan, the terms of which are incorporated herein by reference, and in all respects shall be interpreted in accordance with the Plan. The grant and exercise of the Option are subject to interpretations, regulations and determinations concerning the Plan established from time to time by the Board in accordance with the provisions of the Plan, including, but not limited to, provisions pertaining to (a) rights and obligations with respect to withholding taxes, (b) the registration, qualification or listing of the Shares, (c) changes in capitalization of the Company and (d) other requirements of applicable law. The Board shall have the authority to interpret and construe the Option pursuant to the terms of the Plan, and its decisions shall be conclusive as to any questions arising hereunder.

9. No Employment or Other Rights. The grant of the Option shall not confer upon the Grantee any right to be retained by or in the employ or service of the Employer and shall not interfere in any way with the right of the Employer to terminate the Grantee's employment or service at any time. The right of the Employer to terminate at will the Grantee's employment or service at any time for any reason is specifically reserved.

10. No Stockholder Rights. Neither the Grantee, nor any person entitled to exercise the Grantee's rights in the event of the Grantee's death, shall have any of the rights and privileges of a stockholder with respect to the Shares subject to the Option, until certificates for Shares have been issued upon the exercise of the Option.

11. Assignment and Transfers. The rights and interests of the Grantee under this Agreement may not be sold, assigned, encumbered or otherwise transferred except, in the event of the death of the Grantee, by will or by the laws of descent and distribution. In the event of any attempt by the Grantee to alienate, assign, pledge, hypothecate, or otherwise dispose of the Option or any right hereunder, except as provided for in this Agreement, or in the event of the levy or any attachment, execution or similar process upon the rights or interests hereby conferred, the Company may terminate the Option by notice to the Grantee, and the Option and all rights hereunder shall thereupon become null and void. The rights and protections of the Company hereunder shall extend to any successors or assigns of the Company and to the Company's parents, subsidiaries, and affiliates. This Agreement may be assigned by the Company without the Grantee's consent. Notwithstanding the foregoing, if the Option is a nonnqualified stock option, the foregoing provisions of this section shall apply, except to the extent the Board otherwise permits pursuant to the Plan.

12. Applicable Law. The validity, construction, interpretation and effect of this instrument shall be governed by and construed in accordance with the laws of the State of Delaware, without giving effect to the conflicts of laws provisions thereof.

13. Notice. Any notice to the Company provided for in this instrument shall be addressed to the Company's corporate headquarters, and any notice to the Grantee shall be addressed to such

Grantee at the current address shown on the payroll of the Company, or to such other address as the Grantee may designate to the Company in writing. Any notice shall be delivered by hand, sent by telecopy or enclosed in a properly sealed envelope addressed as stated above, registered and deposited, postage prepaid, in a post office regularly maintained by the United States Postal Service. The Company may, in its sole discretion, decide to deliver any documents related to participation in the Plan and this Option by electronic means or to request Grantee's consent to participate in the Plan by electronic means. By accepting this Option, Grantee consents to receive such documents by electronic delivery and to participate in the Plan through an on-line or electronic system established and maintained by the Company or another third party designated by the Company.

BIONANOMATRIX, INC

AMENDED AND RESTATED 2006 EQUITY COMPENSATION PLAN

Notice of Stock Option Exercise

To: Lorraine LoPresti, VP - Finance & Administration, CFO

From: Name: _____
Social Security Number: _____
Address: _____
_____

Date: ____, __, ____ *(Original exercise notice is in the form of an email dated,*
____, __, ____, *which is attached hereto)*

1. Exercise

I hereby elect to exercise the following option (the "Option") under the BioNanomatrix, Inc. Amended and Restated 2006 Equity Compensation Plan (the "Plan"):

Date of Option: _____

Exercise Price: $_____

The Option is:

☐ an incentive stock option

☐ a nonqualified stock option

2. Payment

I hereby elect to exercise the Option as set forth below.

(a) Number of shares being purchased: _____

(b) Total exercise price to be paid

(per share exercise price multiplied by the number of shares being purchased): $ _____

(c) Payment is made in:

Cash: $ _____

Shares of Company stock equal to the exercise price: _____

If shares of Company stock that I currently hold are being used to exercise the Option, a fully executed Attestation to Ownership is attached.

3. Tax Withholding For Nonqualified Options Only

I elect to have any withholding tax obligations resulting from the exercise of the Option satisfied as follows:

☐ Check to be given to the Company on the date of exercise. Approximately $_____

☐ Share withholding, not to exceed minimum applicable withholding amount. Approximately _____ shares

4. Representations and Agreements

I hereby represent and agree as follows:

(a) I am acquiring the shares underlying the Option solely for investment purposes, with no present intention of distributing or reselling any of the shares or any interest therein. I acknowledge that the shares have not been registered under the Securities Act of 1933, as amended (the "Securities Act"). I am aware of the limitations under the Securities Act and under the Plan relating to a subsequent sale, transfer, pledge or other assignment or encumbrance of the shares. I acknowledge that the shares must be held indefinitely unless they are subsequently registered under the Securities Act and applicable state securities laws or an exemption from such registration is available.

(b) Except as required by the Option grant agreement, I will not sell, transfer, pledge, donate, assign, mortgage, hypothecate or otherwise encumber the shares underlying the Option unless the shares are registered under the Securities Act or the Company is given an opinion of counsel reasonably acceptable to the Company that such registration is not required under the Securities Act. I realize that there is no public market for the shares underlying the Option, that no market may ever develop for them, and that they have not been approved or disapproved by any governmental agency.

(c) In the event of an initial public offering of the Company's stock, I will not sell or otherwise transfer or dispose of the shares of Company stock to be issued pursuant to the exercise of the Option for a period specified by the representatives of the underwriters of the Company stock, which generally shall not exceed 180 days following the effective date of the initial registration statement of the Company filed under the Securities Act.

(d) I hereby acknowledge that the shares of Company stock that I receive upon the exercise of the Option are subject to the Company's right of first refusal and repurchase rights as set forth in the Plan, and other restrictions set forth in the Plan and the Option grant agreement, and that the Company may require me to execute a stockholder's agreement with respect to Company stock issued pursuant to the exercise of the Option.

Grantee

Date: _____ _____

Received and Accepted by the Company
BioNanomatrix, Inc.

Date: _____ By: _____

Attestation to Ownership of
Company Common Stock

Pursuant to the Notice of Stock Option Exercise that I have submitted to BioNanomatrix, Inc. (the "Company") dated _____, I am electing to pay the exercise price for the option shares by attesting to ownership of the shares listed below, and I hereby tender such shares in payment thereof. I hereby certify that:

1. I beneficially own _____ shares of Company common stock (the "Swap Shares") as of the date hereof. These Swap Shares are:

   [ ] Held in my name individually and a photocopy of the stock certificate evidencing my ownership is attached.

   [ ] Held in a brokerage account in my name. A photocopy of a brokerage statement of this account, dated within the preceding 15-day period and showing evidence of ownership of the Swap Shares, is attached. *(The Grantee may black out information not relevant to Company stock ownership on the account statement.)*

2. The Swap Shares are held by me as described above and are not held for my benefit by a trustee or custodian in an IRA account or in any other type of employee benefit or tax deferral plan. The Swap Shares are not subject to any liens, claims or encumbrances.

3. The Swap Shares have been owned by me as described above for at least six months and have not been used or acquired in a stock-for-stock swap transaction within the preceding six months.

Date	Signature of Grantee
Date	Witness

Exhibit 10.10

EMPLOYMENT AGREEMENT

This **EMPLOYMENT AGREEMENT** (this "Agreement") is made and entered into as of January 12, 2011 (the "Effective Date") by and between BioNanomatrix, Inc., a Delaware corporation (the "Company"), and R. Erik Holmlin, an individual resident in the State of California (the "Employee") (the Company and the Employee are hereinafter sometimes individually referred to as a "Party" and together referred to as the "Parties").

WHEREAS, the Employee desires to be employed with the Company, and the Company desires to employ the Employee upon the terms and conditions hereinafter set forth.

NOW, THEREFORE, in consideration of the foregoing and the mutual covenants and agreements of the Parties hereinafter set forth, and for other good and valuable consideration, the receipt and sufficient of which is hereby acknowledged, the Parties hereto, intending to be legally bound, hereby agree as follows:

1. Employment. The Company hereby agrees to employ the Employee as the President and Chief Executive Officer of the Company, and the Employee hereby accepts such employment, upon the terms and conditions hereinafter set forth. The Employee shall have such duties and authority as are from time to time assigned to the Employee by the Company's Board of Directors (the "Board") and that are consistent with the office of President and Chief Executive Officer of the Company. During the Employment Period (as defined below), the Employee shall also serve as a member of the Board. The Employee shall faithfully and to the best of his ability fulfill such duties and shall devote his full business time, attention, skill and efforts to the performance of such duties, except as required during the month of January 2011 to fulfill obligations to his previous employer (GenVault Corporation). The Employee shall perform his duties principally at the offices of the Company to be established as soon as practicable in San Diego, CA, subject to reasonable travel outside such area as may be necessary or incidental to the performance by the Employee of his duties as President and Chief Executive Officer of the Company. The Company acknowledges that the corporate headquarters and principal location will be relocated from Philadelphia, PA to San Diego, CA on a timeline that is agreed to by the Board. The Company agrees to reimburse all of the Employee's reasonable commuting costs between San Diego and Philadelphia, including air fare and hotel and rental car costs, during the time that the Company is co-located in Philadelphia and San Diego, in accordance with the Company's reimbursement policy.

2. Employment Period. This Agreement shall begin as of the Effective Date and shall continue until terminated in accordance with Section 7 herein. Nothing in this Agreement shall be construed as giving the Employee any right to be retained in the employ of the Company, and the Employee specifically acknowledges that he shall be an employee-at-will of the Company, and thus subject to discharge at any time by the Company for any reason in accordance with Section 7 herein. The period of time during which the Employee is employed by the Company hereunder is referred to as the "Employment Period."

3. Compensation and Benefits.

(a) Base Salary. The Employee shall receive a base salary of three hundred fifteen thousand U.S. dollars ($315,000 US) on an annualized basis (the "Base Salary"). The Base Salary shall be paid semi-monthly or, if different, in accordance with the Company's relevant policies in effect from time to time, including normal payroll practices, and shall be subject to all applicable employment and withholding taxes.

(b) Bonus. Beginning in calendar year 2011, the Employee shall be eligible to receive a discretionary annual bonus (the "Bonus") if the Employee achieves target or better performance with respect to the objective performance goals established by the Compensation Committee of the Board (the "Compensation Committee") and remains an active employee through the end of the bonus year in which performance is measured. The applicable performance goals for the calendar year 2011 shall be set by the Compensation Committee no later than sixty (60) days following the Effective Date and by the end of the first quarter of each successive calendar year thereafter. The target amount for such Bonus shall be forty percent (40%) of Base Salary, but a higher amount may be paid if goals exceeding target are achieved, based on the recommendation of the Compensation Committee, and subject to approval by the Board. The Board, in its sole discretion, will determine the extent to which the Employee has achieved the performance objectives upon which the Bonus is based and the exact amount of the actual Bonus awarded to the Employee for any given year. The Bonus, if any, shall be paid within sixty (60) days following the end of the calendar year which contains the end of the Company's fiscal year, but in no event later than March 15 of the calendar year following the calendar year which contains the end of the Company's fiscal year. The Employee will not earn any Bonus (including a prorated Bonus) for any year if the Employee's employment terminates for any reason before end of the year in which performance is measured.

(c) Compensation Review. Effective on January 1, 2012, and then on each subsequent anniversary thereafter during the Employment Period, and provided that the Employee is still employed by the Company at such time, the Board shall review the Employee's Base Salary and Bonus structure and, subject to the results of such review, the Employee's Base Salary and Bonus may be increased consistent with industry practices and market data for individuals holding similar positions within the industry.

(d) Retirement and Welfare Benefits. The Employee shall be eligible to participate in all employee retirement and welfare benefit plans and programs made available to the Company's senior level executives as a group or to its employees generally, as such retirement and welfare plans may be in effect from time to time and subject to the eligibility requirements of the plans and programs. Nothing in this Agreement shall prevent the Company from amending or terminating any retirement, welfare or other employee benefit plans or programs from time to time as the Company deems appropriate. The Employee shall be also entitled to paid vacation each year pursuant to the terms of the Company's vacation policy as established or changed from time to time; provided, that in any event the Employee shall be entitled to a minimum of four (4) weeks paid vacation per calendar year (in addition to paid holidays and personal days which are customarily observed by the Company). Such vacation shall be taken at such time or times as shall not disrupt the orderly conduct of business of the Company. Notwithstanding the foregoing regarding paid vacation time, if there is a conflict

between the Company's vacation policy and California state law, California state law will govern.

(e) Key Person Life Insurance. The Company shall have the right and option to purchase, and to be named the sole beneficiary of, a key person life insurance policy on the life of the Employee in an amount to be agreed upon between the Company and the Employee.

(f) Equity Grants. The Company will issue to the Employee an initial grant of a stock option to purchase shares of common stock of the Company ("Initial Options") representing five percent (5.0%) of the Fully-Diluted Equity Shares (as defined below) immediately subsequent to the closing of a Series B transaction, subject in all respects to the terms and conditions of the BioNanomatrix, Inc. Amended and Restated 2006 Equity Compensation Plan (the "Plan") and the stock option agreement under the Plan. For purposes of this Agreement, "Fully-Diluted Equity Shares" means the sum of all shares of Company common stock outstanding or issuable upon conversion of preferred stock and any other convertible securities, all shares of common stock issuable directly or indirectly upon exercise of outstanding stock options and warrants disregarding any vesting or similar provisions and all shares of common stock reserved for issuance pursuant to Company equity incentive plans to the extent not subject to outstanding options.

In addition, effective upon the closing of each subsequent equity financing transaction in which the Company issues shares of preferred stock to investors at a pre-money valuation equal to or greater than the post-money valuation of the previous equity financing transaction, the Company will issue to the Employee an additional grant of a stock option to purchase shares of common stock of the Company ("Additional Options"). The number of shares in each such grant will be the amount required to restore the Employee's ownership percentage to five percent (5.0%) of the Fully-Diluted Equity Shares and such grant will be made immediately subsequent to each equity financing transaction. In the event an equity financing transaction is conducted at a pre-money valuation that is less than the post-money valuation of the previous equity financing transaction, the target ownership percentage for which Additional Options will be awarded to the Employee will be reduced by the same percentage that the pre-money valuation is lower than the post-money valuation of the previous equity financing (example: if a financing is conducted at pre-money that is 90% of the post-money of the previous round, the target ownership percentage will be reduced from 5.0% to 0.9*5.0% = 4.5%).

In the event the Company issues shares (common or preferred) as consideration to effect an acquisition of assets, intellectual property, or enterprise, the Company will issue to the Employee Additional Options in quantity sufficient to restore the Employee's ownership percentage to five percent (5.0%) of the Fully-Diluted Equity Shares and such grant will be made immediately subsequent to closing of such acquisition.

The Company's obligation to issue Additional Options shall cease to apply once one of the following thresholds has been met: (i) sales of preferred shares results in gross proceeds to the Company of $55 million or more when aggregated with all prior preferred stock equity financing transactions; or (ii) when the valuation of the Fully-Diluted Equity Shares, as

determined by the number of shares outstanding at the most recent price per share established in a financing or acquisition transaction, exceeds $80 million.

Initial Options and Additional Options (the "Options") shall be subject to vesting such that twenty-five percent (25%) of the shares subject thereto shall vest on the first anniversary of the date of Effective Date and six and a quarter percent (6.25%) at the end of each quarter thereafter over the three (3)-year period following such anniversary, provided that such Options shall accelerate in full upon a Deemed Liquidation Event as defined in the Company's Amended and Restated Certificate of Incorporation as in effect on the Effective Date, and provided further that such vesting shall be subject to the provisions of Section 7 below.

Such Options shall otherwise be subject in all respects to the terms and conditions of the and the Company's standard stock option agreement under the Plan. The Options will (i) have an exercise price equal to the fair market value of the common stock of the Company as of the date of grant, (ii) be incentive stock options to the extent permitted by applicable tax laws and (iii) allow for a right of "early exercise" at the election of the holder. For purposes of this Agreement and the Options, the term "early exercise" means the Employee shall be permitted to exercise the Options, in whole or in part, at any time or from time to time, notwithstanding any vesting restrictions contained therein, provided that upon termination of the Employee's employment with the Company, the Company shall have the right to repurchase any shares issued upon any such early exercise that have not vested as of such termination at a price equal to the applicable exercise price per share thereof upon notice delivered to the Employee within thirty (30) days following such termination.

The Employee shall be entitled to be considered for additional stock option grants under the Plan, as approved by the Board in its sole discretion.

(g) Expenses. The Company shall reimburse the Employee for all normal, usual and necessary expenses incurred by the Employee in furtherance of the business and affairs of the Company, including reasonable travel and entertainment, upon timely receipt by the Company of appropriate vouchers or other proof of the Employee's expenditures and otherwise in accordance with any expense reimbursement policy adopted by the Company.

(h) Entire Benefit. The Employee hereby acknowledges and agrees that, except as set forth in this Section 3, he shall not be entitled to receive any other compensation, payments or benefits in connection with his employment under this Agreement unless otherwise agreed to by the Company in writing.

4. Proprietary Information and Inventions Agreement. The Employee shall execute a Proprietary Information and Inventions Agreement in the form attached hereto as Exhibit A (the "Proprietary Information Agreement"). The Proprietary Information Agreement, as well as the provisions of Sections 5-6 below shall survive termination of this Agreement for any reason whatsoever.

5. Non-Solicitation. For the one (1)-year period following the Termination Date, the Employee shall not, directly or indirectly, either for himself or any other person or entity, (a) induce or attempt to induce any employee of the Company to leave the employ of the

Company, (b) in any way knowingly interfere with the relationship between the Company and any employee, or (c) induce or attempt to induce any client, customer, licensee, consultant, research partner, supplier or other business relation of the Company to cease doing business with or reduce the amount of business done with the Company, or in any way knowingly interfere with the relationship between the Company and any client, customer, licensee, consultant, research partner, supplier or other business relation, provided that the foregoing shall not restrict normal hiring, sales, marketing, public relations and other business practices not specifically targeted at the Company, such as presentations at business, investor or scientific conferences or the placement of "help-wanted" or similar solicitations or business or product advertisements or marketing materials in newspapers or other media of general circulation.

6. Injunctive Relief. The Employee hereby acknowledges and agrees that a violation by the Employee of Section 5 of this Agreement or any provision of the Proprietary Information Agreement would cause irreparable and substantial damage and harm to the Company and its business, and that money damages alone would be inadequate to compensate the Company and would not be an adequate remedy for such violation(s). Accordingly, the Employee hereby agrees that, in the event of any breach or threatened breach by the Employee of Section 5 of this Agreement or any provision of the Proprietary Information Agreement the Company will be entitled, in addition to its right to money damages and any other right or remedies that it may have at law or in equity, to obtain injunctive or other equitable relief to restrain any breach or threatened breach or otherwise to specifically enforce the provisions of Section 5 of this Agreement or any provision of the Proprietary Information Agreement.

7. Termination.

(a) Termination for Death or Disability. If the Employee's employment with the Company hereunder shall be terminated during the Employment Period (i) by reason of the Employee's death or (ii) by the Company as a result of the Disability (as defined in subsection 7(e) below) of the Employee, then (aa) the Company shall pay to the Employee (or in the case of his death, the Employee's estate) within the time required by law, a lump sum cash payment equal to the Accrued Compensation (as defined in subsection 7(e) below), (bb) in the event of the Employee's Disability, the Employee shall be entitled to continue group health insurance pursuant to the requirements of COBRA under Section 4980B of the Internal Revenue Code of 1986, as amended, (the "Code"), upon payment by the Employee of the required amounts under COBRA, and (cc) in the event of the Employee's Disability, provided that the Employee executes and does not revoke a written general release in favor of the Company, substantially in the form attached as Exhibit B to this Agreement (the "Release"), any unvested portion of the Options granted to the Employee pursuant to Section 3(f) above shall fully vest.

(b) Termination for Cause; Resignation without Good Reason. If either (i) the Employee's employment with the Company hereunder shall be terminated during the Employment Period for Cause (as defined in subsection 7(e) below) or (ii) the Employee resigns from his employment by the Company hereunder at any time during the Employment Period other than for Good Reason (as defined in subsection 7(e) below), then (w) the Company shall pay to the Employee within the time required by law a lump sum cash payment equal to the Accrued Compensation; (x) the Employee shall be entitled to continue group health insurance pursuant to the requirements of COBRA, upon payment by the Employee of the

required amounts under COBRA; (y) all unvested portions of the Options granted to the Employee pursuant to Section 3(f) above, shall be forfeited.

(c) Termination for Any Reason Other than Death, Disability, resignation without Good Reason or for Cause. If the Employee's employment with the Company hereunder shall be terminated by the Company for any reason other than the Employee's death, Disability, resignation without Good Reason, or by the Company for Cause, and the Employee executes and does not revoke the Release, then, in addition to the Employee's right to receive all Accrued Compensation and the Employee's eligibility for COBRA benefits pursuant to applicable law (both of which the Employee will receive regardless of whether or not he signs the Release), the Employee shall be entitled to the following:

(i) the Company shall pay the Employee his Base Salary in effect at the time of such termination for a six (6)-month period following the Termination Date, subject to the Company's receipt of an effective Release, which shall be paid in lump sum in accordance with the Company's normal payroll schedule, but no more than sixty (60) days following the Termination Date; and

(ii) any unvested portion of the Options granted to the Employee pursuant to Section 3(f) above shall fully vest.

(d) The severance pay and benefits provided for in this Section 7 shall be in lieu of any other severance or termination pay to which the Employee may be entitled under any Company severance or termination plan, program, practice or arrangement. The Employee's entitlement to any other compensation or benefits shall be determined in accordance with the Company's employee benefit plans and other applicable programs, policies and practices then in effect.

(e) For purposes of this Agreement, the following terms shall have the following meanings:

(i) "Accrued Compensation" shall mean an amount which shall include all amounts earned or accrued (including accrued vacation) through the Termination Date but not paid as of the Termination Date including without limitation, (aa) Base Salary and (bb) any Bonuses declared by the Board that are payable to the Employee.

(ii) "Cause" shall mean that the Company terminated the Employee's employment hereunder for one or more of the following reasons: (aa) the Employee's gross negligence or willful misconduct; (bb) an act of fraud or a breach of fiduciary duty by the Employee with respect to the Company and/or its members; (cc) an act by or at the direction of the Employee that the Employee knows is likely to lead to material injury to the Company; (dd) a substantial failure of the Employee to perform the duties normally associated with the position of president and chief executive officer of a similarly situated company operating in a similar industry; (ee) the Employee is convicted of, or pleads guilty or *nolo contendere* to, or confesses to any criminal offense or is involved in any acts in each case involving moral turpitude; or (ff) any material breach of any provision of this Agreement or the Proprietary Information Agreement by the Employee; provided, however, that in the case of (dd)

above, the Employee shall be provided with written notice by the Company of such failure to perform, and shall have thirty (30) days from the date of such notice to remedy such failure.

(iii) "Disability" shall mean the inability of the Employee to perform the Employee's duties under this Agreement, whether with or without reasonable accommodation, because the Employee has become permanently disabled within the meaning of any policy of disability income insurance covering employees of the Company then in force. In the event the Company has no policy of disability income insurance covering employees of the Company in force when the Employee becomes disabled, the term "Disability" shall mean a physical or mental infirmity which impairs the Employee's ability to substantially perform his duties with the Company for a period of 90 consecutive days, as determined by an independent physician selected with the approval of both the Company and the Employee. This definition shall be interpreted and applied consistent with the Americans with Disabilities Act, the Family and Medical Leave Act, and other applicable law.

(iv) "Good Reason" shall mean (aa) any material diminution of the Employee's authority, responsibilities, duties or Base Salary; (bb) a material breach by the Company of Section 3 of this Agreement, which, if capable of being cured, is not cured by the Company within thirty (30) days of written notice by the Employee to the Company; (cc) a material change in the geographic location at which the Employee must perform services under this Agreement (which, for purposes of this Agreement, means relocation of the offices of the Company at which the Employee is principally employed to a location more than thirty-five (35) miles from the location of such offices immediately prior to the relocation); or (dd) a materialbreach by the Company of Section 1 of this Agreement, which includes the requirement that the Employee be a member of the Board during the Employment Period. The Employee must provide written notice of termination for Good Reason to the Company within thirty (30) days after the event constituting Good Reason. The Company shall have a period of thirty (30) days in which it may correct the act or failure to act that constitutes the grounds for Good Reason as set forth in the Employee's notice of termination. If the Company does not correct the act or failure to act, the Employee must terminate his employment for Good Reason within thirty (30) days after the end of the cure period, in order for the termination to be considered a Good Reason termination.

(v) "Termination Date" shall mean, in the case of the Employee's death, his date of death, and in all other cases, the date of the Employee's "separation from service" as defined under Section 409A of the Code.

(f) Notwithstanding any provision of this Agreement to the contrary, in no event shall the timing of the Employee's execution of the Release, directly or indirectly, result in the Employee designating the calendar year payment, and if a payment that is subject to the execution of the Release could be made in more than one taxable year, payment shall be made in the later taxable year.

8. Survivability. The Parties' rights and obligations pursuant to the provisions of Sections 4, 5, 6, 7, 9, 10 and 11 hereof, as well as this Section 8, shall survive the Employment Period, or termination for any reason whatsoever, of this Agreement.

9. Notices. All notices and other communications under this Agreement shall be in writing and shall be deemed effectively given: (a) upon personal delivery to the party to be notified, (b) when sent by electronic mail, telex or confirmed facsimile if sent during normal business hours of the recipient, and if not, then on the next business day, (c) five (5) days after having been sent by registered or certified mail, return receipt requested, postage prepaid, or (d) one (1) day after deposit with a nationally recognized overnight courier, specifying next day delivery, with written verification of receipt. All communications shall be sent to (i) the Company at BioNanomatrix, Inc., 3701 Market Street, 4th Floor, Philadelphia, PA 19104, Attn.: Board of Directors; with a copy to Jeffrey P. Bodle, Morgan Lewis, 1701 Market Street, Philadelphia, PA 19103, and (ii) to the Employee at the Employee's address as listed on the Company payroll.

10. Enforceability and Reformation; Severability. The Parties intend for all provisions of this Agreement to be enforced to the fullest extent permitted by law. Accordingly, in the event that any provision or portion of this Agreement is held to be illegal, invalid or unenforceable, in whole or in part, for any reason, under present or future law, such provision shall be enforced to the extent permitted or shall be severable and the remainder of this Agreement shall not be invalidated or rendered unenforceable or otherwise adversely affected. Without limiting the generality of the foregoing, if a court should deem any provision of this Agreement to create a restriction that is unreasonable as to scope, duration or geographical area, the Parties agree that the provisions of this Agreement shall be enforceable in such scope, for such duration and in such geographic area as any court having jurisdiction may determine to be reasonable.

11. Successor and Assigns. The Employee acknowledges and agrees that the services to be provided by the Employee to the Company under this Agreement are of a unique and special nature. Accordingly, the Employee's rights and obligations under this Agreement shall not be transferred, assigned, or delegated, and any attempted or purported transfer, assignment, or delegation thereof shall be void. This Agreement shall inure to the benefit of, and be binding upon and enforceable by, the successors and assigns of the Company, including any purchaser of substantially all of Company's assets or a majority or more of the Company's outstanding common stock.

12. Amendment. This Agreement may not be amended, modified or changed, in whole or in part, except by a written instrument signed by a duly authorized officer of the Company and by the Employee.

13. Waiver. No failure or delay by either of the Parties in exercising any right, power, or privilege under this Agreement shall operate as a waiver thereof nor shall any single or partial exercise thereof preclude any other or further exercise thereof or the exercise of any other right, power, or privilege.

14. Governing Law. This Agreement shall be governed by and interpreted according to the internal laws of the State of California, without regard to any choice of law rules that may direct the application of the laws of another jurisdiction.

15. Entire Agreement. This Agreement and the Proprietary Information Agreement represent the entire understanding and agreement between the Parties with respect to the subject matter hereof and thereof and shall supersede any prior agreements and understanding between the Parties with respect to that subject matter.

16. Compliance with Section 409A of the Code

(a) This Agreement is intended to comply with Section 409A of the Code and its corresponding regulations, and payments may only be made under this Agreement upon an event and in a manner permitted by Section 409A of the Code, to the extent applicable. All payments to be made upon a termination of employment under this Agreement may only be made upon a "separation from service" under Section 409A of the Code. For purposes of Section 409A of the Code, each payment made under this Agreement shall be treated as a separate payment and the right to a series of installment payments under this Agreement shall be treated as a right to a series of separate payments. In no event may the Employee, directly or indirectly, designate the calendar year of a payment.

(b) Notwithstanding anything herein to the contrary, if, at the time of the Employee's termination of employment with the Company, the Company (or a company required to be aggregated with the Company pursuant to the requirement of Section 409A of the Code) has securities which are publicly traded on an established securities market and the Employee is a "specified employee" (as defined in Section 409A of the Code) and the deferral of the commencement of any payments or benefits otherwise payable pursuant to Section 7 as a result of such termination of employment is necessary in order to prevent any accelerated or additional tax under Section 409A of the Code, then the Company will defer the commencement of the payment of any such payments or benefits hereunder (without any reduction in such payments or benefits ultimately paid or provided to the Employee), until the date that is six (6) months following the Employee's Termination Date (or the earliest date as is permitted under Section 409A of the Code). If any payments or benefits are deferred due to such requirements, such amounts will be paid in a lump sum to the Employee at the end of such six (6) month period and there shall be added to such payments and benefits interest during the deferral period at a rate, per annum, equal to the applicable federal short-term rate (compounded monthly) in effect under Section 1274(d) of the Code on the Employee's date of termination. If the Employee dies during the deferment period prior to the payment of benefits, the amounts withheld on account of Section 409A of the Code shall be paid to the personal representative of the Employee's estate within sixty (60) days after the date of the Employee's death.

(c) All reimbursements and in-kind benefits provided under the Agreement shall be made or provided in accordance with the requirements of Section 409A of the Code, including, where applicable, the requirement that (i) any reimbursement is for expenses incurred during the period of time specified in this Agreement, (ii) the amount of expenses eligible for reimbursement, or in kind benefits provided, during a calendar year may not affect the expenses eligible for reimbursement, or in kind benefits to be provided, in any other calendar year, (iii) the reimbursement of an eligible expense will be made no later than the last day of the calendar year following the year in which the expense is incurred, and (iv) the right to reimbursement or in kind benefits is not subject to liquidation or exchange for another benefit.

17. Effect of Section 280G on Payments.

(a) If any payment or benefit the Employee would receive pursuant to this Agreement ("Payments") would (i) constitute an "excess parachute payment" within the meaning of Section 280G of the Code, and (ii) but for this sentence, be subject to the excise tax imposed by Section 4999 of the Code (the "Excise Tax"), then the aggregate present value of such Payments shall be equal to the Reduced Amount. The "Reduced Amount" shall be either (x) the largest portion of the Payments that would result in no portion of the Payments being subject to the Excise Tax or (y) the largest portion, up to and including the total of the Payments, whichever amount, after taking into account all applicable federal, state and local employment taxes, income taxes, and the Excise Tax (all computed at the highest applicable marginal rate), results in the Employee's receipt, on an after-tax basis, of the greatest economic benefit notwithstanding that all or some portion of the Payments may be subject to the Excise Tax. If a reduction in payments or benefits constituting the Payments is necessary so that the Payments equal the Reduced Amount, reduction shall occur in the order and manner that results in the greatest economic benefit for the Employee. If more than one method of reduction will result in the same economic benefit, the items so reduced will be reduced pro rata.

(b) In the event it is subsequently determined by the Internal Revenue Service that some portion of the Reduced Amount (as determined pursuant to clause (i) in the preceding paragraph) is subject to the Excise Tax, the Employee agrees to promptly return to the Company a sufficient amount of the Payments so that no portion of the Reduced Amount is subject to the Excise Tax. For the avoidance of doubt, if the Reduced Amount is determined in accordance with subsection 17(a)(ii) above, the Employee will have no obligation to return any portion of the Payments pursuant to the preceding sentence.

(c) Unless the Employee and the Company agree on an alternative accounting or law firm, the accounting firm then engaged by the Company for general tax compliance purposes shall perform the foregoing calculations. If the accounting firm so engaged by the Company is serving as accountant or auditor for the individual, entity or group effecting the change in control, the Company shall appoint a nationally recognized accounting, law or consulting firm to make the determinations required hereunder. The Company shall bear all expenses with respect to the determinations by such accounting, law or consulting firm required to be made hereunder.

(d) The Company shall use commercially reasonable efforts such that the accounting, law or consulting firm engaged to make the determinations hereunder shall provide its calculations, together with detailed supporting documentation, to the Employee and the Company within fifteen (15) calendar days after the date on which the Employee's right to the Payments is triggered (if requested at that time by the Employee or the Company) or such other time as requested by the Employee or the Company.

[Signature Page to Follow]

IN WITNESS WHEREOF, each of the Parties has executed this Agreement as of the date first above written.

COMPANY:

BIONANOMATRIX, INC.

By: /s/ Lorraine LoPresti
Name: Lorraine LoPresti
Title: VP – Finance & Administration, CFO

EMPLOYEE:

R. Erik Holmlin

IN WITNESS WHEREOF, each of the Parties has executed this Agreement as of the date first above written.

COMPANY:

BIONANOMATRIX, INC.

By: /s/ Lorraine LoPresti
Name: Lorraine LoPresti
Title: VP – Finance & Administration, CFO

EMPLOYEE:

/s/ Erik Holmlin
R. Erik Holmlin

Exhibit A

Proprietary Information and Inventions Agreement

BioNanomatrix

PROPRIETARY INFORMATION AND INVENTIONS ASSIGNMENT AGREEMENT

THIS PROPRIETARY INFORMATION AND INVENTIONS ASSIGNMENT AGREEMENT (this "Agreement"), is by and between BIONANOMATRIX Inc., a Delaware corporation (the "Company"), and **Employee**, an individual resident in the state of Pennsylvania_("Employee"). In consideration of Employee's employment by the Company, and for other good and valuable consideration, the receipt and sufficiency of which are hereby acknowledged, Employee hereby agrees to the following restrictions placed on Employee's use and development of proprietary information, technology, ideas and inventions:

1. Proprietary Information.

(a) Restrictions on Proprietary Information. Employee agrees that, during the term of Employee's employment with the Company and at all times thereafter, Employee will hold the Proprietary Information of the Company in strict confidence and will neither use the information nor disclose it to anyone, except to the extent necessary to carry out Employee's responsibilities as an employee of the Company or as specifically authorized in writing by a duly authorized representative of the Company. Employee understands that "Proprietary Information" means all information pertaining in any manner to the business of the Company or its affiliates, consultants, or business associates, unless: (i) the information is or becomes through lawful means publicly known and generally known among businesses similar to the Company as demonstrated by documentary evidence; (ii) the information was part of Employee's general knowledge prior to Employee's employment by the Company as demonstrable by documentary evidence; or (iii) the information is disclosed to Employee without restriction by a third party who rightfully possesses the information and did not learn of it from the Company. The term "Proprietary Information" shall specifically include, but not be limited to: (A) schematics, techniques, development tools, processes, computer printouts, computer programs, software, design drawings and manuals, electronic codes, formulas and improvements, ideas, methods, and know-how; (B) business plans and methods, research and development information, marketing strategies and techniques; (C) information about costs, profits, markets, sales, and bids; (D) lists of existing or potential customers and strategic partners; (E) information concerning the Company's patents, copyrights, trademarks, tradenames, trade secrets, and know-how; (F) employee personnel files and information about employee compensation and benefits; and (G) all information and documents (electronic or otherwise) relating to, making known, or making knowable (alone or in combination with any other source of information) any of the foregoing.

(b) Prior Actions and Knowledge. Except as disclosed on **Schedule A** attached hereto, Employee does not know (or, in the event this Agreement is being executed subsequent to the commencement of Employee's employment by the Company, did not know) anything about the Company's Proprietary Information, other than information Employee has learned from the Company in the course of being hired by the Company.

(c) Third Party Information. Employee recognizes that the Company has received and will in the future receive confidential or proprietary information from third parties, including, without limitation, customers and strategic partners of the Company. Employee will hold all such information in the strictest confidence and will not use the information or disclose it to anyone (except as necessary in carrying out Employee's work for the Company consistent with the Company's agreement with such third party).

2. Inventions.

(a) Assignment of Inventions. All Inventions created or prepared by Employee (i) during the term of Employee's employment with the Company and (ii) either (x) in the scope of Employee's employment with the Company, (y) during the Employee's normal business hours, or (z) while utilizing any of the Company's Proprietary Information or resources, shall be considered specially commissioned works and works made for hire, and regardless of whether works made for hire, the Company shall exclusively own all such Inventions and all rights, title, interests and privileges therein, including, but not limited to, all rights of patent and copyright in all countries and jurisdictions. Employee agrees to assign, and upon creation of any such Invention does hereby assign, to the Company, without further consideration, the entire right, title, interest, and privilege (throughout the United States of America and in all other countries and jurisdictions), free and clear of all liens and encumbrances, in and to all Inventions. Employee further agrees to execute any documents that may be necessary or desirable to affect, enable, confirm, or evidence such assignment. Employee understands that "Inventions" means all ideas, processes, inventions, works of authorship, technology, designs, formulas, discoveries, devices, symbols, marks, methods (of doing business or otherwise), and all subject matter that may be protectible by patent, copyright, trade

secret, trademarks, or by any other proprietary rights, along with all applications, registrations, government grants, and rights to the same, and all improvements, continuations (of any form), rights, and claims related to any of the foregoing, that are created, authored, made, invented, discovered, conceived, developed, or reduced to practice by Employee alone or with others. The Company's right, title, interest, and privilege in and to Inventions shall not be affected in any way by the termination of Employee's employment with the Company (for any reason whatsoever or for no reason).

(b) License for Other Inventions. If, in the course of Employee's employment with the Company, Employee incorporates into Company property an Invention owned by Employee or in which Employee has an interest, the Company is hereby granted a nonexclusive, royalty-free, irrevocable, perpetual, worldwide license to the fullest extent of Employee's interest and rights in the Invention to make, modify, use, sublicense and sell the Invention as part of and in connection with the Company property or modifications thereof.

(c) Assist With Registration. In the event any Invention shall be deemed by the Company, in its sole discretion, to be copyrightable or patentable or otherwise registrable, Employee will assist the Company (at the Company's expense) in obtaining and maintaining letters patent or other applicable registrations and in vesting the Company with full title. Without limiting the generality of the foregoing, Employee will execute all documents that may be necessary or desirable to apply for, prosecute, obtain, or enforce any patent, copyright, or other right or protection relating to any Invention. Should the Company be unable to secure Employee's signature on any document necessary or desirable to apply for, prosecute, obtain, or enforce any patent, copyright, or other right or protection relating to any Invention, due to Employee's incapacity or any other cause, Employee hereby irrevocably designates and appoints the Company and each of its duly authorized officers and agents as Employee's agent and attorney-in-fact to do all lawfully permitted acts to further the prosecution, issuance, and enforcement of patents, copyrights, or other rights or protection with the same force and effect as if executed and delivered by Employee.

(d) Disclosure. Employee agrees to disclose promptly to the Company all Inventions and relevant records in which the Company has any interest or right under Section 2 hereof.

3. Former or Conflicting Agreements.

(a) Former Agreements. Employee represents and warrants that Employee's performance of the terms of this Agreement will not breach any agreement to keep in confidence proprietary information acquired by Employee prior to Employee's employment by the Company. Employee has listed in **Schedule A** attached hereto all other agreements that, to the best of Employee's knowledge, concern proprietary information or inventions to which Employee is a party. Employee has provided to the Company, or will, to the extent Employee is legally able, provide to the Company at its request, copies of the Agreements listed in **Schedule A** attached hereto, to the extent such Agreements are relevant to or would have any potential impact upon the operation of the Company's business. Other than those agreements listed in **Schedule A** attached hereto, to the best of Employee's knowledge, there is no other contract between Employee and any other person or entity that is in conflict with this Agreement or concerns proprietary information, Inventions, assignment of ideas, or any intellectual property owned, licensed, or used in any way by the Company.

(b) Obligations During Employment. During Employee's employment with the Company, Employee will not disclose to the Company, or use, or induce the Company to use, any proprietary information or trade secrets of others,

4. Termination.

(a) Return of the Company's Property. Employee agrees to return promptly to the Company upon termination of Employee's employment with the Company (for any reason whatsoever or for no reason) all Proprietary Information, all tangible things from which Proprietary Information may become known or knowable, including, but not limited to, laboratory notebooks, reports and other laboratory records, and all personal property furnished to or prepared by Employee in the course of, as a result of, or incident to Employee's employment with the Company. Following Employee's termination (for any reason whatsoever or for no reason), Employee will not retain any written or other tangible material containing any Proprietary Information or information pertaining to any Invention.

(b) Termination Certificate. In the event of the termination of Employee's employment with the Company (for any reason whatsoever or for no reason), Employee agrees, if requested by the Company, to sign and deliver the Termination Certificate attached hereto as **Schedule** B.

(c) Subsequent Employers. Employee agrees that after the termination of Employee's employment with the Company (for any reason whatsoever or for no reason), Employee will not enter into any agreement that conflicts with Employee's obligations under this Agreement and will inform any and all subsequent employers of Employee's obligations under this Proprietary Information and Inventions Agreement.

5. No Implied Employment Rights. Employee recognizes that nothing in this Agreement shall be construed to imply that Employee's employment by the Company is guaranteed for any period of time beyond the term set forth in the Employment Agreement between Employee and the Company of even date herewith (the "Employment Agreement").

6. Remedies. Employee recognizes that nothing in this Agreement is intended to limit any remedy of the Company under any federal or state law concerning trade secrets. Employee further recognizes that Employee's violation of this Agreement will cause the Company irreparable harm and that monetary damages will be inadequate to compensate fully for such breach. Accordingly, it is understood and agreed that the Company shall be entitled, in the event of a breach or a threatened breach by Employee of any of the provisions of this Agreement, to a temporary restraining order, preliminary injunction and permanent injunction in order to prevent or restrain any such breach by Employee, without the necessity of posting bond. These remedies are in addition to any remedies available at equity or at law. The Employee hereby agrees that if the Company seeks injunctive relief or other equitable relief, or any other remedy available at law, in order to prevent or restrain a breach Or threatened breach of this Agreement by the Employee, the prevailing party shall pay to the other party all costs (including reasonable attorneys' fees) incurred by the prevailing party in connection with any such action, suite or proceeding.

7. Miscellaneous Provisions.

(a) Assignment. Employee agrees that the Company may assign any or all of its rights under this Agreement to any third party at any time; provided, that such assignment is in connection with a Change of Control event, as defined in the Employment Agreement, the sale of all or substantially all of the assets of the Company, or the sale, transfer or license by the Company of any Proprietary Information or Inventions to which this Agreement is applicable.

(b) Governing Law. This Agreement shall be governed by and construed in accordance with the laws of the State of Delaware, without regard to any choice of law rules that may direct the application of the laws of another jurisdiction.

(c) Severability. In the, event that any provision or portion of this Agreement is held to be illegal, invalid or unenforceable, in whole or in part, for any reason, under present or future law, Employee agrees that such provision or portion shall be severable and the remainder of this Agreement shall not be invalidated or rendered unenforceable or otherwise adversely affected. Without limiting the generality of the foregoing, if a court should deem any provision of this Agreement to create a restriction that is unreasonable as to scope, duration or geographical area, Employee agrees that the provisions of this Agreement shall be enforceable in such scope, for such duration and in such geographic area as any court having jurisdiction may determine to be reasonable.

(d) Entire Agreement. The terms of this Agreement and that certain Employment Agreement of even date hereof by and between Employee and the Company are the final expression of Employee's agreement with respect to the subject matter hereof and thereof and may not be contradicted by evidence of any prior or contemporaneous agreement.

(e) Amendment Waivers. This Agreement can be amended or terminated only by a written agreement signed by both parties. No failure to exercise or delay in exercising any right under this Agreement shall operate as a waiver thereof.

(f) Successors and Assigns. This Agreement shall be binding upon Employee and Employee's heirs, executors, administrators, and successors, and shall inure to the benefit of the successors and assigns of the Company, including any purchaser of all or substantially all of the Company's assets or a majority or more of the Company's outstanding common stock.

(g) Facsimile. The parties agree that execution and delivery of this Agreement by facsimile shall constitute good and valid execution and delivery.

BioNanomatrix

SCHEDULE A

EMPLOYEE'S DISCLOSURE

1. Proprietary Information

Except as set forth below, Employee acknowledges that at this time (or, in the event this schedule is being executed subsequent to the commencement of Employee's employment by the Company, at the time of commencement of Employee's employment by the Company) Employee knows nothing about the business or Proprietary Information of BIONANOMATRIX, INC. a Delaware corporation (the "Company"), other than information Employee has learned from the Company in the course of being hired:

Employee has been covered under COA
signed by Domain Assoc & subject to
disclosures under that agreement

2. Prior Inventions.

Except as set forth below, and to the knowledge of Employee, there are no ideas, processes, inventions, technology, writings, programs, designs, formulas, discoveries, patents, copyrights, or trademarks, or any claims, rights, or improvements In the foregoing, that Employee excludes or that by the terms of a previous agreement entered into by Employee are required to be excluded from the operation of this Agreement:

NONE

3. Prior Agreements.

Except as set forth below, Employee is aware of no prior agreements between Employee and any other person or entity concerning proprietary information or inventions:

Employee is bound by PIIA w/
GenVault Corp – as has been acknowledged
& accepted by BNM & GenVault

Date: 11-JAN-2011

/s/ Erik Holmlin
Signature of Employee

(h) Effective Date In the event that Employee is executing this Agreement subsequent to the commencement of Employee's employment with the Company, Employee hereby agrees that this Agreement shall be effective as of the date on which Employee commenced Employee's employment with the Company. Without limiting the foregoing, Employee agrees that the terms of this Agreement shall apply to all Proprietary Information received by Employee, and all Inventions created or prepared by Employee, at any time during the course of Employee's employment with the Company.

EMPLOYEE HAS READ THIS AGREEMENT CAREFULLY AND UNDERSTANDS ITS TERMS. EMPLOYEE HAS COMPLETELY NOTED ON SCHEDULE A TO THIS AGREEMENT, TO THE BEST OF EMPLOYEE'S KNOWLEDGE, ANY PROPRIETARY INFORMATION, IDEAS, PROCESSES, INVENTIONS, TECHNOLOGY, WRITINGS, PROGRAMS, DESIGNS, FORMULAS, DISCOVERIES, PATENTS, COPYRIGHTS, OR TRADEMARKS, OR IMPROVEMENTS, RIGHTS, OR CLAIMS RELATING TO THE FOREGOING, THAT ARE EXCLUDED FROM THIS AGREEMENT OR THAT BY THE TERMS OF A PREVIOUS AGREEMENT ENTERED INTO BY EMPLOYEE AND LISTED ON SCHEDULE A ARE REQUIRED TO BE EXCLUDED.

Date: 11-JAN-2011

/s/ Erik Holmlin

Signature of Employee

Exhibit B

Separation of Employment Agreement and General Release

1. I, R. Erik Holmlin, for and in consideration of certain payments to be made and the benefits to be provided to me under the Employment Agreement, dated as of January , 2011 (the "Employment Agreement") with BioNanomatrix, Inc. (the "Company") on the date this Release becomes irrevocable, and conditioned upon such payments and provisions, do hereby REMISE, RELEASE, AND FOREVER DISCHARGE the Company and each of its past or present subsidiaries and affiliates, its and their past or present officers, directors, shareholders, employees and agents, their respective successors and assigns, heirs, executors and administrators, the pension and employee benefit plans of the Company, or of its past or present subsidiaries or affiliates, and the past or present trustees, administrators, agents, or employees of the pension and employee benefit plans (hereinafter collectively included within the term the "Company"), acting in any capacity whatsoever, of and from any and all manner of actions and causes of actions, suits, debts, claims and demands whatsoever in law or in equity, which I ever had, now have, or hereafter may have, or which my heirs, executors or administrators hereafter may have, by reason of any matter, cause or thing whatsoever, from the beginning of my employment with the Company to the date this Release is executed, and particularly, but without limitation of the foregoing general terms, any claims arising from or relating in any way to my employment relationship and the termination of my employment relationship with the Company, including but not limited to, any claims which have been asserted, could have been asserted, or could be asserted now or in the future under any federal, state or local laws, including any claims for breach of contract, violation of state or federal wage and hour laws, the California Fair Employment and Housing Act, Government Code § 12900 et seq., the California Labor Code, the California Family Leave Act, the Rehabilitation Act of 1973, 29 U.S.0 §§ 701 et seq., as amended, Title VII of the Civil Rights Act of 1964, 42 U.S.C. §§ 2000e et seq., as amended ("Title VII"), the Civil Rights Act of 1871, 42 U.S.C. § 1981, the Civil Rights Act of 1991, 2 U.S.C. §§ 60 et seq., as amended, the Age Discrimination in Employment Act of 1967, 29 U.S.C. §§ 621 et seq., as amended (the "ADEA"), the Americans with Disabilities Act of 1990, 29 U.S.C. §§ 706 et seq. (the "ADA"), the Family Medical Leave Act of 1993, 29 U.S.C. §§ 2601 et seq., as amended, the Equal Pay Act of 1963, 29 U.S.C. §§ 206(d) et seq., as amended (the "EPA"), the Employee Retirement Security Act of 1974, 29 U.S.C. §§ 301 et seq., as amended ("ERISA"), and any contracts between the Company and me, and any common law claims now or hereafter recognized and all claims for counsel fees and costs. Notwithstanding any language to the contrary contained herein, the release and discharge of rights and claims herein arising under the ADEA does not include any waiver of rights or claims that may arise after the date this Release is executed. Expressly excluded from this Release, however, are (i) all express obligations of the Company under this Release, (ii) my existing right to receive accrued benefits under and pursuant to any employee benefit plan maintained by the Company, including under any tax-qualified pension, 401(k), deferred compensation or profit sharing plan, or any other vested benefits under a retirement plan governed by ERISA, (iii) any non-waivable claims such as unemployment compensation benefits, workers compensation benefits, claims under the Fair Labor Standards Act of 1938, 29 U.S.C. §§ 201 et seq., as amended, or health insurance benefits under the Consolidated Omnibus Budget Reconciliation Act of 1985, 29 U.S.C. §§ 1161 et seq., as amended and (iv) any claims I may now or hereafter have as a shareholder of the Company

(except to the extent that I am a shareholder as a result (directly or indirectly) of my employment, or termination thereof, with the Company).

2. I expressly waive any and all rights under California Civil Code § 1542, or any like or similar statute or common law doctrine which provides as follows:

> A general release does not extend to claims which the creditor does not know or suspect to exist in his or her favor at the time of executing the release, which if known by him or her must have materially affected his or her settlement with the debtor.

Thus, notwithstanding the provisions of Civil Code § 1542, and for the purpose of implementing the full and complete release and discharge intended by the parties, I expressly acknowledge that this Agreement is intended to include in its effect, without limitation, claims and causes of action which I do not know of or suspect to exist in my favor at the time of execution hereof and that I intend by this Agreement to extinguish all such claims and causes of action.

3. I hereby agree and recognize that my employment by the Company was permanently and irrevocably severed on , 20 and the Company has no obligation, contractual or otherwise to me to hire, rehire or reemploy me in the future. I acknowledge that the terms of the Employment Agreement provide me with payments and benefits which are in addition to any amounts to which I otherwise would have been entitled.

4. I hereby agree and acknowledge that the payments and benefits provided by the Company pursuant to Section 7 of the Employment Agreement are to bring about an amicable resolution of my employment arrangements and are not to be construed as an admission of any violation of any federal, state or local statute or regulation, or of any duty owed by the Company and that the Employment Agreement was, and this Release is, executed voluntarily to provide an amicable resolution of my employment relationship with the Company.

5. I hereby acknowledge that nothing in this Release shall prohibit or restrict me from: (i) making any disclosure of information required by law; (ii) providing information to, or testifying or otherwise assisting in any investigation or proceeding brought by, any federal regulatory or law enforcement agency or legislative body, any self-regulatory organization, including but not limited to the Equal Employment Opportunity Commission under the ADEA, Title VII, the ADA or the EPA, or the Company's designated legal, compliance or human resources officers; or (iii) filing, testifying, participating in or otherwise assisting in a proceeding relating to an alleged violation of any federal, state or municipal law relating to fraud, or any self-regulatory organization.

6. I hereby agree not to disclose the terms of this Release to anyone, except to my spouse, attorney and tax or financial advisor. Likewise, the Company agrees that the terms of this Release will not be disclosed except as may be necessary to obtain approval or authorization to fulfill its obligations hereunder or as required by law.

7. I hereby certify that I have read the terms of this Release, that I have been advised by the Company to discuss it with my attorney, that I have received the advice of counsel and that I understand its terms and effects. I acknowledge, further, that I am executing this Release of my own volition with a full understanding of its terms and effects and with the intention of releasing all claims recited herein in exchange for the consideration described in the Employment Agreement, which I acknowledge is adequate and satisfactory to me. None of the above named parties, nor their agents, representatives, or attorneys have made any representations to me concerning the terms or effects of this Release other than those contained herein.

8. I hereby acknowledge that I have been informed that I have the right to consider this Release for a period of [21/45] days prior to execution. I also understand that I have the right to revoke this Release for a period of seven days following execution by giving written notice to the Company at , Attention: . *[Note: The applicable time period will depend on whether the termination is part of a reduction in force (45 days) or not (21 days). In addition, if the termination is in connection with a reduction in force, certain disclosures will need to be made to the executive to comply with the requirements of the ADEA if the executive is over 40.]*

9. I hereby further acknowledge that the terms of Sections 6 and 7 of the Employment Agreement shall continue to apply for the balance of the time periods provided therein and that I will abide by and fully perform such obligations.

10. This Release, and the provisions of the Employment Agreement that survive the Employee's termination of employment, constitute the complete and entire understanding between the parties, and supersede any and all prior agreements and understandings between the parties to the extent they are inconsistent with this Release and the Employment Agreement.

11. If any provision of this Release is deemed invalid, the remaining provisions shall not be affected.

12. The provisions of this Release shall be governed by the laws of the State of California, without regard to any choice of law provisions.

Intending to be legally bound hereby, I execute the foregoing Release this day of , .

Witness

R. Erik Holmlin

AMENDMENT NO. 1 TO

EMPLOYMENT AGREEMENT

This **AMENDMENT NO. 1 TO EMPLOYMENT AGREEMENT** (this "Amendment") is made and entered into as of March 14, 2011 (the "Effective Date") by and between BioNanomatrix, Inc., a Delaware corporation (the "Company"), and R. Erik Holmlin, an individual resident in the State of California (the "Employee") (the Company and the Employee are hereinafter sometimes individually referred to as a "Party" and together referred to as the "Parties").

WHEREAS, the Employee and the Company have entered into that certain Employment Agreement dated January 12, 2011 (the "Agreement");

WHEREAS, concurrently herewith, the Company and certain investors (the "Investors") propose to enter into a Series B Convertible Participating Preferred Stock Purchase Agreement pursuant to which, among other things, the Company will sell shares of its Series B Preferred Stock to the Investors (the "Financing"); and

WHEREAS, as a condition to consummation of the Financing, the Investors require that Employee enter into this Amendment;

NOW, THEREFORE, as an inducement to the Investors to consummate the Financing and in consideration of the mutual covenants and agreements of the Parties hereinafter set forth, and for other good and valuable consideration, the receipt and sufficient of which is hereby acknowledged, the Parties hereto, intending to be legally bound, hereby agree as follows:

1. Amendment. Clause (ii) of Section 7(c) of the Agreement is hereby amended and restated to read in its entirety as follows:

"the vesting with respect to the Options granted to the Employee pursuant to Section 3(f) above and with respect to any other stock options or shares of restricted stock then held by Employee shall be accelerated such that effective as of such termination such Options and other options and shares of restricted stock shall be deemed vested to the same extent as if Employee shall have remained continuously employed with the Company through the date that is eighteen (18) months following such termination."

2. Miscellaneous. Except as expressly amended hereby, the Agreement shall continue in full force and effect in accordance with its terms. This Amendment shall be governed by and interpreted according to the internal laws of the State of California, without regard to any choice of law rules that may direct the application of the laws of another jurisdiction.

IN WITNESS WHEREOF, each of the Parties has executed this Amendment as of the date first above written.

COMPANY:

BIONANOMATRIX, INC.

By: /s/ Lorraine LoPresti
Name: Lorraine LoPresti
Title: VP-Finance + Administration, CFO

EMPLOYEE:

/s/ Erik Holmlin
Erik Holmlin

AMENDMENT NO. 2 TO

EMPLOYMENT AGREEMENT

This **AMENDMENT NO. 2 TO EMPLOYMENT AGREEMENT** (this "Amendment") is made and entered into as of November 7, 2017 (the "Effective Date") by and between Bionano Genomics, Inc., a Delaware corporation (the "Company"), formerly known as BioNanoMatrix, Inc., and R. Erik Holmlin, an individual resident in the State of California (the "Employee") (the Company and the Employee are hereinafter sometimes individually referred to as a "Party" and together referred to as the "Parties").

WHEREAS, the Employee and the Company have entered into that certain Employment Agreement dated January 12, 2011 (the "Agreement");

WHEREAS, the Agreement was amended by the Parties effective March 24, 2011 in an Amendment No. 1; and

WHEREAS, the Parties now wish to amend the Agreement as specified herein;

NOW, THEREFORE, as an inducement to the Investors to consummate the Financing and in consideration of the mutual covenants and agreements of the Parties hereinafter set forth, and for other good and valuable consideration, the receipt and sufficient of which is hereby acknowledged, the Parties hereto, intending to be legally bound, hereby agree as follows:

1. Amendment. Clause (i) of Section 7(c) of the Agreement is hereby amended and restated to read in its entirety as follows:

"the Company shall pay the Employee a lump sum amount equivalent to nine (9) months of his Base Salary in effect at the time of such termination, less required deductions, subject to the Employee providing the Company with an effective Release within forty-five (45) days of the Termination Date, not later than sixty (60) days following the Termination Date."

2. Amendment. A new clause, (iii), is added to Section 7(c) of the Agreement, as follows:

"provided that the Employee timely elects COBRA insurance continuation coverage, the Company will pay one hundred percent of the premium cost of such coverage for a period of nine (9) months following the Termination Date, or until such time as the Employee is no longer eligible for COBRA continuation coverage, whichever comes first. Notwithstanding the foregoing, if at any time the Company

determines, in its sole discretion, that its payment of COBRA premiums on the Employee's behalf would result in a violation of applicable law (including, without limitation, Section 2716 of the Public Health Service Act), then in lieu of paying COBRA premiums on the Employee's behalf, the Company will pay the Employee a fully taxable cash payment equal to the COBRA premium for that month, subject to applicable tax withholding such amount, the "***Special Severance Payment***"), such Special Severance Payment to be made without regard to the Employee's payment of COBRA premiums.

3. Miscellaneous. Except as expressly amended hereby, the Agreement, as amended by Amendment No. 1, shall continue in full force and effect in accordance with its terms. This Amendment shall be governed by and interpreted according to the internal laws of the State of California, without regard to any choice of law rules that may direct the application of the laws of another jurisdiction.

IN WITNESS WHEREOF, each of the Parties has executed this Amendment as of the date first above written.

COMPANY:

BIONANO GENOMICS, INC.

By: /s/ David Barker
Name: David Barker
Title: Chairman, Board of Directors

EMPLOYEE:

/s/ R. Erik Holmlin
R. Eric Holmlin

July 18, 2011

Han Cao

2001 Hamilton St, #2009
Philadelphia, PA 19104

Dear Han:

We are pleased to confirm the terms of your employment with BioNanomatrix, Inc. (the "**Company**") as our Chief Scientific Officer. The following terms apply and will constitute your employment agreement with the Company (the "**Agreement**").

1. EMPLOYMENT.

1.1 Term. The term of this Agreement shall begin on the date hereof (the "**Commencement Date**") and shall continue until the termination of your employment with the Company in accordance with Section 4 herein.

1.2 Title. You shall have the title of Chief Scientific Officer and shall report to the Chief Executive Officer of the Company (the "**CEO**"). You shall serve in such other capacity or capacities as the CEO or the Board of Directors of the Company (the "**Board**") may from time to time prescribe.

1.3 Duties. You shall do and perform all services, acts or things necessary or advisable to manage and conduct the business of the Company and which are normally associated with the position of Chief Scientific Officer, consistent with the Bylaws of the Company and as required by the Board.

1.4 Location. Unless otherwise agreed in writing by you and the Company, you shall perform services pursuant to this Agreement primarily at the Company's headquarters, which are currently located in San Diego, California. In addition, the Company may from time to time require you to travel temporarily to other locations in connection with the Company's business. It is anticipated that you will seek to establish your permanent residence in Southern

California as soon as practicable following the date of this Agreement and prior to August 31, 2011.

2. LOYAL AND CONSCIENTIOUS PERFORMANCE; NONCOMPETITION.

2.1 Loyalty. During your employment by the Company you shall devote your full business energies, interest, abilities and productive time to the proper and efficient performance of your duties under this Agreement.

2.2 Covenant not to Compete. Except with the express prior written consent of the Company, you will not, during the term of this Agreement or during any period during which you are receiving Severance Benefits (as defined below) from the Company, engage in competition with the Company and/or any of its affiliates, subsidiaries or joint ventures currently existing or which shall be established during your employment by the Company (collectively, "**Affiliates**") either directly or indirectly, in any manner or capacity, as adviser, principal, agent, affiliate, promoter, partner, officer, director, employee, stockholder, owner, co-owner, consultant, or member of any association or otherwise, in any phase of the business of developing, manufacturing and marketing of products or services which are in the same field of use or which otherwise compete with the products or services or proposed products or services of the Company and/or any of its Affiliates.

2.3 Agreement not to Maintain Conflicts of Interest. During your employment by the Company, you agree not to acquire, assume or participate in, directly or indirectly, any position, investment or interest known by you to be adverse or antagonistic to the Company, its business or prospects, financial or otherwise or in any company, person or entity that is, directly or indirectly, in competition with the business of the Company or any of its Affiliates. Ownership by you, as a passive investment, of less than two percent (2%) of the outstanding shares of capital stock of any corporation with one or more classes of its capital stock listed on a national securities exchange, including, but not limited to, any market of the NASDAQ Stock Market, or publicly traded in the over-the-counter market shall not constitute a breach of the foregoing Section 2.2 or this Section 2.3.

3. COMPENSATION.

3.1 Base Salary. The Company shall pay you a base salary of two hundred fifty thousand dollars ($250,000) per year, payable in regular periodic payments in accordance with Company policy. Such base salary shall be prorated for any partial year of employment on the basis of a 365-day fiscal year.

3.2 Signing Bonus. The Company will pay you a one-time signing bonus of $40,000 in cash (the "***Signing Bonus***") as soon as reasonably practicable following the Commencement Date, less payroll deductions and all required withholdings. It is anticipated that you will apply this Signing Bonus towards the costs associated with storage of your household belongings and approximately six months of temporary housing following your relocation to Southern California.

3.3 Annual Performance Bonus. In addition to your base salary and Signing Bonus, you will be eligible to be considered for an annual discretionary bonus of twenty percent (20%) of your base salary based upon the Company's performance (25% weighting) and your personal performance (75% weighting), at the sole discretion of the Board, against specific milestones to be defined by the Board and agreed to by you.

3.4 Equity Participation.

3.4.1 As soon as practicable following the Commencement Date, you will be granted an option to purchase a number of shares of the Company's common stock that, together with shares and/or options currently owned by you and the shares of Series B Preferred Stock of the Company to be issued to you pursuant to Section 3.4.3, represents no less than 7.5% of the total outstanding shares of the common stock of the Company (on a fully diluted and as converted to common stock basis) pursuant to the Company's Amended and Restated 2006 Equity Compensation Plan (the "***Plan***"). The exercise price per share of such shares shall be the fair market value of such shares as determined in good faith by the Board and is anticipated to be $0.10 per share.

3.4.2 The option granted pursuant to Section 3.4.1 will vest over a period of four (4) years commencing upon the Commencement Date, with 1/48th of such shares vesting on a monthly basis until all the shares are vested, so long as you remain continuously employed by the Company and subject to (i) the establishment of your permanent residence in Southern California by not later than August 31, 2011 and (ii) the provisions of Sections 4.1.2 and 4.3. Your option will be an incentive stock option to the extent permitted by applicable tax laws and will be governed by a separate Stock Option Agreement (that shall be substantially in the form annexed hereto as Exhibit A) that you and the Company agree to use reasonable efforts to enter into by not later than August 31, 2011 and the Plan.

3.4.3 As soon as practicable following the Commencement Date, you will be granted a bonus consisting of 240,800 shares of Series B Preferred Stock of the Company (the "***Series B Bonus Shares***") pursuant to the terms of a restricted stock purchase agreement in a form reasonably acceptable to you and the Company that you and Company agree to use reasonable efforts to enter into by not later than August 31, 2011. The Series B Bonus Shares will have a right of repurchase in favor of the Company (for no consideration) (the "***Repurchase Right***") that lapses and may not be exercised with respect to 1/48th of such shares per month over a period of four (4) years commencing upon the Commencement Date, so long as you remain continuously employed by the Company through each applicable lapse date and subject to the establishment of your permanent residence in Southern California by not later than August 31, 2011. If the provisions of Sections 4.1.2 or 4.3 are triggered and become applicable and in effect, the Repurchase Right shall lapse and may not be exercised with respect to an additional number of shares that would have lapsed and become unexercisable if you had been employed for an additional (i) twelve (12) months as of the date of termination if the termination of your employment is on or before the date that is two years following the Commencement Date or (ii) six (6) months as of the date of termination if the

termination of your employment is after the date that is two years following the Commencement Date. In addition to any other limitation on transfer created by applicable securities laws, you will be prohibited from assigning, hypothecating, donating, encumbering or otherwise disposing of any interest in any portion of the Series B Bonus Shares while such portion of the shares are subject to the Repurchase Right. The Series B Bonus Shares will be subject to standard market stand-off provisions. Subject to your timely filing an election under Section 83(b) of the Internal Revenue Code with respect to all the Series B Bonus Shares, the Company will provide you no less than $150,908 in the form of a forgivable loan (the "Loan") pursuant to the terms of a promissory note in a form reasonably acceptable to you and the Company (the "Promissory Note") that you and the Company shall use reasonable efforts to execute by not later than August 31, 2011, which amount will be retained by the Company and applied towards covering the Company's federal, state and local tax withholding obligations that arise during 2011 (i) in connection with the issuance of the Series B Bonus Shares, and (ii) as a result of the Loan. The Company intends to treat the entire amount of the Loan as taxable income to you during 2011. The Promissory Note will provide (i) that the interest rate is equal to the applicable federal rate in effect as of the date of such Promissory Note and (ii) that the Company will forgive 1/48th of the principal, along with the accrued interest associated therewith, under the Loan per month during the term of the Loan, so long as you remain continuously employed by the Company through each applicable Loan forgiveness date and subject to the establishment of your permanent residence in Southern California by not later than August 31, 2011. If the provisions of Sections 4.1.2 or 4.3 are triggered and become applicable and in effect, the Company shall immediately forgive an additional portion of the principal, along with the accrued interest associated therewith, under the Loan that would have been forgiven if you had been employed for an additional (i) twelve (12) months as of the date of termination if the termination of your employment is on or before the date that is two years following the Commencement Date or (ii) six (6) months as of the date of termination if the termination of your employment is after the date that is two years following the Commencement Date. The Loan forgiveness will be fully accelerated on the first to occur of (a) the closing of a Change of Control (as defined in the Plan) ("***Change of Control***"), (b) the date on which the securities of the Company become registered under Section 12 of the Securities Exchange Act of 1934, as amended (the "***Exchange Act***"), (c) the date on which the Company becomes subject to the reporting requirements under Section 15(d) of the Exchange Act, or (d) immediately prior to the filing by the Company of a registration statement under the Securities Act of 1933, as amended (the "***Securities Act***"). Any unforgiven principal and accrued interest under the Loan will be due and payable in full 60 days following the termination of your employment with the Company. Upon maturity of the Loan, you will have the election to satisfy payment of any unforgiven principal and accrued interest that is due thereunder and subject to the provisions of this Agreement by delivery of any combination of cash or shares of common stock or Series B Preferred Stock of the Company held by you that are not at such time subject to a contractual right of repurchase by the Company, valued at fair market value as reasonably determined by the Company's board of directors.

3.5 Relocation Allowance. In addition to the provisions of Sections 3.1 through 3.4 above, the Company shall provide you with relocation assistance benefits as follows. In order for any relocation expenses to be eligible for reimbursement, such expenses must be

incurred by you no later than December 31, 2011 (except as to the expenses referenced in Sections 3.5.2 and 3.5.3, as to which such expenses must be incurred no later than December 31, 2012), and you must provide receipts or other satisfactory documentation of such expenses to the Company no later than sixty (60) days following the date such expenses are incurred. All verified eligible expenses will be reimbursed be the Company no later than sixty (60) days following submission of such documentation. To the extent such amounts are taxable income, such payments shall be subject to applicable payroll deduction and withholding.

3.5.1 The Company shall reimburse you for the following relocation expenses not to exceed $20,000 in the aggregate, subject to your delivery to the Company of reasonably satisfactory evidence of such expenses: (i) moving costs with respect to your primary household belongings; (ii) airfare for up to two round-trip flights for you and each of your immediate family members from the region of your current residence to the region of the Company's headquarters; and (iii) airfare for one one-way flight for you and each of your immediate family members from the region of your current residence to the region of the Company's headquarters.

3.5.2 The Company shall reimburse you $10,000 for mortgage points and related loan origination and closing expenses incurred with respect to the purchase of a residential property in Southern California to serve as your permanent residence.

3.5.3 The Company shall reimburse you seven percent (7%) of the sales price of your permanent residence in Philadelphia, Pennsylvania ("***Philadelphia Residence***"), subject to the completion of such sale, to cover the costs associated therewith including, but not limited to, real estate sales commissions and other closing costs (the "***Residence Sale Costs Reimbursal***"). Prior to the sale or your Philadelphia Residence, the Company shall reimburse you on a monthly basis for your carrying costs with respect to your Philadelphia Residence at a rate of $2,000 per month commencing on the Commencement Date and not to exceed twelve (12) months (the "***Carrying Cost Reimbursal***"), subject to your delivery of a signed affidavit stating that you have not sold such permanent residence or been given approval by the applicable homeowners' association to rent out such permanent residence prior to or during the period of such reimbursement. The amount of any Carrying Cost Reimbursal actually paid by the Company shall be applied against and reduce the amount of the Residence Sale Costs Reimbursal to be paid by the Company.

3.6 Employment Taxes and Withholdings. All of your compensation shall be subject to payroll deductions and withholdings required to be collected or withheld by the Company.

3.7 Vacation; Benefits. You shall, in accordance with Company policy and the terms of any applicable plan documents, be eligible for paid time off (at a rate of no less than four weeks per year with respect to vacation days) and benefits under any executive benefit plan or arrangement, such as group health insurance coverage and other fringe benefits, which may be in effect from time to time and made available to the Company's executives or key management employees.

4. TERMINATION.

4.1 Termination Without Cause or for Good Reason. If your employment with the Company is terminated by the Company without Cause or you terminate your employment for Good Reason, then subject to your delivery to the Company of a Release and Waiver in the form attached hereto as **Exhibit B** within the applicable time period set forth therein, but in no event later than forty-five (45) days following termination of your employment, and permitting such Release and Waiver to become fully effective in accordance with its terms, the Company shall provide you with the following:

4.1.1 Severance pay in the form of salary continuation at your then-current salary over a period of six (6) months, to be paid on the Company's normal pay days commencing with the first regular payroll date of the Company following the effective date of the Release and Waiver; and

4.1.2 You shall vest immediately such number of unvested stock options that would have vested in accordance with the applicable vesting schedule as if you had been employed for an additional (i) twelve (12) months as of the date of termination if the termination of your employment is on or before the date that is two years following the Commencement Date or (ii) six (6) months as of the date of termination if the termination of your employment is after the date that is two years following the Commencement Date.

4.2 ***For purposes of this Agreement*****:**

"**Cause**" shall mean your:

(i) gross negligence or willful misconduct in the performance of your duties to the Company as an employee of the Company (other than a failure resulting your complete or partial incapacity due to physical or mental illness or impairment); provided, however, that no act, or failure to act, by you shall be considered "willful" unless committed without good faith and without a reasonable belief that the act or omission was in the Company's best interest;

(ii) material and willful violation of any federal or state law or regulation applicable to the business of the Company;

(iii) significant or material refusal or failure to act in accordance with any lawful specific direction or order of the Board;

(iv) commission of any act of fraud with respect to the Company;

(v) breach of any material provision of your Proprietary Information and Inventions Agreement, including without limitation, theft or other misappropriation by you of the Company's proprietary information or trade secrets;

(vi) conviction of, or entry of plea of nolo contendere to, a felony or a crime involving moral turpitude; or

(vii) failure to establish your permanent residence in Southern California on or prior to August 31, 2011.

"**Good Reason**" means the occurrence of any of the following events without your consent; *provided however*, that any resignation by you due to any of the following conditions shall only be deemed for Good Reason if: (i) you give the Company written notice of your intent to terminate for Good Reason within sixty (60) days following the first occurrence of the condition(s) that you believe constitute Good Reason, which notice shall describe such condition(s); (ii) the Company fails to remedy, if remediable, such condition(s) within thirty (30) days following receipt of the written notice (the "**Cure Period**") of such condition(s) from you; and (iii) you actually resign your employment within the first fifteen (15) days after expiration of the Cure Period:

(i) a material reduction in your authority or job responsibilities as an employee of the Company or successor to the Company, where such material reduction in authority or job responsibilities is accompanied by a change in title;

(ii) a material reduction in your base compensation, other than pursuant to a Company-wide reduction of base compensation for employees of the Company generally;

(iii) the relocation of the Company's executive offices by a distance of fifty (50) miles or more, which relocation requires an increase in your one-way driving distance by more than twenty-five (25) miles; or

(iv) breach by the Company of any material term of this Agreement.

Whether or not the actions or omissions of Executive constitute "Cause" within the meaning of this Section 4 shall be decided by the Board based upon a reasonable good faith investigation and determination.

4.3 Termination for Death or Disability. Your employment with the Company shall terminate effective upon the date of your death or Complete Disability. "**Complete Disability**" shall mean your inability to perform your duties under this Agreement by reason of any medically determinable physical or mental impairment which could reasonably be expected to result in death or which has lasted or could reasonably be expected to last for a continuous period of not less than six (6) months. If your employment shall be terminated by death or Complete Disability, (a) the Company shall pay to you, and/or your heirs, your base salary and accrued and unused vacation benefits earned through the date of termination at the rate in effect at the time of termination as well as unreimbursed amounts that are due and any amounts not yet paid under Section 3.5 hereof, less standard deductions and withholdings as applicable, (b) you shall vest immediately such number of unvested stock options that would have vested in accordance with the applicable vesting schedule as if you had been employed for an additional (i) twelve (12) months as of the date of termination if the termination of your employment is on or before the date that is two years following the Commencement Date or (ii)

six (6) months as of the date of termination if the termination of your employment is after the date that is two years following the Commencement Date and (c) the Company shall thereafter have no further obligations to you and/or your heirs under this Agreement.

4.4 Termination by You Without Good Reason. You may resign your employment without Good Reason upon thirty (30) days written notice to the Company. Upon such resignation, the Company shall pay you your base salary and accrued and unused vacation earned through the date upon which the Company accepts such resignation, and you shall not be entitled to any other benefit or compensation and the Company shall have no further obligations to you under this Agreement.

4.5 Termination by Mutual Agreement of the Parties. Your employment pursuant to this Agreement may be terminated at any time upon mutual agreement, in writing. Any such termination of employment shall have the consequences specified in such writing.

4.6 Survival of Certain Provisions. Sections 2.2 and 5 shall survive the termination of this Agreement.

4.7 LIMITATION ON PAYMENTS.

4.7.1 Reductions. If any payment or benefit you would receive from the Company (a "Payment") would (i) constitute a "parachute payment" within the meaning of Section 280G of the Internal Revenue Code of 1986, as amended (the "**Code**"), and (ii) but for this sentence, be subject to the excise tax imposed by Section 4999 of the Code (the "**Excise Tax**"), then such Payment shall be equal to the Reduced Amount (as defined below). The "**Reduced Amount**" shall be either (x) the largest portion of the Payment that would result in no portion of the Payment being subject to the Excise Tax or (y) the largest portion of the Payment, up to and including the total Payment, whichever amount, after taking into account all applicable federal, state and local employment taxes, income taxes, and the Excise Tax (all computed at the highest applicable marginal rate), results in your receipt, on an after-tax basis, of the greater amount of the Payment notwithstanding that all or some portion of the Payment may be subject to the Excise Tax. If a reduction in payments or benefits constituting "parachute payments" is necessary so that the Payment equals the Reduced Amount, reduction shall occur in the following order unless you elect in writing a different order: reduction of cash payments; cancellation of accelerated vesting of stock awards; reduction of employee benefits. If acceleration of vesting of stock award compensation is to be reduced, such acceleration of vesting shall be cancelled in the reverse order of the date of grant of your stock awards.

4.7.2 Accounting Firm. The accounting firm engaged by the Company for general audit purposes as of the time of the Payment shall perform the foregoing calculations, subject to the necessary authorizations of the Audit Committee of the Company's Board (the "Audit Committee"). Alternatively, the Audit Committee may engage a consulting firm with expertise in calculations under Section 280G of the Code to perform such calculations. The

Company shall bear all expenses with respect to the determinations by such accounting or consulting firm required to be made hereunder.

4.7.3 Determinations. The accounting or consulting firm engaged to make the determinations hereunder shall provide its calculations, together with detailed supporting documentation, to the Company and you within ten (10) calendar days after the date on which your right to a Payment is triggered (if requested at that time by the Company or you) or such other time as requested by the Company or you. If the accounting or consulting firm determines that no Excise Tax is payable with respect to a Payment, either before or after the application of the Reduced Amount, it shall furnish the Company and you with an opinion reasonably acceptable to you that no Excise Tax will be imposed with respect to such Payment. Any good faith determinations of the accounting firm made hereunder shall be final, binding and conclusive upon the Company and you.

5. CONFIDENTIAL AND PROPRIETARY INFORMATION;NONSOLICITATION.

5.1 As a condition of employment pursuant to this Agreement you agree to abide by the Company's standard Proprietary Information and Inventions Agreement which you have executed prior to the date hereof, attached hereto as **EXHIBIT C**.

5.2 While employed by the Company and for one (1) year thereafter, you agree that in order to protect the Company's trade secrets and confidential and proprietary information from unauthorized use, you will not, either directly or through others, solicit or attempt to solicit any employee, consultant or independent contractor of the Company to terminate his or her relationship with the Company in order to become an employee, consultant or independent contractor to or for any other person or business entity.

6. ASSIGNMENT AND BINDING EFFECT.

This Agreement shall be binding upon and inure to the benefit of you and your heirs, executors, personal representatives, assigns, administrators and legal representatives. Because of the unique and personal nature of your duties under this Agreement, neither this Agreement nor any rights or obligations under this Agreement shall be assignable by you. This Agreement shall be binding upon and inure to the benefit of the Company and its successors, assigns and legal representatives.

7. CHOICE OF LAW.

This Agreement shall be construed and interpreted in accordance with the internal laws of the State of California without regard to conflict of laws principles.

8. INTEGRATION.

This Agreement, including Exhibits A, B and C, and the other agreements referenced herein as being entered into in connection herewith contain the complete, final and exclusive agreement of the Parties relating to the terms and conditions of your employment and the

termination of your employment, and supersedes all prior and contemporaneous oral and written employment agreements or arrangements between you and the Company. To the extent this Agreement conflicts with the Proprietary Information and Inventions Agreement attached as Exhibit B hereto, the Proprietary Information and Inventions Agreement controls.

9. AMENDMENT.

This Agreement cannot be amended or modified except by a written agreement signed by you and the Company.

10. WAIVER.

No term, covenant or condition of this Agreement or any breach thereof shall be deemed waived, except with the written consent of the party against whom the wavier is claimed, and any waiver or any such term, covenant, condition or breach shall not be deemed to be a waiver of any preceding or succeeding breach of the same or any other term, covenant, condition or breach.

11. SEVERABILITY.

The finding by a court of competent jurisdiction of the unenforceability, invalidity or illegality of any provision of this Agreement shall not render any other provision of this Agreement unenforceable, invalid or illegal. Such court shall have the authority to modify or replace the invalid or unenforceable term or provision with a valid and enforceable term or provision which most accurately represents the parties' intention with respect to the invalid or unenforceable term or provision.

12. INTERPRETATION; CONSTRUCTION.

The headings set forth in this Agreement are for convenience of reference only and shall not be used in interpreting this Agreement. This Agreement has been drafted by legal counsel representing the Company, but you have been encouraged to consult with, and have consulted with, your own independent counsel and tax advisors with respect to the terms of this Agreement. The parties hereto acknowledge that each party and its counsel has reviewed and revised, or had an opportunity to review and revise, this Agreement, and any rule of construction to the effect that any ambiguities are to be resolved against the drafting party shall not be employed in the interpretation of this Agreement.

13. REPRESENTATIONS AND WARRANTIES.

You represent and warrant that you are not restricted or prohibited, contractually or otherwise, from entering into and performing each of the terms and covenants contained in this Agreement, and that your execution and performance of this Agreement will not violate or breach any other agreements between you and any other person or entity.

14. COUNTERPARTS; FACSIMILE.

This Agreement may be executed in two counterparts, each of which shall be deemed an original, and all of which together shall contribute one and the same instrument. Facsimile or other electronically transmitted signatures shall be as effective as original signatures.

15. LITIGATION COSTS.

Should any claim be commenced between the parties hereto or their personal representatives concerning any provision of this Agreement or the rights and duties of any person in relation to this Agreement, the party prevailing in such action shall be entitled, in addition to such other relief as may be granted to a reasonable sum as and for that party's attorney's fees in such action.

16. APPLICATION OF INTERNAL REVENUE CODE SECTION 409A.

Notwithstanding anything to the contrary set forth herein, any payments and benefits provided under this Agreement {the "**Severance Benefits**") that constitute "deferred compensation" within the meaning of Section 409A of the Code and the regulations and other guidance thereunder and any state law of similar effect (collectively "**Section 409A**") shall not commence in connection with your termination of employment unless and until you have also incurred a "separation from service" (as such term is defined in Treasury Regulation Section 1.409A-1(h)) (the "**Separation From Service**"), unless the Company reasonably determines that such amounts may be provided to you without causing you to incur adverse taxation under Section 409A. For the avoidance of doubt, it is intended that payments of the Severance Benefits set forth in this Agreement satisfy, to the greatest extent possible, the exemptions from the application of Section 409A provided under Treasury Regulation Sections 1.409A-1(b)(4), 1.409A-1(b)(5) and 1.409A-1(b)(9) and this Agreement will be construed to the greatest extent possible as consistent with those provisions, and to the extent no so exempt, this Agreement (and any definitions hereunder) will be construed in a manner that complies with Section 409A. However, if the Company (or, if applicable, the successor entity thereto) determines that the Severance Benefits constitute "deferred compensation" under Section 409A and you are, on the termination of your service, a "specified employee" of the Company or any successor entity thereto, as such term is defined in Section 409A(a)(2)(B)(i) of the Code, then, to the extent delayed commencement of any portion of such payments is required in order to avoid a prohibited distribution under Code Section 409A(a)(2)(B)(i) and the related adverse taxation under Section 409A, the timing of the Severance Benefit payments shall be delayed until the earlier to occur of (i) the date that is six months and one day after your Separation From Service, (ii) the date of your death or (iii) such earlier date as permitted under Section 409A without the imposition of adverse taxation (such applicable date, the "**Specified Executive Initial Payment Date**"). Upon the first business day following the Specified Executive Initial Payment Date, and subject to the effectiveness of the Release and Waiver, the Company {or the successor entity thereto, as applicable) shall pay to you a lump sum amount equal to the sum of the Severance Benefit payments that you would otherwise have received through the Specified Executive Initial

Payment Date if the commencement of the payment of the Severance Benefits had not been so delayed pursuant to this paragraph and any remaining payments due shall be paid as otherwise provided herein. No interest shall be due on any amounts so deferred.

Notwithstanding the foregoing provisions of this Agreement, you shall receive Severance Benefits only if you execute and return to the Company, within the applicable time period set forth therein but in no event more than forty-five (45) days following the date of your termination of employment, the Release and Waiver in the form attached hereto as **Exhibit B**, and permit such release to become effective in accordance with its terms (such latest permitted date, the "**Release Deadline**"). If the Severance Benefits are not covered by one or more exemptions from the application of Section 409A and the Release and Waiver could become effective in the calendar year following the calendar year in which your termination of employment occurs, the Release and Waiver will not be deemed effective any earlier than the Release Deadline. None of the Severance Benefits will be paid or otherwise delivered prior to the effective date of the Release and Waiver. Except to the minimum extent that payments must be delayed until the Specified Executive Initial Payout Date because you are a "specified employee" or until the effectiveness of the Release and Waiver, the Company will pay you the Severance Benefits as soon as practicable in accordance with the Company's normal payroll practices. All amounts payable under the Agreement will be subject to standard payroll taxes and deductions.

17. ELIGIBILITY.

As required by law, this offer and Agreement is subject to satisfactory proof of your right to work in the United States.

[REMAINDER OF THIS PAGE INTENTIONALLY LEFT BLANK]

If you accept employment on the terms described above, please sign and date this letter in the space provided below and return it to me.

We look forward to your favorable reply and to a productive and enjoyable working relationship.

Sincerely,

BioNanomatrix, Inc.

/s/ Erik Holmlin
Erik Holmlin
President and Chief Executive Officer

Agreed and Accepted:

/s/ Han Cao
Han Cao

Dated: 7/18/2011

EXHIBIT A

STOCK OPTION AGREEMENT

3545 John Hopkins Court Ste 160 | San Diego, CA 92121 | 858.888.7600 tel | 858.888.7601 fax | www.bionanomatrix.com

EXHIBIT B

RELEASE AND WAIVER OF CLAIMS

In consideration of the payments and other benefits set forth in Section 4.1 of the Employment Agreement dated July ___, 2011 (the "**Employment Agreement**") to which this form is attached as Exhibit B, I, Han Cao, hereby furnish BioNanomatrix, Inc. (the "Company"), with the following release and waiver ("Release and Waiver").

In exchange for the consideration provided to me by the Employment Agreement that I am not otherwise entitled to receive, I hereby generally and completely release the Company and its directors, officers, employees, shareholders, partners, agents, attorneys, predecessors, successors, parent and subsidiary entities, insurers, Affiliates (as defined in the Employment Agreement), and assigns from any and all claims, liabilities and obligations, both known and unknown, that arise out of or are in any way related to events, acts, conduct, or omissions occurring prior to my signing this Release and Waiver. This general release includes, but is not limited to: (1) all claims arising out of or in any way related to my employment with the Company or the termination of that employment; (2) all claims related to my compensation or benefits from the Company, including salary, bonuses, commissions, vacation pay, expense reimbursements, severance pay, fringe benefits, stock, stock options, or any other ownership interests in the Company; (3) all claims for breach of contract, wrongful termination, and breach of the implied covenant of good faith and fair dealing; (4) all tort claims, including claims for fraud, defamation, emotional distress, and discharge in violation of public policy; and (5) all federal, state, and local statutory claims, including claims for discrimination, harassment, retaliation, attorneys' fees, or other claims arising under the federal Civil Rights Act of 1964 (as amended), the federal Americans with Disabilities Act of 1990, the federal Age Discrimination in Employment Act of 1967 (as amended) ("**ADEA**"), and the California Fair Employment and Housing Act (as amended); provided, however, that nothing in this Release and Waiver of Claims shall release the Company from its obligations pursuant to the Employment Agreement or any other contract with the Company to which I am a party or under which I am an intended beneficiary, including without limitation my rights to exercise vested stock options following termination of employment pursuant to the terms of those stock options, to indemnification pursuant to the Company's Bylaws or any contracts to which I am a party providing for indemnification or to benefits which have vested as of the termination of my employment with the Company pursuant to the terms of applicable Company benefit plans.

I also acknowledge that I have read and understand Section 1542 of the California Civil Code which reads as follows: "**A general release does not extend to claims which the creditor does not know or suspect to exist in his favor at the time of executing the release, which if known by him must have materially affected his settlement with the debtor.**" I hereby expressly waive and relinquish all rights and benefits under that section and any law of any jurisdiction of similar effect with respect to any claims I may have against the Company.

I acknowledge that, among other rights, I am waiving and releasing any rights I may have under ADEA, that this Release and Waiver is knowing and voluntary, and that the consideration given for this Release and Waiver is in addition to anything of value to which I was already entitled as an executive of the Company. I further acknowledge that I have been advised, as required by the Older Workers Benefit Protection Act, that: (a) the release and waiver granted herein does not relate to claims under the ADEA which may arise after this Release and Waiver is executed; (b) I have the right to consult with an attorney prior to executing this Release and Waiver (although I may choose voluntarily not to do so); and (c) I have twenty-one (21) days from the date of termination of my employment with the Company in which to consider this Release and Waiver (although I may choose voluntarily to execute this Release and Waiver earlier); (d) I have seven (7) days following the execution of this Release and Waiver to revoke my consent to this Release and Waiver; and (e) this Release and Waiver shall not be effective until the seven (7) day revocation period has expired.

I acknowledge that I have the right to consult with an attorney prior to executing this Release and Waiver (although I may choose voluntarily not to do so); and (c) I have five (5) days from the date of termination of my employment with the Company in which to consider this Release and Waiver (although I may choose voluntarily to execute this Release and Waiver earlier).

I acknowledge my continuing obligations under my Proprietary Information and Inventions Agreement, a copy of which is attached to the Employment Agreement as Exhibit C. Pursuant to the Proprietary Information and Inventions Agreement I understand that among other things, I must not use or disclose any confidential or proprietary information of the Company and I must immediately return all Company property and documents (including all embodiments of proprietary information) and all copies thereof in my possession or control. I understand and agree that my right to the severance pay I am receiving in exchange for my agreement to the terms of this Release and Waiver is contingent upon my continued compliance with my Proprietary Information & Inventions Agreement.

This Release and Waiver, including Exhibits A and C to the Employment Agreement, constitutes the complete, final and exclusive embodiment of the entire agreement between the Company and me with regard to the subject matter hereof. I am not relying on any promise or representation by the Company that is not expressly stated herein. This Release and Waiver may only be modified by a writing signed by both me and a duly authorized officer of the Company.

Date: 7/18/2011

By: /s/ Han Cao
Han Cao

EXHIBIT C

PROPRIETARY INFORMATION AND INVENTIONS AGREEMENT

3545 John Hopkins Court Ste 160 | San Diego, CA 92121 | 858.888.7600 tel | 858.888.7601 fax | www.bionanomatrix.com

AMENDMENT NO. 1 TO

EMPLOYMENT AGREEMENT

This **AMENDMENT NO. 1 TO EMPLOYMENT AGREEMENT** (this "Amendment") is made and entered into as of November 7, 2017 (the "Effective Date") by and between Bionano Genomics, Inc., a Delaware corporation (the "Company"), formerly known as BioNanoMatrix, Inc., and Han Cao, an individual resident in the State of California (the "Employee") (the Company and the Employee are hereinafter sometimes individually referred to as a "Party" and together referred to as the "Parties").

WHEREAS, the Employee and the Company have entered into that certain Employment Agreement dated July 18, 2011 (the "Agreement");

WHEREAS, the Parties now wish to amend the Agreement as specified herein;

NOW, **THEREFORE**, as an inducement to the Investors to consummate the Financing and in consideration of the mutual covenants and agreements of the Parties hereinafter set forth, and for other good and valuable consideration, the receipt and sufficient of which is hereby acknowledged, the Parties hereto, intending to be legally bound, hereby agree as follows:

1. Amendment. A new clause, (4.1.3), is added to *Section 4: Termination* of the Agreement, as follows:

"provided that the Employee timely elects COBRA insurance continuation coverage, the Company will pay one hundred percent of the premium cost of such coverage for a period of six (6) months following the Termination Date, or until such time as the Employee is no longer eligible for COBRA continuation coverage, whichever comes first. Notwithstanding the foregoing, if at any time the Company determines, in its sole discretion, that its payment of COBRA premiums on the Employee's behalf would result in a violation of applicable law (including, without limitation, Section 2716 of the Public Health Service Act), then in lieu of paying COBRA premiums on the Employee's behalf, the Company will pay the Employee a fully taxable cash payment equal to the COBRA premium for that month, subject to applicable tax withholding such amount, the "***Special Severance Payment***"), such Special Severance Payment to be made without regard to the Employee's payment of COBRA premiums.

2. Miscellaneous. Except as expressly amended hereby, the Agreement, shall continue in full force and effect in accordance with its terms. This Amendment shall be governed by and interpreted according to the internal laws of the State of California, without regard to any choice of law rules that may direct the application of the laws of

another jurisdiction.

IN WITNESS WHEREOF, each of the Parties has executed this Amendment as of the date first above written.

COMPANY:

BIONANO GENOMICS, INC.

By: /s/ R. Erik Holmlin
Name: R. Erik Holmlin
Title: President and CEO

EMPLOYEE:

/s/ Han Cao
Han Cao

BIONANO GENOMICS, INC.
EMPLOYMENT AGREEMENT

This **EMPLOYMENT AGREEMENT** (this "***Agreement***") is made and entered into effective as of July 1, 2016 (the "***Effective Date***") by and among **BIONANO GENOMICS, INC.** (the "***Company***") and Michael Ward (the "***Executive***"). The Company and Executive are hereinafter collectively referred to as the "***Parties***", and individually referred to as a "***Party***".

RECITALS

A. The Company desires assurance of the association and services of Executive in order to retain Executive's experience, skills, abilities, background and knowledge, and is willing to continue the engagement of Executive's services on the terms and conditions set forth in this Agreement.

B. Executive desires to be in the employ of the Company, and is willing to accept employment on the terms and conditions set forth in this Agreement.

AGREEMENT

In consideration of the foregoing Recitals and the mutual promises and covenants herein contained, and for other good and valuable consideration, the Parties, intending to be legally bound, agree as follows:

1. EMPLOYMENT.

1.1 Title. Executive's position shall be Chief Business Officer of the Company, subject to the terms and conditions set forth in this Agreement.

1.2 Term. The term of this Agreement shall begin on the Effective Date and shall continue until it is terminated pursuant to Section 4 herein (the "***Term***").

1.3 Duties. Executive shall do and perform all services, acts or things necessary or advisable to manage and conduct the business of the Company and that are normally associated with the position of Chief Business Officer, and such other duties as may from time to time be assigned to Executive. Executive shall report to the Chief Executive Officer of the Company.

1.4 Policies and Practices. The employment relationship between the Parties shall be governed by this Agreement and by the policies and practices established by the Company and/or the Company's Board of Directors (the "***Board***"), or any designated committee thereof. In the event that the terms of this Agreement differ from or are in conflict with the Company's policies or practices or the Company's Employee Handbook, this Agreement shall control.

1.5 Location. Unless the Parties otherwise agree in writing, during the Term Executive shall perform the services Executive is required to perform pursuant to this Agreement at the Company's offices in San Diego, California, ***provided, however,*** that the Company may from time to time require Executive to travel temporarily to other locations in connection with the Company's business.

2. LOYALTY; NONCOMPETITION; NONSOLICITATION.

2.1 Loyalty. During Executive's employment with the Company, Executive shall devote Executive's full business energies, interest, abilities and productive time to the proper and efficient performance of Executive's duties under this Agreement.

2.2 Agreement not to Participate in Company's Competitors. During Executive's employment with the Company, Executive agrees not to acquire, assume or participate in, directly or indirectly, any position, investment or interest known by Executive to be adverse or antagonistic to the Company, its business, or prospects, financial or otherwise, or in any company, person, or entity that is, directly or indirectly, in competition with the business of the Company or any of its Affiliates (as defined below). Ownership by Executive, in professionally managed funds over which the Executive does not have control or discretion in investment decisions, or as a passive investment, of less than two percent (2%) of the outstanding shares of capital stock of any corporation with one or more classes of its capital stock listed on a national securities exchange or publicly traded on a national securities exchange or in the over-the-counter market shall not constitute a breach of this Section. For purposes of this Agreement, ***"Affiliate,"*** means, with respect to any specific entity, any other entity that, directly or indirectly, through one or more intermediaries, controls, is controlled by or is under common control with such specified entity.

2.3 Covenant not to Compete. During Executive's employment with the Company, the Executive shall not engage in competition with the Company and/or any of its Affiliates, either directly or indirectly, in any manner or capacity, as adviser, principal, agent, affiliate, promoter, partner, officer, director, employee, stockholder, owner, co-owner, consultant, or member of any association or otherwise, in any phase of the business of developing, manufacturing and marketing of products or services that are in the same field of use or which otherwise compete with the products or services of the Company, except with the prior written consent of the Company.

3. COMPENSATION OF THE EXECUTIVE.

3.1 Base Salary. The Company shall pay Executive a base salary at the annualized rate of $278,250 (the "***Base Salary***"), less payroll deductions and all required withholdings, payable in regular periodic installments in accordance with the Company's normal payroll practices. The Base Salary shall be prorated for any partial year of employment on the basis of a 365-day fiscal year.

3.2 Discretionary Bonus. At the sole discretion of the Company, following each calendar year of employment Executive shall be eligible to receive a discretionary cash

bonus with a target amount of up to thirty percent (30%) of Executive's then-current base salary (the "***Bonus***"), based on Executive's achievement relative to certain performance goals ("***Performance Goals***") to be established by the Company. The determination of whether Executive has met the Performance Goals for any given year, and if so, the amount of any Bonus that will be paid for such year (if any), shall be determined by the Company in its sole and absolute discretion. In order to be eligible to earn or receive any Bonus, Executive must remain employed by the Company through and including the end of the year with respect to which such Bonus is earned.

3.3 Expense Reimbursements. The Company will reimburse Executive for all reasonable business expenses Executive incurs in conducting his duties hereunder, pursuant to the Company's usual expense reimbursement policies; provided that Executive supplies the appropriate substantiation for such expenses no later than the end of the calendar month following the month in which such expenses were incurred by Executive. For the avoidance of doubt, to the extent that any expense reimbursements payable to Executive under Section 3.3 above or this Section 3.4 are taxable income and subject to the provisions of Section 409A of the Internal Revenue Code of 1986, as amended (the "***Code***") and the regulations and other guidance thereunder and any state law of similar effect (collectively "***Section 409A***"): (i) to be eligible to obtain reimbursement for such expenses Executive must supply the appropriate documentation substantiating such expenses no later than the end of the calendar month following the month in which such expenses were incurred by Executive, (ii) any such reimbursements will be paid by the Company as soon as administratively practicable after submission of such documentation, but in no event later than December 31 of the year following the year in which the expense was incurred, (iii) the amount of expenses reimbursed in one year will not affect the amount eligible for reimbursement in any subsequent year, and (iv) the right to expense reimbursement under this Agreement will not be subject to liquidation or exchange for another benefit.

3.4 Changes to Compensation. Executive's compensation will be reviewed annually and may be increased from time to time in the Company's sole discretion.

3.5 Employment Taxes. All of Executive's compensation shall be subject to customary withholding taxes and any other employment taxes as are commonly required to be collected or withheld by the Company.

3.6 Benefits. Executive shall, in accordance with Company policy and the terms of the applicable plan documents, be eligible to participate in benefits under any benefit plan or arrangement that may be in effect from time to time and made available to the Company's senior management employees.

3.7 Holidays and Vacation. Executive shall be eligible for paid holiday and vacation time in accordance with Company policy as in effect from time to time.

4. TERMINATION.

4.1 Termination by the Company. Executive's employment with the Company is at will and may be terminated by the Company at any time and for any reason, or for

no reason, including, but not limited to, under the following conditions:

4.1.1 Termination by the Company for Cause. The Company may terminate Executive's employment under this Agreement for Cause by delivery of written notice to Executive. Any notice of termination given pursuant to this Section shall effect termination as of the date of the notice, or as of such other date specified in the notice.

4.1.2 Termination by the Company without Cause. The Company may terminate Executive's employment under this Agreement without Cause at any time and for any reason, or for no reason. Such termination shall be effective on the date Executive is so informed by the Company.

4.2 Termination By Executive. Executive may terminate his employment with the Company at any time and for any reason, or for no reason, upon thirty (30) days written notice to the Company.

4.3 Termination for Death or Complete Disability. Executive's employment with the Company shall automatically terminate effective upon the date of Executive's death or Complete Disability (as defined below).

4.4 Termination by Mutual Agreement of the Parties. Executive's employment with the Company may be terminated at any time upon a mutual agreement in writing of the Parties. Any such termination of employment shall have the consequences specified in such agreement.

4.5 Compensation Upon Termination.

4.5.1 Death or Complete Disability. If Executive's employment is terminated by death or due to Complete Disability, the Company shall pay to Executive, or to Executive's heirs, Executive's base salary and accrued and unused vacation benefits earned through the date of termination at the rate in effect at the time of termination, less standard deductions and withholdings. The Company shall thereafter have no further obligations to Executive and/or Executive's heirs under this Agreement, except as otherwise provided by law (and except as provided otherwise in Executive's stock option agreements with the Company).

4.5.2 Termination For Cause If the Company terminates Executive's employment for Cause, then the Company shall pay Executive's base salary and accrued and unused vacation benefits earned through the date of termination, at the rate in effect at the time of termination, less standard deductions and withholdings. The Company shall thereafter have no further obligations to Executive under this Agreement, except as otherwise provided by law (and except as provided otherwise in Executive's stock option agreements with the Company).

4.5.3 Termination Without Cause. If the Company terminates Executive's employment without Cause, the Company shall pay Executive's base salary and accrued and unused vacation benefits earned through the date of termination, at the rate in effect at the time of termination, less standard deductions and withholdings. In addition, if Executive

furnishes to the Company an executed waiver and release of claims in the form attached hereto as **Exhibit A** (the "***Release***") within the time period specified therein, but in no event later than forty-five (45) days following Executive's termination, and if Executive allows such Release to become effective in accordance with its terms, then Executive shall be entitled to receive the following severance benefits:

4.5.3.1 cash payments in the form of continuation of Executive's base salary at the rate in effect at the time of termination for a period of six (6) months following the termination date, and

4.5.3.2 provided that Executive is eligible for and timely elects continued group health plan coverage under the Consolidated Omnibus Budget Reconciliation Act of 1985 ("***COBRA***") following the Executive's termination date, the Company shall pay directly to the insurance provider the premium for COBRA continuation coverage for the Executive and the Executive's family for a period that will expire upon the earliest of (i) six (6) months following the termination date (the "***COBRA Payment Period***"), (ii) the effective date that Executive becomes eligible for new healthcare coverage eligibility available through new employment, or (iii) the date Executive is no longer eligible for COBRA coverage, whichever comes first.

4.5.4 General Severance Benefit Terms.

4.5.4.1 The provisions in this Section 4.5.5.1 shall control and supersede anything to the contrary set forth in this Agreement. For all purposes of this Agreement, references to COBRA premiums shall not include any amounts payable by Executive under a Section 125 health care reimbursement plan under the Code. If at any time the Company determines, in its sole discretion, that it cannot pay the COBRA premiums without potentially incurring financial costs or penalties under applicable law (including, without limitation, Section 2716 of the Public Health Service Act), then regardless of whether Executive elects continued health coverage under COBRA, and in lieu of providing the COBRA premiums, the Company will instead pay Executive on the last day of each remaining month of the COBRA Payment Period a fully taxable cash payment equal to the COBRA premiums for that month, subject to applicable tax withholdings, which payments shall continue until the earlier of expiration of the COBRA Payment Period or the date when Executive becomes eligible for health insurance coverage in connection with new employment. If Executive becomes eligible for coverage under another employer's group health plan, Executive must immediately notify the Company of such event, and all COBRA severance benefit payments and obligations under this Agreement shall cease effective as of such date of the Executive's eligibility.

4.5.4.2 All severance payments made under this Agreement will be subject to standard payroll deductions and withholdings and will be made on the Company's regular payroll cycle, provided, however, that any severance payments otherwise scheduled to be made prior to the effective date of the Release shall instead accrue and be paid in the first payroll period that follows such effective date. Following provision of any severance benefits to which the Executive may be entitled under Section 4.5.3, the Company shall thereafter have no further

obligations to Executive under this Agreement, except as otherwise provided by law (and except as provided otherwise in Executive's stock option agreements with the Company).

4.6 Additional Definitions. For purposes of this Agreement, the following terms shall have the following meanings:

4.6.1 "***Complete Disability***" shall mean the inability of Executive to perform Executive's duties under this Agreement, whether with or without reasonable accommodation, because Executive has become permanently disabled within the meaning of any policy of disability income insurance covering employees of the Company then in force. In the event the Company has no policy of disability income insurance covering employees of the Company in force when Executive becomes disabled, the term "***Complete Disability***" shall mean the inability of Executive to perform Executive's duties under this Agreement, whether with or without reasonable accommodation, by reason of any incapacity, physical or mental, which the Company, based upon medical advice or an opinion provided by a licensed physician acceptable to the Company, determines to have incapacitated Executive from satisfactorily performing all of Executive's usual services for the Company, with or without reasonable accommodation, for a period of at least one hundred twenty (120) days during any twelve (12) month period (whether or not consecutive). Based upon such medical advice or opinion, the determination of the Company shall be final and binding and the date such determination is made shall be the date of such Complete Disability for purposes of this Agreement.

4.6.2 "***Cause***" shall mean the occurrence of any of the following: (i) Executive's conviction of any felony or any crime involving fraud or dishonesty that has a material adverse effect on the Company; (ii) Executive's active participation (whether by affirmative act or material omission) in a fraud, act of dishonesty or other act of misconduct against the Company and/or its affiliates; (iii) conduct by Executive which, based upon a good faith and reasonable factual investigation by the Company, demonstrates Executive's gross unfitness to serve; (iv) Executive's material violation of any statutory or fiduciary duty, or duty of loyalty, owed to the Company; (v) Executive's breach of any material term of any material contract between such Executive and the Company and the failure to cure such breach within 30 days of written notice; and (vi) Executive's repeated violation of any material Company policy. Executive's Complete Disability shall not constitute Cause as set forth herein. The determination that a termination is for Cause shall be by the Company in its sole and exclusive judgment and discretion.

4.7 Survival of Certain Sections. Sections 2, 3.5 and 4 through 18 of this Agreement will survive the termination of this Agreement.

4.8 Parachute Payment. If any payment or benefit the Executive would receive pursuant to this Agreement ("***Payment***") would (i) constitute a "***Parachute Payment***" within the meaning of Section 280G of the Code, and (ii) but for this sentence, be subject to the excise tax imposed by Section 4999 of the Code (the "***Excise Tax***"), then such Payment shall be equal to the Reduced Amount. The "***Reduced Amount***" shall be either (x) the largest portion of the Payment that would result in no portion of the Payment being subject to the Excise Tax or (y) the largest portion, up to and including the total of the Payment, whichever amount, after taking

into account all applicable federal, state and local employment taxes, income taxes, and the Excise Tax (all computed at the highest applicable marginal rate), results in the Executive's receipt, on an after-tax basis, of the greatest economic benefit notwithstanding that all or some portion of the Payment may be subject to the Excise Tax. If a reduction in payments or benefits constituting Parachute Payments is necessary so that the Payment equals the Reduced Amount, reduction shall occur in the manner that results in the greatest economic benefit for the Executive. If more than one method of reduction will result in the same economic benefit, the items so reduced will be reduced pro rata.

In the event it is subsequently determined by the Internal Revenue Service that some portion of the Reduced Amount (as determined pursuant to clause (x) in the preceding paragraph) is subject to the Excise Tax, Executive agrees to promptly return to the Company a sufficient amount of the Payment so that no portion of the Reduced Amount is subject to the Excise Tax. For the avoidance of doubt, if the Reduced Amount is determined in accordance with clause (y) in the preceding paragraph, Executive will have no obligation to return any portion of the Payment pursuant to the preceding sentence.

Unless Executive and the Company agree on an alternative accounting or law firm, the accounting firm then engaged by the Company for general tax compliance purposes shall perform the foregoing calculations. If the accounting firm so engaged by the Company is serving as accountant or auditor for the individual, entity or group effecting the Change in Control, the Company shall appoint a nationally recognized accounting, law or consulting firm to make the determinations required hereunder. The Company shall bear all expenses with respect to the determinations by such accounting, law or consulting firm required to be made hereunder.

The Company shall use commercially reasonable efforts such that the accounting, law or consulting firm engaged to make the determinations hereunder shall provide its calculations, together with detailed supporting documentation, to Executive and the Company within fifteen (15) calendar days after the date on which Executive's right to a Payment is triggered (if requested at that time by the Executive or the Company) or such other time as requested by the Executive or the Company.

In the event the payment of any amounts pursuant to this letter agreement would result in Executive being subject to an Excise Tax (without giving effect to any reduction in such payments to the Reduced Amount), at Executive's request in Executive's sole discretion, the Company will use its commercially reasonable best efforts to obtain a vote of the stockholders of the Company approving such payments in the manner set forth in Section 280G(b)(5)(B) of the Code and the Treasury Regulations issued thereunder such that the payments would not be subject to the Excise Tax if the required stockholder approval is obtained. In the event Executive so requests that such a vote be taken, Executive agrees to execute a waiver and enter into such additional agreements as may be reasonably requested by the Company in relation thereto, including, without limitation, agreeing that the portion of such payments that would otherwise, if made, result in Executive becoming liable for the Excise Tax will not be made if the required stockholder approval is not obtained.

4.9 Application of Internal Revenue Code Section 409A. Notwithstanding anything to the contrary set forth herein, any payments and benefits provided under this Agreement (the "***Severance Benefits***") that constitute "deferred compensation" within the meaning of Section 409A shall not commence in connection with Executive's termination of employment unless and until Executive has also incurred a "separation from service" (as such term is defined in Treasury Regulation Section 1.409A-1(h) ("***Separation From Service***"), unless the Company reasonably determines that such amounts may be provided to Executive without causing Executive to incur the additional 20% tax under Section 409A.

It is intended that each installment of the Severance Benefits payments provided for in this Agreement is a separate "payment" for purposes of Treasury Regulation Section 1.409A-2(b)(2)(i). For the avoidance of doubt, it is intended that payments of the Severance Benefits set forth in this Agreement satisfy, to the greatest extent possible, the exemptions from the application of Section 409A provided under Treasury Regulation Sections 1.409A-1(b)(4), 1.409A-1(b)(5) and 1.409A-1(b)(9). However, if the Company (or, if applicable, the successor entity thereto) determines that the Severance Benefits constitute "deferred compensation" under Section 409A and Executive is, on the termination of service, a "specified employee" of the Company or any successor entity thereto, as such term is defined in Section 409A(a)(2)(B)(i) of the Code, then, solely to the extent necessary to avoid the incurrence of the adverse personal tax consequences under Section 409A, the timing of the Severance Benefit payments shall be delayed until the earlier to occur of: (i) the date that is six months and one day after Executive's Separation From Service, or (ii) the date of Executive's death (such applicable date, the "***Specified Employee Initial Payment Date***"), the Company (or the successor entity thereto, as applicable) shall (A) pay to Executive a lump sum amount equal to the sum of the Severance Benefit payments that Executive would otherwise have received through the Specified Employee Initial Payment Date if the commencement of the payment of the Severance Benefits had not been so delayed pursuant to this Section and (B) commence paying the balance of the Severance Benefits in accordance with the applicable payment schedules set forth in this Agreement.

Notwithstanding anything to the contrary set forth herein, Executive shall receive the Severance Benefits described above, if and only if Executive duly executes and returns to the Company within the applicable time period set forth therein, but in no event more than forty-five days following Separation From Service, the Release and permits the Release to become effective in accordance with its terms. Notwithstanding any other payment schedule set forth in this Agreement, none of the Severance Benefits will be paid or otherwise delivered prior to the effective date of the Release. Except to the extent that payments may be delayed until the Specified Employee Initial Payment Date pursuant to the preceding paragraph, on the first regular payroll pay day following the effective date of the Release, the Company will pay Executive the Severance Benefits Executive would otherwise have received under the Agreement on or prior to such date but for the delay in payment related to the effectiveness of the Release, with the balance of the Severance Benefits being paid as originally scheduled. All amounts payable under the Agreement will be subject to standard payroll taxes and deductions.

The severance benefits are intended to qualify for an exemption from application of Section 409A or comply with its requirements to the extent necessary to avoid adverse personal

tax consequences under Section 409A, and any ambiguities herein shall be interpreted accordingly.

5. CONFIDENTIAL AND PROPRIETARY INFORMATION.

As a condition of continued employment, Executive agrees to execute and continue to abide by the Company's standard form of Proprietary Information and Inventions Agreement ("***PIIA***").

6. ASSIGNMENT AND BINDING EFFECT.

This Agreement shall be binding upon and inure to the benefit of Executive and Executive's heirs, executors, personal representatives, assigns, administrators and legal representatives. Because of the unique and personal nature of Executive's duties under this Agreement, neither this Agreement nor any rights or obligations under this Agreement shall be assignable by Executive. This Agreement shall be binding upon and inure to the benefit of the Company and its successors, assigns and legal representatives. Any such successor of the Company will be deemed substituted for the Company under the terms of this Agreement for all purposes. For this purpose, "successor" means any person, firm, corporation or other business entity which at any tie, whether by purchase, merger or otherwise, directly or indirectly acquires all or substantially all of the assets or business of the Company.

7. NOTICES.

All notices or demands of any kind required or permitted to be given by the Company or Executive under this Agreement shall be given in writing and shall be personally delivered (and receipted for) or faxed during normal business hours or mailed by certified mail, return receipt requested, postage prepaid, addressed as follows:

If to the Company:

BioNano Genomics, Inc.
9640 Towne Centre Drive, Ste. 100
San Diego, CA 92121
Attention: Chief Executive Officer

If to Executive:

Michael Ward
2221 Forestview Road
Evanston, IL 60201

Any such written notice shall be deemed given on the earlier of the date on which such notice is personally delivered or three (3) days after its deposit in the United States mail as specified

above. Either Party may change its address for notices by giving notice to the other Party in the manner specified in this Section.

8. CHOICE OF LAW.

This Agreement shall be construed and interpreted in accordance with the internal laws of the State of California without regard to its conflict of laws principles.

9. INTEGRATION.

This Agreement, including Exhibit A, and the PIIA contain the complete, final and exclusive agreement of the Parties relating to the terms and conditions of Executive's employment and the termination of Executive's employment, and supersedes any and all prior and/or contemporaneous oral and written employment agreements or arrangements between the Parties regarding Executive's service with the Company, including, without limitation, that certain offer letter dated April 16, 2014.

10. AMENDMENT.

This Agreement cannot be amended or modified except by a written agreement signed by Executive and the Company.

11. WAIVER.

No term, covenant or condition of this Agreement or any breach thereof shall be deemed waived, except with the written consent of the Party against whom the wavier is claimed, and any waiver or any such term, covenant, condition or breach shall not be deemed to be a waiver of any preceding or succeeding breach of the same or any other term, covenant, condition or breach.

12. SEVERABILITY.

The finding by a court of competent jurisdiction of the unenforceability, invalidity or illegality of any provision of this Agreement shall not render any other provision of this Agreement unenforceable, invalid or illegal. Such court shall have the authority to modify or replace the invalid or unenforceable term or provision with a valid and enforceable term or provision, which most accurately represents the Parties' intention with respect to the invalid or unenforceable term, or provision.

13. INTERPRETATION; CONSTRUCTION.

The headings set forth in this Agreement are for convenience of reference only and shall not be used in interpreting this Agreement. This Agreement has been drafted by legal counsel representing the Company, but the Executive has been encouraged to consult with, and has consulted with, Executive's own independent counsel and tax advisors with respect to the terms of this Agreement. The Parties acknowledge that each Party and its counsel has reviewed and revised, or had an opportunity to review and revise, this Agreement, and any rule of

construction to the effect that any ambiguities are to be resolved against the drafting party shall not be employed in the interpretation of this Agreement.

14. REPRESENTATIONS AND WARRANTIES.

Executive represents and warrants that Executive is not restricted or prohibited, contractually or otherwise, from entering into and performing each of the terms and covenants contained in this Agreement, and that Executive's execution and performance of this Agreement will not violate or breach any other agreements between the Executive and any other person or entity.

15. COUNTERPARTS.

This Agreement may be executed in two counterparts, each of which shall be deemed an original, all of which together shall contribute one and the same instrument.

16. ARBITRATION.

To ensure the rapid and economical resolution of disputes that may arise in connection with the Executive's employment with the Company, Executive and the Company agree that any and all disputes, claims, or causes of action, in law or equity, arising from or relating to Executive's employment, or the termination of that employment, will be resolved, to the fullest extent permitted by law, by final, binding and confidential arbitration pursuant to both the substantive and procedural provisions of the Federal Arbitration Act in San Diego, California conducted by the Judicial Arbitration and Mediation Services/Endispute, Inc. ("***JAMS***"), or its successors, under the then current rules of JAMS for employment disputes; provided that the arbitrator shall: (a) have the authority to compel adequate discovery for the resolution of the dispute and to award such relief as would otherwise be permitted by law; and (b) issue a written arbitration decision including the arbitrator's essential findings and conclusions and a statement of the award. Accordingly, Executive and the Company hereby waive any right to a jury trial. Both Executive and the Company shall be entitled to all rights and remedies that either Executive or the Company would be entitled to pursue in a court of law. The Company shall pay any JAMS filing fee and shall pay the arbitrator's fee. Nothing in this Agreement is intended to prevent either Executive or the Company from obtaining injunctive relief in court to prevent irreparable harm pending the conclusion of any such arbitration. Notwithstanding the foregoing, Executive and the Company each have the right to resolve any issue or dispute involving confidential, proprietary or trade secret information, or intellectual property rights, by Court action instead of arbitration.

17. TRADE SECRETS OF OTHERS.

It is the understanding of both the Company and Executive that Executive shall not divulge to the Company and/or its subsidiaries any confidential information or trade secrets belonging to others, including Executive's former employers, nor shall the Company and/or its Affiliates seek to elicit from Executive any such information. Consistent with the foregoing,

Executive shall not provide to the Company and/or its Affiliates, and the Company and/or its Affiliates shall not request, any documents or copies of documents containing such information.

18. ADVERTISING WAIVER.

Executive agrees to permit the Company, and persons or other organizations authorized by the Company, to use, publish and distribute advertising or sales promotional literature concerning the products and/or services of the Company, or the machinery and equipment used in the provision thereof, in which Executive's name and/or pictures of Executive taken in the course of Executive's provision of services to the Company appear. Executive hereby waives and releases any claim or right Executive may otherwise have arising out of such use, publication or distribution.

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IN WITNESS WHEREOF, the Parties have executed this Agreement as of the date first above written.

BIONANO GENOMICS, INC.

By: /s/ Erik Holmlin
Its: CEO

Dated: Jul 7 2016

EXECUTIVE:

/s/ Michael Ward
MICHAEL WARD

Dated: 07/06/16

EXHIBIT A

RELEASE AND WAIVER OF CLAIMS

TO BE SIGNED ON OR FOLLOWING THE SEPARATION DATE ONLY

In consideration of the payments and other benefits set forth in the Employment Agreement dated July 1, 2016, to which this form is attached (the "***Employment Agreement***"), I, Michael Ward, hereby furnish **BIONANO GENOMICS, INC.** (the ***"Company"***), with the following release and waiver (***"Release and Waiver"***).

In exchange for the consideration provided to me by the Employment Agreement that I am not otherwise entitled to receive, I hereby generally and completely release the Company and its current and former directors, officers, employees, stockholders, partners, agents, attorneys, predecessors, successors, parent and subsidiary entities, insurers, affiliates, and assigns (collectively, the "***Released Parties***") from any and all claims, liabilities and obligations, both known and unknown, that arise out of or are in any way related to events, acts, conduct, or omissions occurring prior to or on the date that I sign this Agreement (collectively, the "***Released Claims***"). The Released Claims include, but are not limited to: (a) all claims arising out of or in any way related to my employment with the Company, or the termination of that employment; (b) all claims related to my compensation or benefits from the Company including salary, bonuses, commissions, vacation pay, expense reimbursements, severance pay, fringe benefits, stock, stock options, or any other ownership interests in the Company; (c) all claims for breach of contract, wrongful termination, and breach of the implied covenant of good faith and fair dealing; (d) all tort claims, including claims for fraud, defamation, emotional distress, and discharge in violation of public policy; and (e) all federal, state, and local statutory claims, including claims for discrimination, harassment, retaliation, misclassification, attorneys' fees, or other claims arising under the federal Civil Rights Act of 1964 (as amended), the federal Americans with Disabilities Act of 1990, the federal Age Discrimination in Employment Act of 1967 (as amended) (the "***ADEA***"), the California Labor Code, and the California Fair Employment and Housing Act (as amended). Notwithstanding the foregoing, the following are not included in the Released Claims (the "***Excluded Claims***"): (a) any rights or claims for indemnification I may have pursuant to any written indemnification agreement with the Company to which I am a party, the charter, bylaws, or operating agreements of the Company, or under applicable law; (b) any rights or claims to unemployment compensation, funds accrued in my 401k account, or any vested equity incentives; (c) any rights that are not waivable as a matter of law; or (d) any claims arising from the breach of this Agreement. I hereby represent and warrant that, other than the Excluded Claims, I am not aware of any claims I have or might have against any of the Released Parties that are not included in the Released Claims.

I also acknowledge that I have read and understand Section 1542 of the California Civil Code which reads as follows: "**A general release does not extend to claims which the creditor does not know or suspect to exist in his or her favor at the time of executing the release, which if known by him or her must have materially affected his or her settlement with the debtor.**" I hereby expressly waive and relinquish all rights and benefits under that

Section and any law of any jurisdiction of similar effect with respect to any claims I may have against the Company.

I acknowledge that, among other rights, I am waiving and releasing any rights I may have under ADEA, that this Release and Waiver is knowing and voluntary, and that the consideration given for this Release and Waiver is in addition to anything of value to which I was already entitled as an executive of the Company. If I am 40 years of age or older upon execution of this Release and Waiver, I further acknowledge that I have been advised, as required by the Older Workers Benefit Protection Act, that: (a) the release and waiver granted herein does not relate to claims under the ADEA which may arise after this Release and Waiver is executed; (b) I should consult with an attorney prior to executing this Release and Waiver; and (c) I have twenty-one (21) days from the date of termination of my employment with the Company in which to consider this Release and Waiver (although I may choose voluntarily to execute this Release and Waiver earlier); (d) I have seven (7) days following the execution of this Release and Waiver to revoke my consent to this Release and Waiver; and (e) this Release and Waiver shall not be effective until the seven (7) day revocation period has expired without my having previously revoked this Release and Waiver.

I acknowledge my continuing obligations under my Proprietary Information and Inventions Agreement. Pursuant to the Proprietary Information and Inventions Agreement I understand that among other things, I must not use or disclose any confidential or proprietary information of the Company and I must immediately return all Company property and documents (including all embodiments of proprietary information) and all copies thereof in my possession or control. I understand and agree that my right to the severance pay I am receiving in exchange for my agreement to the terms of this Release and Waiver is contingent upon my continued compliance with my Proprietary Information and Inventions Agreement.

This Release and Waiver constitutes the complete, final and exclusive embodiment of the entire agreement between the Company and me with regard to the subject matter hereof. I am not relying on any promise or representation by the Company that is not expressly stated herein. This Release and Waiver may only be modified by a writing signed by both me and a duly authorized officer of the Company.

Date:

By: _____
Michael Ward

EMPLOYMENT AGREEMENT

This **EMPLOYMENT AGREEMENT** (the "***Agreement***") is made and entered into effective as of November 7, 2017 (the "***Effective Date***"), by and between **BIONANO GENOMICS, INC.** (the "***Company***") and **WARREN ROBINSON** ("***Executive***"). The Company and Executive are hereinafter collectively referred to as the "***Parties***", and individually referred to as a "***Party***".

RECITALS

The Company desires assurance of the association and services of Executive in order to retain Executive's experience, skills, abilities, background and knowledge, and is willing to continue to the engagement of Executive's services on the terms and conditions set forth in this Agreement.

Executive desires to be in the employ of the Company, and is willing to accept employment on the terms and conditions set forth in this Agreement.

AGREEMENT

In consideration of the foregoing Recitals and mutual promises and covenants contained herein, and for other good and valuable consideration, the Parties, intending to be legally bound, agree as follows:

1. EMPLOYMENT.

1.1 Title. Executive's position shall be Chief Commercial Officer of the Company, subject to the terms and conditions set forth in this Agreement.

1.2 Term. The term of this Agreement shall begin on the Effective Date, and shall continue until terminated in accordance with Section 4 herein (the "***Term***").

1.3 Duties. Executive shall do and perform all services, acts or things necessary or advisable to manage and conduct the business of the Company and that are normally associated with the position of Chief Commercial Officer, and such other duties as may from time to time be assigned to Executive. Executive shall report to the Chief Executive Officer of the Company.

1.4 Policies and Procedures. The employment relationship between the Parties shall be governed by this Agreement and by the policies and practices established by the Company and/or the Company's Board of Directors (the "***Board***"), or any designated committee thereof. In the event the terms of this Agreement differ from or are in conflict with the Company's policies and practices or the Company's Employee Handbook, this Agreement shall control,

1.5 Location. Unless the Parties otherwise agree in writing, during the Term Executive shall perform the services Executive is required to perform pursuant to this Agreement at the Company's offices in San Diego, California *provided*, *however*, that the Company may

from time to time require Executive to travel temporarily to other locations in connection with the Company's business.

2. LOYAL; NON-COMPETITION; NON-SOLICITATION.

2.1 Loyalty. Except as expressly provided herein, during Executive's employment by the Company, Executive shall devote Executive's full business energies, interest, abilities and productive time to the proper and efficient performance of Executive's duties under this Agreement.

2.2 Agreement not to participate in Company's Competitors. During Executive's employment with the Company, Executive agrees not to acquire, assume or participate in, directly or indirectly, any position, investment or interest known by Executive to be adverse or antagonistic to the Company, its business, or prospects, financial or otherwise, or in any company, person or entity that is, directly or indirectly, in competition with the business of the Company or any of its Affiliates (as defined below). Ownership by Executive, in professionally managed funds over which the Executive does not have control or discretion in investment decisions, or as a passive investment, of less than two percent (2%) of the outstanding shares of capital stock of any corporation with one or more classes of its capital stock listed on a national securities exchange or publicly traded on a national securities exchange or in the over-the-counter market shall not constitute a breach of this Section. For purposes of this Agreement, "Affiliate" means, with respect to any specific entity, any other entity that, directly or indirectly, through one or more intermediaries, controls is controlled by or is under common control with such specified entity.

2.3 Covenant not to Compete. During Executive's employment with the Company, the Executive shall not engage in competition with the Company and/or any of its Affiliates, either directly or indirectly, in any manner or capacity, as adviser, principal, agent, affiliate, promoter, partner, officer, director, employee, stockholder, owner, co-owner, consultant, or member of any association or otherwise, in any phase of the business of developing, manufacturing and marketing of products or services that are in the same field of use or which otherwise compete with the products or services of the Company except with the prior written consent of the Company.

3. COMPENSATION OF EXECUTIVE.

3.1 Base Salary. The Company shall pay Executive a base salary at the annualized rate of $275,392.17 per year (the "***Base Salary***"), less payroll deductions and all required withholdings, payable in regular bi-weekly payments or otherwise in accordance with Company policy. Such Base Salary shall be prorated for any partial year of employment on the basis of a 365-day fiscal year.

3.2 Discretionary Bonus. At the sole discretion of the Company, following each calendar year of employment, Executive shall be eligible to receive a discretionary cash bonus with a target amount of up to thirty point two percent (30.2%) of Executive's then-current base salary (the "***Bonus***"), based on Executive's achievement relative to certain performance goals ("***Performance Goals***") to be established by the Company. The determination of whether

Executive has met the Performance Goals for any given year, and if so, the amount of any Bonus that will be paid for such year (if any), shall be determined by the Company in its sole and absolute discretion, In order to be eligible to earn or receive any Bonus, Executive must remain employed by the Company through and including the end of the year with respect to which such Bonus is earned.

3.3 Expense Reimbursement. The Company will reimburse Executive for all reasonable business expenses Executive incurs in conducting his duties hereunder, pursuant to the Company's usual expense reimbursement policies; provided that Executive supplies the appropriate substantiation for such expenses no later than the end of the calendar month following the month in which such expenses were incurred by Executive, For the avoidance of doubt, to the extent that any expense reimbursements payable to Executive under Section 3.3 above or this Section 3.4 are taxable income and subject to the provisions of Section 409A of the Internal Revenue Code of 1986, as amended (the "***Code***") and the regulations and other guidance thereunder and any state law of similar effect (collectively "***Section 409A***"): (i) to be eligible to obtain reimbursement for such expenses Executive must supply the appropriate documentation substantiating such expenses no later than the end of the calendar month following the month in which such expenses were incurred by Executive, (ii) any such reimbursements will be paid by the Company as soon as administratively practicable after submission of such documentation, but in no event later than December 31 of the year following the year in which the expense was incurred, (iii) the amount of expenses reimbursed i n one year will not affect the amount eligible for reimbursement in any subsequent year, and (iv) the right to expense reimbursement under this Agreement will not be subject to liquidation or exchange for another benefit,

3.4 Changes to Compensation. Executive's compensation will be reviewed annually and may be increased from time to time in the Company's sole discretion.

3.5 Employment Taxes. All of Executive's compensation and payments under this Agreement shall be subject to customary withholding taxes and any other employment taxes as are commonly required to be collected or withheld by the Company.

3.6 Benefits. Executive shall, in accordance with Company policy and the terms of the applicable plan documents, be eligible to participate in benefits under any benefit plan or arrangement which may be in effect from time to time and made available to the Company's executive or key management employees.

3.7 Holidays and Vacation. Executive shall be eligible for paid holiday and vacation time in accordance with Company policy as in effect from time to time and made available to Company's senior management employees.

4. TERMINATION.

4.1 Termination by the Company. Executive's employment with the Company is at will and may be terminated by the Company at any time and for any reason, or for no reason, including, but not limited to, under the following conditions:

4.1.1 Termination by the Company for Cause. The Company may terminate Executive's employment under this Agreement for Cause by delivery of written notice to Executive. Any notice of termination given pursuant to this Section shall effect termination as of the date of the notice, or as of such other date specified in the notice,

4.1.2 Termination by the Company without Cause. The Company may terminate Executive's employment under this Agreement without Cause at any time and for any reason, or for no reason. Such termination shall be effective on the date Executive is so informed by the Company.

4.2 Termination by Executive. Executive may terminate his employment with the Company at any time and for any reason, or for no reason, upon thirty (30) days written notice to the Company.

4.3 Termination for Death or Complete Disability. Executive's employment with the Company shall automatically terminate effective upon the date of Executive's death or Complete Disability (as defined below).

4.4 Termination by Mutual Agreement of the Parties. Executive's employment with the Company may be terminated at any time upon a mutual agreement in writing of the Parties. Any such termination of employment shall have the consequences specified in such agreement.

4.5 Compensation upon Termination.

4.5.1 Death or Complete Disability. If Executive's employment with the Company is terminated as a result of Executive's death or Complete Disability, the Company shall pay to Executive, or to Executive's heirs, Executive's base salary and accrued and unused vacation benefits earned through the date of termination at the rate in effect at the time of termination, less standard deductions and withholdings. The Company shall thereafter have no further obligations to Executive and/or Executive's heirs under this Agreement, except as otherwise provided by law (and except as provided otherwise in Executive's stock option agreements with the Company).

4.5.2 With Cause or Without Good Reason. If Executive's employment with the Company is terminated at any time either by the Company for Cause or by Executive without Good Reason, the Company shall pay the Accrued Obligations, and the Company shall thereafter have no further obligations to Executive under this Agreement, except as otherwise provided by law (and except as provided otherwise in Executive's stock option agreements with the Company).

4.5.3 Without Cause or for Good Reason. If Executive's employment with the Company is terminated by the Company without Cause or by Executive for Good

Reason, and in either case Executive signs a separation agreement including a comprehensive waiver and release of claims in such form as the Company may require (the "***Release***") on or within the time period set forth therein, but in no event later than 45 days after Executive's termination date, and allows such Release to become effective in accordance with its terms (such latest permitted date on which the Release could become effective, the ("***Release Deadline***"), then Executive will receive the following benefits:

4.5.3.1 Severance Payment. Cash payments in the form of continuation of Executive's Base Salary at the rate in effect at the time of termination for a period of six (6) months following the termination date and, ("***Severance Payment***")

4.5.3.2 Benefits. Provided that Executive is eligible for and timely elects continued group health coverage under the Consolidated Omnibus Budget Reconciliation Act of 1985 ("***COBRA***") following Executive's termination date, the Company shall pay directly to the insurance provider the premium for COBRA continuation coverage for the Executive and Executive's family for a period that will expire upon the earliest of (i) six (6) months following the termination date (the "***COBRA Payment Period***"), (ii) the effective date that Executive becomes eligible for new healthcare coverage eligibility available through new employment, or (iii) the date Executive is no longer eligible for COBRA coverage, whichever comes first.

4.5.4 General Severance Benefit Terms.

4.5.4.1 The provisions in this Section 4.5.5.1 shall control and supersede anything to the contrary set forth in this Agreement. For all purposes of this Agreement, references to COBRA premiums shall not include any amounts payable by Executive under a Section 125 health care reimbursement plan under the Code. If at any time the Company determines, in its sole discretion, that it cannot pay the COBRA premiums without potentially incurring financial costs or penalties under applicable law (including, without limitation, Section 2716 of the Public Health Service Act), then regardless of whether Executive elects continued health coverage under COBRA, and in lieu of providing COBRA premiums, the Company will instead pay Executive on the last day of each remaining month of the COBRA Payment Period a fully taxable cash payment equal to the CBRA premiums for that month, subject to applicable tax withholdings, which payments shall continue until the earlier of expiration of the COBRA Payment Period of the date when Executive becomes eligible for health insurance coverage in connection with new employment. If Executive becomes eligible for coverage under another employer's group health plan, Executive must immediately notify the Company of such event, and all COBRA severance benefit payments and obligations under this Agreement shall cease effective as of such date of Executive's eligibility.

4.5.4.2 If All severance payments made under this Agreement will be subject to standard payroll deductions and withholdings and will be made on the Company's regular payroll cycle, provided, however, that any severance payments otherwise scheduled to be made prior to the effective date of the Release shall instead accrue and be paid in the first payroll period that follows such effective date. Following provisions of any severance benefits to which the Executive may be entitled under Section 4.5.3, the Company shall thereafter have no further obligations to Executive under this Agreement, except as otherwise

provided by law (and except as provided otherwise in Executive's stock option agreements with the Company).

4.6 Additional Definitions. For the purposes of this Agreement, the following terms shall have the following meanings:

4.6.1 "***Complete Disability***" shall mean the inability of executive to perform Executive's duties under this Agreement, whether with or without reasonable accommodation, because Executive has become permanently disabled within the meaning of any policy of disability income insurance covering employees of the Company then in force. In the event the Company has no policy of disability income insurance covering employees of the Company in force when Executive becomes disabled, the term "***Complete Disability***" shall mean the inability of Executive to perform Executive's duties under this Agreement, whether with or without reasonable accommodation, by reason of any incapacity, physical or mental, which the Company, based upon medical advice or an opinion provided by a licensed physician acceptable to the Company, determines to have incapacitated Executive from satisfactorily performing all of Executive's usual services for the Company, with or without reasonable accommodation, for a period of at least on hundred twenty (120) days during any twelve (12) month period (whether or not consecutive). Based upon such medical advice or opinion, the determination of the Company shall be final and binding and the date such determination is made shall be the date of such Complete Disability for purposes of this Agreement.

4.6.2 "***Cause***" shall mean the occurrence of any of the following: (i) Executive's conviction of any felony or any crime involving fraud or dishonesty that has a material adverse effect on the Company; (ii) Executive's active participation (whether by affirmative act or material omission) in a fraud, act of dishonesty or other act of misconduct against the Company and/or its affiliates; (iii) conduct by Executive which, based upon a good faith and reasonable factual investigation by the Company, demonstrates Executive's gross unfitness to serve; (iv) Executive's material violation of any statutory or fiduciary duty, or duty of loyalty, owed to the Company; (v) Executive's breach of any material term of any material contract between such Executive and the Company and the failure to cure such breach within 30 days of written notice; and (vi) Executive's repeated violation of any material Company policy. Executive's Complete Disability shall not constitute Cause as set forth herein. The determination that a termination is for Cause shall be by the Company in its sole and exclusive judgement and discretion.

4.6.3 Good Reason. "***Good Reason***" for Executive to terminate Executive's employment hereunder shall mean the occurrence of any of the following events without Executive's consent; provided however, that any resignation by Executive due to any of the following conditions shall only be deemed for Good Reason if (i) Executive gives the Company written notice of the intent to terminate for Good Reason within 90 days following the first occurrence of the condition(s) that Executive believes constitutes Good Reason, which notice shall describe such condition(s); (ii) the Company fails to remedy, if remediable, such condition(s) within 30 days following receipt of the written notice (the "***Cure Period***") of such condition(s) from Executive; and (iii) Executive actually resigns his employment within the first 15 days after expiration of the Cure Period:

4.6.3.1 a material breach of this Agreement by the Company;

4.6.3.2 a material reduction (but not less than 10%) by the Company of Executive's Base Salary as initially set forth herein or as the same may be increased from time to time, unless such reduction is part of a reduction program equally applicable to other executive employees of the Company;

4.6.3.3 a material reduction in Executive's authority, duties or responsibilities; or

4.6.3.4 the Company relocates the facility that is Executive's principal place of business with the Company to a location that requires an increase in Executive's one-way driving distance by more than 50 miles.

4.7 Survival of Certain Provisions. Sections 2, 3.5 and 4 through 19 of this Agreement shall survive the termination of this Agreement.

4.8 Parachute Payments. Except as otherwise provided in an agreement between Executive and the Company, if any payment or benefit Executive would receive from the Company or otherwise in connection with a Change in Control ("Payment") would (i) constitute a "parachute payment" within the meaning of Section 280G of the Code, and (ii) but for this sentence, be subject to the excise tax imposed by Section 4999 of the Code (the "Excise Tax"), then such Payment shall be equal to the Reduced Amount (as defined herein). The "Reduced Amount" shall be either (x) the largest portion of the Payment that would result in no portion of the Payment being subject to the Excise Tax, or (y) the largest portion, up to and including the total, of the Payment, whichever amount, after taking into account all applicable federal, state and local employment taxes, income taxes, and the Excise Tax (all computed at the highest applicable marginal rate), results in Executive's receipt, on an after-tax basis, of the greater amount of the Payment notwithstanding that all or some portion of the Payment may be subject to the Excise Tax. If a reduction in payments or benefits constituting "parachute payments" is necessary so that the Payment equals the Reduced Amount, reduction shall occur in the manner that results in the greatest economic benefit to Executive.

The independent registered public accounting firm engaged by the Company for general audit purposes as of the day prior to the effective date of the event described in Section 280G(b)(2)(A)(i) of the Code shall perform the foregoing calculations. If the independent registered public accounting firm so engaged by the Company is serving as accountant or auditor for the individual, entity or group effecting such event, the Company shall appoint a nationally recognized independent registered public accounting firm to make the determinations required hereunder, The Company shall bear all expenses with respect to the determinations by such independent registered public accounting firm required to be made hereunder. The independent registered public accounting firm engaged to make the determinations hereunder shall provide its calculations, together with detailed supporting documentation, to the Company and Executive within thirty (30) calendar days after the date on which Executive's right to a Payment is triggered (if requested at that time by the Company or Executive) or such other time as reasonably requested by the Company or Executive. Any good faith determinations of the

independent registered public accounting firm made hereunder shall be final, binding and conclusive upon the Company and Executive.

4.9 Application of Internal Revenue Code Section 409A.

All benefits under this Agreement are intended to qualify for an exemption from application of Section 409A of the Code and the regulations and other guidance thereunder and any state law of similar effect ("Section 409A") or to comply with its requirements to the extent necessary to avoid adverse personal tax consequences under Section 409A, and any ambiguities herein shall be interpreted accordingly.

Notwithstanding anything to the contrary set forth herein, any severance benefits that constitute "deferred compensation" within the meaning of Section 409A shall not commence in connection with Executive's termination of employment unless and until Executive has also incurred a "separation from service" (as such term is defined in Treasury Regulation Section 1.409A-1(h)) ("Separation From Service"), unless the Company reasonably determines that such amounts may be provided to Executive without causing Executive to incur the additional 20% tax under Section 409A.

It is intended that each installment of the severance benefit payments provided for in this Agreement is a separate "payment" for purposes of Treasury Regulation Section 1.409A-2(b)(2)(i). For the avoidance of doubt, it is intended that payments of the severance benefits set forth in this Agreement satisfy, to the greatest extent possible, the exemptions from the application of Section 409A provided under Treasury Regulation Sections 1.409A-1(b)(4), 1.409A-1(b)(5) and 1.409A-1(b)(9). However, if the Company (or, if applicable, the successor entity thereto) determines that the severance benefits constitute "deferred compensation" under Section 409A and Executive is, on the termination of service, a "specified employee" of the Company or any successor entity thereto, as such term is defined in Section 409A(a)(2)(B)(i) of the Code, then, solely to the extent necessary to avoid the incurrence of the adverse personal tax consequences under Section 409A, the timing of the severance benefit payments shall be delayed until the earlier to occur of: (i) the date that is six months and one day after Executive's Separation From Service, or (ii) the date of Executive's death. None of the severance benefits will be paid or otherwise delivered prior to the effective date of the Release. If the severance benefits are not covered by one or more exemptions from the application of Section 409A and the Release could become effective in the calendar year following the calendar year in which Executive's Separation From Service occurs, the Release will not be deemed effective any earlier than the Release Deadline. Except to the minimum extent that payments must be delayed because Executive is a "specified employee" or until the effectiveness of the Release, all amounts will be paid as soon as practicable in accordance with the Company's normal payroll practices.

The severance benefits are intended to qualify for an exemption from application of Section 409A or comply with its requirements to the extent necessary to avoid adverse personal tax consequences under Section 409A, and any ambiguities herein shall be interpreted accordingly.

5. CONFIDENTIAL AND PROPRIETARY INFORMATION; NONSOLICITATION.

5.1 As a condition of employment, Executive agrees to execute and abide by the Company's Confidential Information and Inventions Assignment Agreement attached hereto as **EXHIBIT A**.

5.2 While employed by the Company and for one year thereafter, Executive agrees that in order to protect the Company's trade secrets and confidential and proprietary information from unauthorized use, Executive will not, either directly or through others, solicit or attempt to solicit any employee, consultant or independent contractor of the Company to terminate his or her relationship with the Company in order to become an employee, consultant or independent contractor to or for any other person or business entity.

6. ASSIGNMENT AND BINDING EFFECT.

This Agreement shall be binding upon and inure to the benefit of Executive and Executive's heirs, executors, personal representatives, assigns, administrators and legal representatives. Because of the unique and personal nature of Executive's duties under this Agreement, neither this Agreement nor any rights or obligations under this Agreement shall be assignable by Executive. This Agreement shall be binding upon and inure to the benefit of the Company and its successors, assigns and legal representatives.

7. NOTICES.

All notices or demands of any kind required or permitted to be given by the Company or Executive under this Agreement shall be given in writing and shall be personally delivered (and receipted for) or faxed during normal business hours or mailed by certified mail return receipt requested, postage prepaid, address as follows,

If to the Company:

Attn: Chief Executive Officer
Bionano Genomics, Inc.
9640 Towne Centre Drive, Suite 100
San Diego, CA 92121

If to Executive:

Warren Robinson
6210 Silverdawn Court
Kingwood, TX 77345

Any such written notice shall be deemed given on the earlier of the date on which such notice is personally delivered or three (3) days after its deposit in the United States mail as specified above. Either Party may change its address for notices by giving notice to the other Party in the manner specified in this Section.

8. CHOICE OF LAW.

This Agreement shall be construed and interpreted in accordance with the internal laws of the State of California without regard to its conflict of laws principles.

9. INTEGRATION.

This Agreement, including Exhibit A, contains the complete, final and exclusive agreement of the Parties relating to the terms and conditions of Executive's employment and the

termination of Executive's employment, and supersedes all prior and/or contemporaneous oral and written employment agreements or arrangements between the Parties.

10. AMENDMENT.

This Agreement cannot be amended or modified except by a written agreement signed by Executive and the Company.

11. WAIVER.

No term, covenant or condition of this Agreement or any breach thereof shall be deemed waived, except with the written consent of the Party against whom the wavier is claimed, and any waiver or any such term, covenant, condition or breach shall not be deemed to be a waiver of any preceding or succeeding breach of the same or any other term, covenant, condition or breach.

12. SEVERABILITY.

The finding by a court of competent jurisdiction of the unenforceability, invalidity or illegality of any provision of this Agreement shall not render any other provision of this Agreement unenforceable, invalid or illegal. Such court shall have the authority to modify or replace the invalid or unenforceable term or provision with a valid and enforceable term or provision which most accurately represents the Parties' intention with respect to the invalid or unenforceable term or provision.

13. INTERPRETATION; CONSTRUCTION.

The headings set forth in this Agreement are for convenience of reference only and shall not be used in interpreting this Agreement. This Agreement has been drafted by legal counsel representing the Company, but Executive has been encouraged to consult with, and have consulted with, Executive's own independent counsel and tax advisors with respect to the terms of this Agreement. The Parties acknowledge that each Party and its counsel has reviewed and revised, or had an opportunity to review and revise, this Agreement, and any rule of construction to the effect that any ambiguities are to be resolved against the drafting party shall not be employed in the interpretation of this Agreement.

14. REPRESENTATIONS AND WARRANTIES.

Executive represents and warrants that Executive is not restricted or prohibited, contractually or otherwise, from entering into and performing each of the terms and covenants contained in this Agreement, and that Executive's execution and performance of this Agreement will not violate or breach any other agreements between Executive and any other person or entity.

15. COUNTERPARTS; FACSIMILE.

This Agreement may be executed in two counterparts, each of which shall be deemed an original, all of which together shall contribute one and the same instrument. Facsimile signatures shall be treated the same as original signatures.

16. DISPUTE RESOLUTION.

To ensure the timely and economical resolution of disputes that may arise in connection with Executive's employment with the Company, Executive and the Company agree that any and all disputes, claims, or causes of action arising from or relating to the enforcement, breach, performance, negotiation, execution, or interpretation of this Agreement, Executive's employment, or the termination of Executive's employment, including but not limited to statutory claims, shall be resolved to the fullest extent permitted by law by final, binding and confidential arbitration, by a single arbitrator, in Sacramento, California, conducted by JAMS, Inc. ("***JAMS***") under the then applicable JAMS rules (which can be found at the following web address: http://www.jamsadr.com/rulesclauses). By agreeing to this arbitration procedure, both Executive and the Company waive the right to resolve any such dispute through a trial by jury or judge or administrative proceeding. The Company acknowledges that Executive will have the right to be represented by legal counsel at any arbitration proceeding. The arbitrator shall: (a) have the authority to compel adequate discovery for the resolution of the dispute and to award such relief as would otherwise be permitted by law; and (b) issue a written arbitration decision, to include the arbitrator's essential findings and conclusions and a statement of the award. The arbitrator shall be authorized to award any or all remedies that Executive or the Company would be entitled to seek in a court of law. The Company shall pay all JAMS' arbitration fees in excess of the amount of court fees that would be required of Executive if the dispute were decided in a court of law. Nothing in this Agreement is intended to prevent either Executive or the Company from obtaining injunctive relief in court to prevent irreparable harm pending the conclusion of any such arbitration. Any awards or orders in such arbitrations may be entered and enforced as judgments in the federal and state courts of any competent jurisdiction,

17. TRADE SECRETS OF OTHERS.

It is the understanding of both the Company and Executive that Executive shall not divulge to the Company and/or its subsidiaries any confidential information or trade secrets belonging to others, including Executive's former employers, nor shall the Company and/or its Affiliates seek to elicit from Executive any such information. Consistent with the foregoing, Executive shall not provide to the Company and/or its Affiliates, and the Company and/or its Affiliates shall not request, any documents or copies of documents containing such information.

18. ADVERTISING WAIVER.

Executive agrees to permit the Company and/or its affiliates, subsidiaries, or joint ventures currently existing or which shall be established during Executive's employment by the Company (collectively, "***Affiliates***"), and persons or other organizations authorized by the Company and/or its Affiliates, to use, publish and distribute advertising or sales promotional literature concerning the products and/or services of the Company and/or its Affiliates, or the machinery and equipment used in the provision thereof, in which Executive's name and/or

pictures of Executive taken in the course of Executive's provision of services to the Company and/or its Affiliates, appear. Executive hereby waives and releases any claim or right Executive may otherwise have arising out of such use, publication or distribution. The Company agrees that, following termination of Executive's employment, it will not create any new such literature containing Executive's name and/or pictures without Executive's prior written consent.

19. INDEMNIFICATION.

Subject to applicable law, Executive will be provided indemnification to the maximum extent permitted by the Company's Bylaws and Articles of Incorporation, including coverage, if applicable, under any directors and officers insurance policies, with such indemnification determined by the Board or any of its committees in good faith based on principles consistently applied (subject to such limited exceptions as the Board may approve in cases of hardship) and on terms no less favorable than provided to any other Company executive officer or director.

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IN WITNESS WHEREOF, the Parties have executed this Agreement as of the date first above written.

BIONANO GENOMICS, INC

By: /s/ R. Erik Holmlin
R. Erik Holmlin, President and CEO

Date: Nov 7, 2017

EXECUTIVE

/s/ Warren Robinson
Warren Robinson

Date: 11/07/2017

EXHIBIT A

CONFIDENTIAL INFORMATION AND INVENTIONS ASSIGNMENT AGREEMENT

Exhibit 10.14

EMPLOYMENT AGREEMENT

This **EMPLOYMENT AGREEMENT** (the ***"Agreement"***) is made and entered into effective as of November 7, 2017 (the ***"Effective Date"***), by and between **BIONANO GENOMICS, INC.** (the ***"Company"***) and **MARK BORODKIN** (***"Executive"***). The Company and Executive are hereinafter collectively referred to as the ***"Parties"***, and individually referred to as a ***"Party"***.

RECITALS

The Company desires assurance of the association and services of Executive in order to retain Executive's experience, skills, abilities, background and knowledge, and is willing to continue to the engagement of Executive's services on the terms and conditions set forth in this Agreement.

Executive desires to be in the employ of the Company, and is willing to accept employment on the terms and conditions set forth in this Agreement.

AGREEMENT

In consideration of the foregoing Recitals and mutual promises and covenants contained herein, and for other good and valuable consideration, the Parties, intending to be legally bound, agree as follows:

1. EMPLOYMENT.

1.1 Title. Executive's position shall be Chief Operations Officer of the Company, subject to the terms and conditions set forth in this Agreement.

1.2 Term. The term of this Agreement shall begin on the Effective Date, and shall continue until terminated in accordance with Section 4 herein (the ***"Term"***).

1.3 Duties. Executive shall do and perform all services, acts or things necessary or advisable to manage and conduct the business of the Company and that are normally associated with the position of Chief Operations Officer, and such other duties as may from time to time be assigned to Executive. Executive shall report to the Chief Executive Officer of the Company.

1.4 Policies and Procedures. The employment relationship between the Parties shall be governed by this Agreement and by the policies and practices established by the Company and/or the Company's Board of Directors (the ***"Board"***), or any designated committee thereof. In the event the terms of this Agreement differ from or are in conflict with the Company's policies and practices or the Company's Employee Handbook, this Agreement shall control.

1.5 Location. Unless the Parties otherwise agree in writing, during the Term Executive shall perform the services Executive is required to perform pursuant to this Agreement at the Company's offices in San Diego, California *provided, however*, that the Company may from time to time require Executive to travel temporarily to other locations in connection with the Company's business.

2. LOYAL; NON-COMPETITION; NON-SOLICITATION.

2.1 Loyalty. Except as expressly provided herein, during Executive's employment by the Company, Executive shall devote Executive's full business energies, interest, abilities and productive time to the proper and efficient performance of Executive's duties under this Agreement.

2.2 Agreement not to participate in Company's Competitors. During Executive's employment with the Company, Executive agrees not to acquire, assume or participate in, directly or indirectly, any position, investment or interest known by Executive to be adverse or antagonistic to the Company, its business, or prospects, financial or otherwise, or in any company, person or entity that is, directly or indirectly, in competition with the business of the Company or any of its Affiliates (as defined below**)**. Ownership by Executive, in professionally managed funds over which the Executive does not have control or discretion in investment decisions, or as a passive investment, of less than two percent (2%) of the outstanding shares of capital stock of any corporation with one or more classes of its capital stock listed on a national securities exchange or publicly traded on a national securities exchange or in the over-the-counter market shall not constitute a breach of this Section. For purposes of this Agreement, "Affiliate" means, with respect to any specific entity, any other entity that, directly or indirectly, through one or more intermediaries, controls is controlled by or is under common control with such specified entity.

2.3 Covenant not to Compete. During Executive's employment with the Company, the Executive shall not engage in competition with the Company and/or any of its Affiliates, either directly or indirectly, in any manner or capacity, as adviser, principal, agent, affiliate, promoter, partner, officer, director, employee, stockholder, owner, co-owner, consultant, or member of any association or otherwise, in any phase of the business of developing, manufacturing and marketing of products or services that are in the same field of use or which otherwise compete with the products or services of the Company except with the prior written consent of the Company.

3. COMPENSATION OF EXECUTIVE.

3.1 Base Salary. The Company shall pay Executive a base salary at the annualized rate of $276,925 per year (the ***"Base Salary"***), less payroll deductions and all required withholdings, payable in regular bi-weekly payments or otherwise in accordance with Company policy. Such Base Salary shall be prorated for any partial year of employment on the basis of a 365-day fiscal year.

3.2 Discretionary Bonus. At the sole discretion of the Company, following each calendar year of employment, Executive shall be eligible to receive a discretionary cash bonus with a target amount of up to twenty percent (20%) of Executive's then-current base salary (the ***"Bonus"***), based on Executive's achievement relative to certain performance goals (***"Performance Goals"***) to be established by the Company. The determination of whether Executive has met the Performance Goals for any given year, and if so, the amount of any Bonus that will be paid for such year (if any), shall be determined by the Company in its sole and absolute discretion. In order

to be eligible to earn or receive any Bonus, Executive must remain employed by the Company through and including the end of the year with respect to which such Bonus is earned.

3.3 Expense Reimbursement. The Company will reimburse Executive for all reasonable business expenses Executive incurs in conducting his duties hereunder, pursuant to the Company's usual expense reimbursement policies; provided that Executive supplies the appropriate substantiation for such expenses no later than the end of the calendar month following the month in which such expenses were incurred by Executive. For the avoidance of doubt, to the extent that any expense reimbursements payable to Executive under Section 3.3 above or this Section 3.4 are taxable income and subject to the provisions of Section 409A of the Internal Revenue Code of 1986, as amended (the ***"Code"***) and the regulations and other guidance thereunder and any state law of similar effect (collectively ***"Section 409A"***): (i) to be eligible to obtain reimbursement for such expenses Executive must supply the appropriate documentation substantiating such expenses no later than the end of the calendar month following the month in which such expenses were incurred by Executive, (ii) any such reimbursements will be paid by the Company as soon as administratively practicable after submission of such documentation, but in no event later than December 31 of the year following the year in which the expense was incurred, (iii) the amount of expenses reimbursed i n one year will not affect the amount eligible for reimbursement in any subsequent year, and (iv) the right to expense reimbursement under this Agreement will not be subject to liquidation or exchange for another benefit.

3.4 Changes to Compensation. Executive's compensation will be reviewed annually and may be increased from time to time in the Company's sole discretion.

3.5 Employment Taxes. All of Executive's compensation and payments under this Agreement shall be subject to customary withholding taxes and any other employment taxes as are commonly required to be collected or withheld by the Company.

3.6 Benefits. Executive shall, in accordance with Company policy and the terms of the applicable plan documents, be eligible to participate in benefits under any benefit plan or arrangement which may be in effect from time to time and made available to the Company's executive or key management employees.

3.7 Holidays and Vacation. Executive shall be eligible for paid holiday and vacation time in accordance with Company policy as in effect from time to time and made available to Company's senior management employees.

4. TERMINATION.

4.1 Termination by the Company. Executive's employment with the Company is at will and may be terminated by the Company at any time and for any reason, or for no reason, including, but not limited to, under the following conditions:

4.1.1 Termination by the Company for Cause. The Company may terminate Executive's employment under this Agreement for Cause by delivery of written notice to Executive. Any notice of termination given pursuant to this Section shall effect termination as of the date of the notice, or as of such other date specified in the notice.

4.1.2 Termination by the Company without Cause. The Company may terminate Executive's employment under this Agreement without Cause at any time and for any reason, or for no reason. Such termination shall be effective on the date Executive is so informed by the Company.

4.2 Termination by Executive. Executive may terminate his employment with the Company at any time and for any reason, or for no reason, upon thirty (30) days written notice to the Company.

4.3 Termination for Death or Complete Disability. Executive's employment with the Company shall automatically terminate effective upon the date of Executive's death or Complete Disability (as defined below).

4.4 Termination by Mutual Agreement of the Parties. Executive's employment with the Company may be terminated at any time upon a mutual agreement in writing of the Parties. Any such termination of employment shall have the consequences specified in such agreement.

4.5 Compensation upon Termination.

4.5.1 Death or Complete Disability. If Executive's employment with the Company is terminated as a result of Executive's death or Complete Disability, the Company shall pay to Executive, or to Executive's heirs, Executive's base salary and accrued and unused vacation benefits earned through the date of termination at the rate in effect at the time of termination, less standard deductions and withholdings. The Company shall thereafter have no further obligations to Executive and/or Executive's heirs under this Agreement, except as otherwise provided by law (and except as provided otherwise in Executive's stock option agreements with the Company).

4.5.2 With Cause or Without Good Reason. If Executive's employment with the Company is terminated at any time either by the Company for Cause or by Executive without Good Reason, the Company shall pay the Accrued Obligations, and the Company shall thereafter have no further obligations to Executive under this Agreement, except as otherwise provided by law (and except as provided otherwise in Executive's stock option agreements with the Company).

4.5.3 Without Cause or for Good Reason. If Executive's employment with the Company is terminated by the Company without Cause or by Executive for Good Reason, and in either case Executive signs a separation agreement including a comprehensive waiver and release of claims in such form as the Company may require (the ***"Release"***) on or within the time period set forth therein, but in no event later than 45 days after Executive's termination date, and allows such Release to become effective in accordance with its terms (such latest permitted date on which the Release could become effective, the (***"Release Deadline"***), then Executive will receive the following benefits:

4.5.3.1 Severance Payment. Cash payments in the form of continuation of Executive's Base Salary at the rate in effect at the time of termination for a period of six (6) months following the termination date and, (***"Severance Payment"***)

4.5.3.2 Benefits. Provided that Executive is eligible for and timely elects continued group health coverage under the Consolidated Omnibus Budget Reconciliation Act of 1985 (***"COBRA"***) following Executive's termination date, the Company shall pay directly to the insurance provider the premium for COBRA continuation coverage for the Executive and Executive's family for a period that will expire upon the earliest of (i) six (6) months following the termination date (the ***"COBRA Payment Period"***), (ii) the effective date that Executive becomes eligible for new healthcare coverage eligibility available through new employment, or (iii) the date Executive is no longer eligible for COBRA coverage, whichever comes first.

4.5.4 General Severance Benefit Terms.

4.5.4.1 The provisions in this Section 4.5.5.1 shall control and supersede anything to the contrary set forth in this Agreement. For all purposes of this Agreement, references to COBRA premiums shall not include any amounts payable by Executive under a Section 125 health care reimbursement plan under the Code. If at any time the Company determines, in its sole discretion, that it cannot pay the COBRA premiums without potentially incurring financial costs or penalties under applicable law (including, without limitation, Section 2716 of the Public Health Service Act), then regardless of whether Executive elects continued health coverage under COBRA, and in lieu of providing COBRA premiums, the Company will instead pay Executive on the last day of each remaining month of the COBRA Payment Period a fully taxable cash payment equal to the CBRA premiums for that month, subject to applicable tax withholdings, which payments shall continue until the earlier of expiration of the COBRA Payment Period of the date when Executive becomes eligible for health insurance coverage in connection with new employment. If Executive becomes eligible for coverage under another employer's group health plan, Executive must immediately notify the Company of such event, and all COBRA severance benefit payments and obligations under this Agreement shall cease effective as of such date of Executive's eligibility.

4.5.4.2 If All severance payments made under this Agreement will be subject to standard payroll deductions and withholdings and will be made on the Company's regular payroll cycle, provided, however, that any severance payments otherwise scheduled to be made prior to the effective date of the Release shall instead accrue and be paid in the first payroll period that follows such effective date. Following provisions of any severance benefits to which the Executive may be entitled under Section 4.5.3, the Company shall thereafter have no further obligations to Executive under this Agreement, except as otherwise provided by law (and except as provided otherwise in Executive's stock option agreements with the Company).

4.6 Additional Definitions. For the purposes of this Agreement, the following terms shall have the following meanings:

4.6.1 ***"Complete Disability"*** shall mean the inability of executive to perform Executive's duties under this Agreement, whether with or without reasonable

accommodation, because Executive has become permanently disabled within the meaning of any policy of disability income insurance covering employees of the Company then in force. In the event the Company has no policy of disability income insurance covering employees of the Company in force when Executive becomes disabled, the term ***"Complete Disability"*** shall mean the inability of Executive to perform Executive's duties under this Agreement, whether with or without reasonable accommodation, by reason of any incapacity, physical or mental, which the Company, based upon medical advice or an opinion provided by a licensed physician acceptable to the Company, determines to have incapacitated Executive from satisfactorily performing all of Executive's usual services for the Company, with or without reasonable accommodation, for a period of at least on hundred twenty (120) days during any twelve (12) month period (whether or not consecutive). Based upon such medical advice or opinion, the determination of the Company shall be final and binding and the date such determination is made shall be the date of such Complete Disability for purposes of this Agreement.

4.6.2 ***"Cause"*** shall mean the occurrence of any of the following: (i) Executive's conviction of any felony or any crime involving fraud or dishonesty that has a material adverse effect on the Company; (ii) Executive's active participation (whether by affirmative act or material omission) in a fraud, act of dishonesty or other act of misconduct against the Company and/or its affiliates; (iii) conduct by Executive which, based upon a good faith and reasonable factual investigation by the Company, demonstrates Executive's gross unfitness to serve; (iv) Executive's material violation of any statutory or fiduciary duty, or duty of loyalty, owed to the Company; (v) Executive's breach of any material term of any material contract between such Executive and the Company and the failure to cure such breach within 30 days of written notice; and (vi) Executive's repeated violation of any material Company policy. Executive's Complete Disability shall not constitute Cause as set forth herein. The determination that a termination is for Cause shall be by the Company in its sole and exclusive judgement and discretion.

4.6.3 Good Reason. ***"Good Reason"*** for Executive to terminate Executive's employment hereunder shall mean the occurrence of any of the following events without Executive's consent; provided however, that any resignation by Executive due to any of the following conditions shall only be deemed for Good Reason if: (i) Executive gives the Company written notice of the intent to terminate for Good Reason within 90 days following the first occurrence of the condition(s) that Executive believes constitutes Good Reason, which notice shall describe such condition(s); (ii) the Company fails to remedy, if remediable, such condition(s) within 30 days following receipt of the written notice (the ***"Cure Period"***) of such condition(s) from Executive; and (iii) Executive actually resigns his employment within the first 15 days after expiration of the Cure Period:

4.6.3.1 a material breach of this Agreement by the Company;

4.6.3.2 a material reduction (but not less than 10%) by the Company of Executive's Base Salary as initially set forth herein or as the same may be increased from time to time, unless such reduction is part of a reduction program equally applicable to other executive employees of the Company;

4.6.3.3 a material reduction in Executive's authority, duties or responsibilities; or

4.6.3.4 the Company relocates the facility that is Executive's principal place of business with the Company to a location that requires an increase in Executive's one-way driving distance by more than 50 miles.

4.7 Survival of Certain Provisions. Sections 2, 3.5 and 4 through 19 of this Agreement shall survive the termination of this Agreement.

4.8 Parachute Payments. Except as otherwise provided in an agreement between Executive and the Company, if any payment or benefit Executive would receive from the Company or otherwise in connection with a Change in Control ("Payment") would (i) constitute a "parachute payment" within the meaning of Section 280G of the Code, and (ii) but for this sentence, be subject to the excise tax imposed by Section 4999 of the Code (the "Excise Tax"), then such Payment shall be equal to the Reduced Amount (as defined herein). The "Reduced Amount" shall be either (x) the largest portion of the Payment that would result in no portion of the Payment being subject to the Excise Tax, or (y) the largest portion, up to and including the total, of the Payment, whichever amount, after taking into account all applicable federal, state and local employment taxes, income taxes, and the Excise Tax (all computed at the highest applicable marginal rate), results in Executive's receipt, on an after-tax basis, of the greater amount of the Payment notwithstanding that all or some portion of the Payment may be subject to the Excise Tax. If a reduction in payments or benefits constituting "parachute payments" is necessary so that the Payment equals the Reduced Amount, reduction shall occur in the manner that results in the greatest economic benefit to Executive.

The independent registered public accounting firm engaged by the Company for general audit purposes as of the day prior to the effective date of the event described in Section 280G(b)(2)(A)(i) of the Code shall perform the foregoing calculations. If the independent registered public accounting firm so engaged by the Company is serving as accountant or auditor for the individual, entity or group effecting such event, the Company shall appoint a nationally recognized independent registered public accounting firm to make the determinations required hereunder. The Company shall bear all expenses with respect to the determinations by such independent registered public accounting firm required to be made hereunder. The independent registered public accounting firm engaged to make the determinations hereunder shall provide its calculations, together with detailed supporting documentation, to the Company and Executive within thirty (30) calendar days after the date on which Executive's right to a Payment is triggered (if requested at that time by the Company or Executive) or such other time as reasonably requested by the Company or Executive. Any good faith determinations of the independent registered public accounting firm made hereunder shall be final, binding and conclusive upon the Company and Executive.

4.9 Application of Internal Revenue Code Section 409A.

All benefits under this Agreement are intended to qualify for an exemption from application of Section 409A of the Code and the regulations and other guidance thereunder and any state law of similar effect ("Section 409A") or to comply with its requirements to the extent necessary to avoid adverse personal tax consequences under Section 409A, and any ambiguities herein shall be interpreted accordingly.

Notwithstanding anything to the contrary set forth herein, any severance benefits that constitute "deferred compensation" within the meaning of Section 409A shall not commence in connection with Executive's termination of employment unless and until Executive has also incurred a "separation from service" (as such term is defined in Treasury Regulation Section 1.409A-1(h)) ("Separation From Service"), unless the Company reasonably determines that such amounts may be provided to Executive without causing Executive to incur the additional 20% tax under Section 409A.

It is intended that each installment of the severance benefit payments provided for in this Agreement is a separate "payment" for purposes of Treasury Regulation Section 1.409A-2(b)(2)(i). For the avoidance of doubt, it is intended that payments of the severance benefits set forth in this Agreement satisfy, to the greatest extent possible, the exemptions from the application of Section 409A provided under Treasury Regulation Sections 1.409A-1(b)(4), 1.409A-1(b)(5) and 1.409A-1(b)(9). However, if the Company (or, if applicable, the successor entity thereto) determines that the severance benefits constitute "deferred compensation" under Section 409A and Executive is, on the termination of service, a "specified employee" of the Company or any successor entity thereto, as such term is defined in Section 409A(a)(2)(B)(i) of the Code, then, solely to the extent necessary to avoid the incurrence of the adverse personal tax consequences under Section 409A, the timing of the severance benefit payments shall be delayed until the earlier to occur of: (i) the date that is six months and one day after Executive's Separation From Service, or (ii) the date of Executive's death. None of the severance benefits will be paid or otherwise delivered prior to the effective date of the Release. If the severance benefits are not covered by one or more exemptions from the application of Section 409A and the Release could become effective in the calendar year following the calendar year in which Executive's Separation From Service occurs, the Release will not be deemed effective any earlier than the Release Deadline. Except to the minimum extent that payments must be delayed because Executive is a "specified employee" or until the effectiveness of the Release, all amounts will be paid as soon as practicable in accordance with the Company's normal payroll practices.

The severance benefits are intended to qualify for an exemption from application of Section 409A or comply with its requirements to the extent necessary to avoid adverse personal tax consequences under Section 409A, and any ambiguities herein shall be interpreted accordingly.

5. CONFIDENTIAL AND PROPRIETARY INFORMATION; NONSOLICITATION.

5.1 As a condition of employment, Executive agrees to execute and abide by the Company's Confidential Information and Inventions Assignment Agreement attached hereto as **EXHIBIT A**.

5.2 While employed by the Company and for one year thereafter, Executive agrees that in order to protect the Company's trade secrets and confidential and proprietary information from unauthorized use, Executive will not, either directly or through others, solicit or attempt to solicit any employee, consultant or independent contractor of the Company to terminate his or her relationship with the Company in order to become an employee, consultant or independent contractor to or for any other person or business entity.

6. ASSIGNMENT AND BINDING EFFECT.

This Agreement shall be binding upon and inure to the benefit of Executive and Executive's heirs, executors, personal representatives, assigns, administrators and legal representatives. Because of the unique and personal nature of Executive's duties under this Agreement, neither this Agreement nor any rights or obligations under this Agreement shall be assignable by Executive. This Agreement shall be binding upon and inure to the benefit of the Company and its successors, assigns and legal representatives.

7. NOTICES.

All notices or demands of any kind required or permitted to be given by the Company or Executive under this Agreement shall be given in writing and shall be personally delivered (and receipted for) or faxed during normal business hours or mailed by certified mail return receipt requested, postage prepaid, address as follows,

If to the Company:

Attn: Chief Executive Officer
Bionano Genomics, Inc.
9640 Towne Centre Drive, Suite 100
San Diego, CA 92121

If to Executive:

Mark Borodkin
13578 Ginger Glen Road
San Diego, CA 92130

Any such written notice shall be deemed given on the earlier of the date on which such notice is personally delivered or three (3) days after its deposit in the United States mail as specified above. Either Party may change its address for notices by giving notice to the other Party in the manner specified in this Section.

8. CHOICE OF LAW.

This Agreement shall be construed and interpreted in accordance with the internal laws of the State of California without regard to its conflict of laws principles.

9. INTEGRATION.

This Agreement, including **Exhibit A**, contains the complete, final and exclusive agreement of the Parties relating to the terms and conditions of Executive's employment and the termination of Executive's employment, and supersedes all prior and/or contemporaneous oral and written employment agreements or arrangements between the Parties.

10. AMENDMENT.

This Agreement cannot be amended or modified except by a written agreement signed by Executive and the Company.

11. WAIVER.

No term, covenant or condition of this Agreement or any breach thereof shall be deemed waived, except with the written consent of the Party against whom the wavier is claimed, and any waiver or any such term, covenant, condition or breach shall not be deemed to be a waiver of any preceding or succeeding breach of the same or any other term, covenant, condition or breach.

12. SEVERABILITY.

The finding by a court of competent jurisdiction of the unenforceability, invalidity or illegality of any provision of this Agreement shall not render any other provision of this Agreement unenforceable, invalid or illegal. Such court shall have the authority to modify or replace the invalid or unenforceable term or provision with a valid and enforceable term or provision which most accurately represents the Parties' intention with respect to the invalid or unenforceable term or provision.

13. INTERPRETATION; CONSTRUCTION.

The headings set forth in this Agreement are for convenience of reference only and shall not be used in interpreting this Agreement. This Agreement has been drafted by legal counsel representing the Company, but Executive has been encouraged to consult with, and have consulted with, Executive's own independent counsel and tax advisors with respect to the terms of this Agreement. The Parties acknowledge that each Party and its counsel has reviewed and revised, or had an opportunity to review and revise, this Agreement, and any rule of construction to the effect that any ambiguities are to be resolved against the drafting party shall not be employed in the interpretation of this Agreement.

14. REPRESENTATIONS AND WARRANTIES.

Executive represents and warrants that Executive is not restricted or prohibited, contractually or otherwise, from entering into and performing each of the terms and covenants contained in this Agreement, and that Executive's execution and performance of this Agreement will not violate or breach any other agreements between Executive and any other person or entity.

15. COUNTERPARTS; FACSIMILE.

This Agreement may be executed in two counterparts, each of which shall be deemed an original, all of which together shall contribute one and the same instrument. Facsimile signatures shall be treated the same as original signatures.

16. DISPUTE RESOLUTION.

To ensure the timely and economical resolution of disputes that may arise in connection with Executive's employment with the Company, Executive and the Company agree that any and all disputes, claims, or causes of action arising from or relating to the enforcement, breach, performance, negotiation, execution, or interpretation of this Agreement, Executive's employment, or the termination of Executive's employment, including but not limited to statutory

claims, shall be resolved to the fullest extent permitted by law by final, binding and confidential arbitration, by a single arbitrator, in Sacramento, California, conducted by JAMS, Inc. (***"JAMS"***) under the then applicable JAMS rules (which can be found at the following web address: http://www.jamsadr.com/rulesclauses). By agreeing to this arbitration procedure, both Executive and the Company waive the right to resolve any such dispute through a trial by jury or judge or administrative proceeding. The Company acknowledges that Executive will have the right to be represented by legal counsel at any arbitration proceeding. The arbitrator shall: (a) have the authority to compel adequate discovery for the resolution of the dispute and to award such relief as would otherwise be permitted by law; and (b) issue a written arbitration decision, to include the arbitrator's essential findings and conclusions and a statement of the award. The arbitrator shall be authorized to award any or all remedies that Executive or the Company would be entitled to seek in a court of law. The Company shall pay all JAMS' arbitration fees in excess of the amount of court fees that would be required of Executive if the dispute were decided in a court of law. Nothing in this Agreement is intended to prevent either Executive or the Company from obtaining injunctive relief in court to prevent irreparable harm pending the conclusion of any such arbitration. Any awards or orders in such arbitrations may be entered and enforced as judgments in the federal and state courts of any competent jurisdiction.

17. TRADE SECRETS OF OTHERS.

It is the understanding of both the Company and Executive that Executive shall not divulge to the Company and/or its subsidiaries any confidential information or trade secrets belonging to others, including Executive's former employers, nor shall the Company and/or its Affiliates seek to elicit from Executive any such information. Consistent with the foregoing, Executive shall not provide to the Company and/or its Affiliates, and the Company and/or its Affiliates shall not request, any documents or copies of documents containing such information.

18. ADVERTISING WAIVER.

Executive agrees to permit the Company and/or its affiliates, subsidiaries, or joint ventures currently existing or which shall be established during Executive's employment by the Company (collectively, ***"Affiliates"***), and persons or other organizations authorized by the Company and/or its Affiliates, to use, publish and distribute advertising or sales promotional literature concerning the products and/or services of the Company and/or its Affiliates, or the machinery and equipment used in the provision thereof, in which Executive's name and/or pictures of Executive taken in the course of Executive's provision of services to the Company and/or its Affiliates, appear. Executive hereby waives and releases any claim or right Executive may otherwise have arising out of such use, publication or distribution. The Company agrees that, following termination of Executive's employment, it will not create any new such literature containing Executive's name and/or pictures without Executive's prior written consent.

19. INDEMNIFICATION.

Subject to applicable law, Executive will be provided indemnification to the maximum extent permitted by the Company's Bylaws and Articles of Incorporation, including coverage, if applicable, under any directors and officers insurance policies, with such indemnification determined by the Board or any of its committees in good faith based on principles

consistently applied (subject to such limited exceptions as the Board may approve in cases of hardship) and on terms no less favorable than provided to any other Company executive officer or director.

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IN WITNESS WHEREOF, the Parties have executed this Agreement as of the date first above written.

BIONANO GENOMICS, INC

By: /s/ R. Erik Holmlin
R. Erik Holmlin, President and CEO

Date: Nov 7, 2017

EXECUTIVE

/s/ Mark Borodkin
Mark Borodkin

Date: 11/7/2017

EXHIBIT A

CONFIDENTIAL INFORMATION AND INVENTIONS ASSIGNMENT AGREEMENT

BIONANO GENOMICS, INC.

WESTERN ALLIANCE BANK, AN ARIZONA CORPORATION

LOAN AND SECURITY AGREEMENT

This **LOAN AND SECURITY AGREEMENT** is entered into as of March 8, 2016, by and between **WESTERN ALLIANCE BANK**, an Arizona corporation ("Bank") and **BIONANO GENOMICS, INC.** ("Borrower").

RECITALS

Borrower wishes to obtain credit from time to time from Bank, and Bank desires to extend credit to Borrower. This Agreement sets forth the terms on which Bank will advance credit to Borrower, and Borrower will repay the amounts owing to Bank.

AGREEMENT

The parties agree as follows:

1. DEFINITIONS AND CONSTRUCTION.

1.1 Definitions. As used in this Agreement, the following terms shall have the following definitions:

"Accounts" means all presently existing and hereafter arising accounts, contract rights, payment intangibles, and all other forms of obligations owing to Borrower arising out of the sale or lease of goods (including, without limitation, the licensing of software and other technology) or the rendering of services by Borrower, whether or not earned by performance, and any and all credit insurance, guaranties, and other security therefor, as well as all merchandise returned to or reclaimed by Borrower and Borrower's Books relating to any of the foregoing.

"Affiliate" means, with respect to any Person, any Person that owns or controls directly or indirectly such Person, any Person that controls or is controlled by or is under common control with such Person, and each of such Person's senior executive officers, directors, and partners.

"Amortization Date" is April 8, 2017; provided, however, if Borrower achieves the Irys Milestone, then the Amortization Date shall be extended to October 8, 2017.

"Bank Expenses" means all: reasonable costs or expenses (including reasonable attorneys' fees and expenses) incurred in connection with the preparation, negotiation, administration, and enforcement of the Loan Documents; reasonable Collateral audit fees; and Bank's reasonable attorneys' fees and expenses incurred in amending, enforcing or defending the Loan Documents (including fees and expenses of appeal), incurred before, during and after an Insolvency Proceeding, whether or not suit is brought.

"Borrower's Books" means all of Borrower's books and records including: ledgers; records concerning Borrower's assets or liabilities, the Collateral, business operations or financial condition; and all computer programs, or tape files, and the equipment, containing such information.

"Business Day" means any day that is not a Saturday, Sunday, or other day on which banks in the State of California are authorized or required to close.

"Change in Control" shall mean a transaction in which any "person" or "group" (within the meaning of Section 13(d) and 14(d)(2) of the Securities Exchange Act of 1934) becomes the "beneficial owner" (as defined in Rule 13d-3 under the Securities Exchange Act of 1934), directly or indirectly, of a sufficient number of shares of all classes of stock then outstanding of Borrower ordinarily entitled to vote in the election of directors, empowering such "person" or "group" to elect a majority of the Board of Directors of Borrower, who did not have such power before such transaction.

"Closing Date" means the date of this Agreement.

"Code" means the California Uniform Commercial Code.

"Collateral" means the property described on **Exhibit A** attached hereto.

"Contingent Obligation" means, as applied to any Person, any direct or indirect liability, contingent or otherwise, of that Person with respect to (i) any indebtedness, lease, dividend, letter of credit or other obligation of another; (ii) any obligations with respect to undrawn letters of credit, corporate credit cards, or merchant services issued or provided for the account of that Person; and (iii) all obligations arising under any agreement or arrangement designed to protect such Person against fluctuation in interest rates, currency exchange rates or commodity prices; provided, however, that the term "Contingent Obligation" shall not include endorsements for collection or deposit in the ordinary course of business. The amount of any Contingent Obligation shall be deemed to be an amount equal to the stated or determined amount of the primary obligation in respect of which such Contingent Obligation is made or, if not stated or determinable, the maximum reasonably anticipated liability in respect thereof as determined by Bank in good faith; provided, however, that such amount shall not in any event exceed the maximum amount of the obligations under the guarantee or other support arrangement.

"Copyrights" means any and all copyright rights, copyright applications, copyright registrations and like protections in each work or authorship and derivative work thereof.

"Credit Extension" means each Term Loan, or any other extension of credit by Bank for the benefit of Borrower hereunder.

"Daily Balance" means the principal amount of the Obligations owed at the end of a given day.

"Designated Deposit Account" means Borrower's primary depository or operating account with Bank.

"Domestic Subsidiary" means a Subsidiary organized under the laws of the United States or any state or territory thereof or the District of Columbia.

"Equipment" means all present and future machinery, equipment, tenant improvements, furniture, fixtures, vehicles, tools, parts and attachments in which Borrower has any interest.

"Equity Event' means Borrower's receipt, on or before the Closing Date, of at least Seven Million Dollars ($7,000,000) of net cash proceeds from the sale of its equity securities to investors and on terms and conditions reasonably acceptable to Bank.

"ERISA" means the Employee Retirement Income Security Act of 1974, as amended, and the regulations thereunder.

"Event of Default" has the meaning assigned in Article 8.

"Existing Indebtedness" is the indebtedness of Borrower to PWB in the aggregate principal outstanding amount as of the Closing Date of approximately Five Million Dollars ($5,000,000) pursuant to that certain Loan and Security Agreement, dated September 18, 2008, as amended from time to time, entered into by and between PWB and Borrower.

"Final Payment" is a payment (in addition to and not a substitution for the regular monthly payments of principal plus accrued interest) due on the earliest to occur of (a) the Term Loan Maturity Date, or (b) the acceleration of any Term Loan, or (c) the prepayment of a Term Loan pursuant to Section 2.2(c) or (d), equal to the original principal amount of the Term Loan multiplied by the Final Payment Percentage, payable to Bank.

"Final Payment Percentage" is three and one quarter percent (3.25%).

"Foreign Exchange Reserve Percentage" is defined in Section 2.1(d)(ii) hereof.

"Foreign Subsidiary" means any Subsidiary which is not a Domestic Subsidiary.

"Foreign Support Account" is defined in the Schedule.

"Funding Date" is any date on which a Credit Extension is made to or on account of Borrower which shall be a Business Day.

"GAAP" means generally accepted accounting principles as in effect from time to time.

"Indebtedness" means (a) all indebtedness for borrowed money or the deferred purchase price of property or services, including without limitation reimbursement and other obligations with respect to surety bonds and letters of credit, (b) all obligations evidenced by notes, bonds, debentures or similar instruments, (c) all capital lease obligations and (d) all Contingent Obligations.

"Index Rate" means the thirty (30) day U.S. LIBOR rate reported in the Wall Street Journal.

"Insolvency Proceeding" means any proceeding commenced by or against any person or entity under any provision of the United States Bankruptcy Code, as amended, or under any other bankruptcy or insolvency law, including assignments for the benefit of creditors, formal or informal moratoria, compositions, extension generally with its creditors, or proceedings seeking reorganization, arrangement, or other relief.

"Intellectual Property" means all of Borrower's right, title, and interest in and to the following: Copyrights, Trademarks and Patents; all trade secrets, all design rights, claims for damages by way of past, present and future infringement of any of the rights included above, all licenses or other rights to use any of the Copyrights, Patents or Trademarks, and all license fees and royalties arising from such use to the extent permitted by such license or rights; all amendments, renewals and extensions of any of the Copyrights, Trademarks or Patents; and all proceeds and products of the foregoing, including without limitation all payments under insurance or any indemnity or warranty payable in respect of any of the foregoing.

"Inventory" means all inventory in which Borrower has or acquires any interest, including work in process and finished products intended for sale or lease or to be furnished under a contract of service, of every kind and description now or at any time hereafter owned by or in the custody or possession, actual or constructive, of Borrower, including such inventory as is temporarily out of its custody or possession or in transit and including any returns upon any accounts or other proceeds, including insurance proceeds, resulting from the sale or disposition of any of the foregoing and any documents of title representing any of the above, and Borrower's Books relating to any of the foregoing.

"Investment" means any beneficial ownership of (including stock, partnership interest or other securities) any Person, or any loan, advance or capital contribution to any Person.

"IRC" means the Internal Revenue Code of 1986, as amended, and the regulations thereunder.

"Irys Milestone" means Borrower's successful placement of a minimum of twenty (20) Irys Instruments, at prices not less than Two Hundred Twenty-Five Thousand Dollars ($225,000) per instrument, during the 2016 fiscal year.

"Lien" means any mortgage, lien, deed of trust, charge, pledge, security interest or other encumbrance.

"Loan Documents" means, collectively, this Agreement, any note or notes executed by Borrower, and any other agreement entered into in connection with this Agreement, all as amended or extended from time to time.

"Material Adverse Effect" means a material adverse effect on (i) the business operations or condition (financial or otherwise) of Borrower and its Subsidiaries taken as a whole or (ii) the ability of Borrower to repay the Obligations or otherwise perform its obligations under the Loan Documents or (iii) the value or priority of Bank's security interests in the Collateral.

"Negotiable Collateral" means all letters of credit of which Borrower is a beneficiary, notes, drafts, instruments, securities, documents of title, and chattel paper, and Borrower's Books relating to any of the foregoing.

"Obligations" means all debt, principal, interest, the Prepayment Fee, the Final Payment, Bank Expenses and other amounts owed to Bank by Borrower pursuant to this Agreement or any other agreement, whether absolute or contingent, due or to become due, now existing or hereafter arising, including any interest that accrues after the commencement of an Insolvency Proceeding and including any debt, liability, or obligation owing from Borrower to others that Bank may have obtained by assignment or otherwise. Notwithstanding the foregoing, the "Obligations" shall not include any of Borrower's obligations under the Warrant.

"Patents" means all patents, patent applications and like protections including without limitation improvements, divisions, continuations, renewals, reissues, extensions and continuations-in-part of the same.

"Payment Date" means the first (1st) calendar day of each calendar month.

"Periodic Payments" means all installments or similar recurring payments that Borrower may now or hereafter become obligated to pay to Bank pursuant to the terms and provisions of any instrument, or agreement now or hereafter in existence between Borrower and Bank.

"Permitted Indebtedness" means:

(a) Indebtedness of Borrower in favor of Bank arising under this Agreement or any other Loan Document;

(b) Indebtedness existing on the Closing Date and disclosed in the Schedule;

(c) Indebtedness secured by a lien described in clause (c) of the defined term "Permitted Liens," provided (i) such Indebtedness does not exceed the lesser of the cost or fair market value of the equipment and software financed with such Indebtedness and (ii) such Indebtedness does not exceed Two Hundred Fifty Thousand Dollars ($250,000) in the aggregate at any given time;

(d) Subordinated Debt;

(e) Unsecured Indebtedness to trade creditors incurred in the ordinary course of business;

(f) Indebtedness incurred as a result of endorsing negotiable instruments received in the ordinary course of business;

(g) Indebtedness that also constitutes a Permitted Investment;

(h) Indebtedness consisting of reimbursement obligations with respect to letters of credit having a face amount not to exceed One Hundred Fifty Thousand Dollars ($150,000) in the aggregate issued by PWB to secure Borrower's obligations under real estate leases, and indebtedness related to a corporate credit facility not to exceed Fifty Thousand Dollars ($50,000) in the aggregate provided by PWB to Borrower, in each case for a period ending not later than ninety (90) days after the Closing Date;

(i) Indebtedness related to a corporate credit facility not to exceed Fifty Thousand Dollars ($50,000) in the aggregate provided by American Express to Borrower (which facility will replace the corporate credit facility provided by PWB to Borrower unless such facility is provided by Bank to Borrower instead);

(j) extensions, refinancings, modifications, amendments and restatements of any items of Permitted Indebtedness (a) through (i) above, provided that the principal amount thereof is not increased or

the terms thereof are not modified to impose more burdensome terms upon Borrower or its Subsidiary, as the case may be.

"Permitted Investment" means:

(a) Investments existing on the Closing Date disclosed in the Schedule;

(b) (i) marketable direct obligations issued or unconditionally guaranteed by the United States of America or any agency or any State thereof maturing within one (1) year from the date of acquisition thereof, (ii) commercial paper maturing no more than one (1) year from the date of creation thereof and currently having rating of at least A-2 or P-2 from either Standard & Poor's Corporation or Moody's Investors Service, (iii) certificates of deposit maturing no more than one (1) year from the date of investment therein issued by Bank and (iv) Bank's money market accounts;

(c) Investments consisting of the endorsement of negotiable instruments for deposit or collection or similar transactions in the ordinary course of Borrower;

(d) Investments consisting of deposit accounts or securities accounts in which Bank has a perfected security interest, except as provided in Section 6.7;

(e) Investments accepted in connection with Transfers permitted by Section 7.1;

(f) Investments consisting of the creation of a Subsidiary for the purpose of consummating a merger transaction permitted by Section 7.3 of this Agreement, which is otherwise a Permitted Investment;

(g) Investments by Borrower in Subsidiaries and by Subsidiaries in other Subsidiaries not to exceed Two Million Five Hundred Thousand Dollars ($2,500,000) in the aggregate in any fiscal year;

(h) Investments consisting of (i) travel advances and employee relocation loans and other employee loans and advances in the ordinary course of business, and (ii) loans to employees, officers or directors relating to the purchase of equity securities of Borrower or its Subsidiaries pursuant to employee stock purchase plans or agreements approved by Borrower's Board of Directors; not to exceed in the aggregate for (i) and (ii), One Hundred Fifty Thousand Dollars ($150,000) in any fiscal year;

(i) Investments (including debt obligations) received in connection with the bankruptcy or reorganization of customers or suppliers and in settlement of delinquent obligations of, and other disputes with, customers or suppliers arising in the ordinary course of business;

(j) Investments consisting of notes receivable of, or prepaid royalties and other credit extensions, to customers and suppliers who are not Affiliates, in the ordinary course of business; provided that this paragraph (j) shall not apply to Investments of Borrower in any Subsidiary;

(k) Repurchases of stock permitted by Section 7.6(i); and

(l) joint ventures or strategic alliances in the ordinary course of Borrower's business consisting of the non-exclusive licensing of technology, the development of technology or the providing of technical support, provided that any cash investments by Borrower do not exceed One Hundred Thousand Dollars ($100,000) in the aggregate in any fiscal year.

"Permitted Liens" means the following:

(a) Any Liens existing on the Closing Date and disclosed in the Schedule or arising under this Agreement or the other Loan Documents;

(b) Liens for taxes, fees, assessments or other governmental charges or levies, either not delinquent or being contested in good faith by appropriate proceedings, provided the same have no priority over any of Bank's security interests;

(c) Liens (including capital leases) (i) upon or in any equipment and related software which was not financed by Bank acquired or held by Borrower or any of its Subsidiaries to secure the purchase price of such equipment and software or indebtedness incurred solely for the purpose of financing the acquisition of such equipment and software, or (ii) existing on such equipment and software at the time of its acquisition, provided that the Lien is confined solely to the property so acquired and improvements thereon, and the proceeds of such equipment and software;

(d) Liens of carriers, warehousemen, suppliers, or other Persons that are possessory in nature arising in the ordinary course of business so long as such Liens secure liabilities in the aggregate amount not to exceed Two Hundred Fifty Thousand Dollars ($250,000) and are not delinquent or remain payable without penalty or are being contested in good faith and by appropriate proceedings which proceedings have the effect of preventing the forfeiture or sale of the property subject thereto;

(e) Liens to secure payment of workers' compensation, employment insurance, old-age pensions, social security and other like obligations incurred in the ordinary course of business (other than Liens imposed by ERISA);

(f) leases or subleases of real property granted in the ordinary course of Borrower's business (or, if referring to another Person, in the ordinary course of such Person's business), and leases, subleases, non-exclusive licenses or sublicenses of personal property (other than Intellectual Property) granted in the ordinary course of Borrower's business (or, if referring to another Person, in the ordinary course of such Person's business), if the leases, subleases, licenses and sublicenses do not prohibit granting Bank a security interest therein;

(g) non-exclusive licenses of Intellectual Property granted to third parties in the ordinary course of business, and licenses of Intellectual Property that could not result in a legal transfer of title of the licensed property that may be exclusive in respects other than territory and that may be exclusive as to territory only as to discreet geographical areas outside of the United States;

(h) statutory or common law Liens of landlords;

(i) deposits in the aggregate not to exceed $250,000 securing the performance of real estate leases entered into in the ordinary course of business;

(j) Liens in favor of customs and revenue authorities arising as a matter of law to secure payment of custom duties that are promptly paid on or before the date they become due;

(k) Liens arising from attachments or judgments, orders, or decrees in circumstances not constituting an Event of Default under Sections 8.4 and 8.7;

(l) Liens in favor of other financial institutions arising in connection with Borrower's deposit and/or securities accounts held at such institutions, provided that Borrower is permitted under the terms of this Agreement to maintain such accounts and Bank has a perfected security interest in the amounts held in such deposit and/or securities accounts, except as provided in Section 6.7.

(m) Liens on cash collateral to secure the obligations described in clause (h) of the definition of "Permitted Indebtedness"; and

(n) Liens incurred in connection with the extension, renewal or refinancing of the indebtedness secured by Liens of the type described in clauses (a) through (m) above, provided that any extension, renewal or replacement Lien shall be limited to the property encumbered by the existing Lien and the principal amount of the indebtedness being extended, renewed or refinanced does not increase.

"Person" means any individual, sole proprietorship, partnership, limited liability company, joint venture, trust, unincorporated organization, association, corporation, institution, public benefit corporation, firm, joint stock company, estate, entity or governmental agency.

"Prepayment Fee" is, with respect to any Term Loan subject to prepayment prior to the Term Loan Maturity Date, whether by mandatory or voluntary prepayment, acceleration or otherwise, an additional fee payable to Bank in an amount equal to:

(i) for a prepayment made on or after the Funding Date of the Term Loan and prior to the one year anniversary of the Closing Date, three percent (3.0%) of the principal amount of the Term Loan prepaid;

(ii) for a prepayment made on or after the one year anniversary of the Closing Date and prior to the two year anniversary of the Closing Date, two percent (2.0%) of the principal amount of the Term Loan prepaid; and

(iii) for a prepayment made on or after the two year anniversary of the Closing Date, one percent (1.0%) of the principal amount of the Term Loan prepaid.

"PWB" is Pacific Western Bank, a California state chartered bank, as successor in interest by merger with SQUARE 1 BANK, a North Carolina corporation

"Responsible Officer" means each of the Chief Executive Officer and the Chief Financial Officer of Borrower.

"Schedule" means the schedule of exceptions attached hereto and approved by Bank, if any, as the same may be updated from time to time, subject to Bank's prior written approval.

"Shares" is (i) one hundred percent (100%) of the issued and outstanding capital stock, membership units or other securities owned or held of record by Borrower or Borrower's Subsidiary, in any Domestic Subsidiary; and (ii) sixty-five percent (65%) of the issued and outstanding capital stock, membership units or other securities owned or held of record by Borrower or any Domestic Subsidiary in any Foreign Subsidiary.

"Square 1 Accounts" is defined in the Schedule.

"Square 1 Cash Collateral Accounts" is defined in the Schedule.

"Subordinated Debt" means any debt incurred by Borrower that is subordinated to the debt owing by Borrower to Bank on terms acceptable to Bank (and identified as being such by Borrower and Bank).

"Subsidiary" means any corporation, company or partnership in which (i) any general partnership interest or (ii) more than 50% of the stock or other units of ownership which by the terms thereof has the ordinary voting power to elect the Board of Directors, managers or trustees of the entity, at the time as of which any determination is being made, is owned by Borrower, either directly or through an Affiliate.

"SVB Accounts" is defined in the Schedule.

"Term Loan" is defined in Section 2.2(a)(ii) hereof.

"Term Loan Maturity Date" means April 1, 2020.

"Total Liabilities" means at any date as of which the amount thereof shall be determined, all obligations that should, in accordance with GAAP be classified as liabilities on the consolidated balance sheet of Borrower, including in any event all Indebtedness.

"Trademarks" means any trademark and servicemark rights, whether registered or not, applications to register and registrations of the same and like protections, and the entire goodwill of the business of Borrower connected with and symbolized by such trademarks.

"Warrant" means that certain Warrant to Purchase Stock issued by Borrower to Bank on the Closing Date, as the same may be amended from time to time.

1.2 Accounting Terms. All accounting terms not specifically defined herein shall be construed in accordance with GAAP and all calculations made hereunder shall be made in accordance with GAAP. When used herein, the terms "financial statements" shall include the notes and schedules thereto.

2. LOAN AND TERMS OF PAYMENT.

2.1 Credit Extensions.

Borrower promises to pay to the order of Bank, in lawful money of the United States of America, the aggregate unpaid principal amount of all Credit Extensions made by Bank to Borrower hereunder. Borrower shall also pay interest on the unpaid principal amount of such Credit Extensions at rates in accordance with the terms hereof.

2.2 Term Loan.

(a) Availability. Subject to the terms and conditions of this Agreement, Bank agrees to make a term loan to Borrower on the Closing Date in an aggregate amount of Seven Million Dollars ($7,000,000) Dollars. After repayment, no Term Loan may be re-borrowed.

(b) Repayment. Borrower shall make monthly payments of interest only, in arrears, commencing on the first (1st) Payment Date following the Funding Date of the Term Loan, and continuing on the Payment Date of each successive month thereafter through and including the Payment Date immediately preceding the Amortization Date. Borrower agrees to pay, on the Funding Date of the Term Loan, any initial partial monthly interest payment otherwise due for the period between the Funding Date of the Term Loan and the first Payment Date thereof. Commencing on the Amortization Date, and continuing on the Payment Date of each month thereafter, Borrower shall make equal monthly payments of principal, together with applicable interest, in arrears, to Bank, as calculated by Bank (which calculations shall be deemed correct absent manifest error) based upon: (1) the amount of the Term Loan, (2) the effective rate of interest, as determined in Section 2.4(a), and (3) a repayment schedule equal to (i) if the Amortization Date is April 8, 2017, thirty-six (36) months and (ii) if the Amortization Date is October 8, 2017, thirty (30) months. All unpaid principal and accrued and unpaid interest with respect to the Term Loan is due and payable in full on the Term Loan Maturity Date. The Term Loan may only be prepaid in accordance with Sections 2.2(c) and 2.2(d).

(c) Mandatory Prepayments. If the Term Loan is accelerated following the occurrence of an Event of Default, Borrower shall immediately pay to Bank, payable to Bank, an amount equal to the sum of: (i) all outstanding principal of the Term Loan plus accrued and unpaid interest thereon through the prepayment date, (ii) the Final Payment, (iii) the Prepayment Fee, plus (iv) all other Obligations that are due and payable, including Bank's Expenses and interest at the Default Rate with respect to any past due amounts. Notwithstanding (but without duplication with) the foregoing, on the Term Loan Maturity Date, if the Final Payment had not previously been paid in full in connection with the prepayment of the Term Loan in full, Borrower shall pay to Bank the Final Payment in respect of the Term Loan.

(d) Permitted Prepayment of Term Loan. Borrower shall have the option to prepay all, but not less than all, of the Term Loan advanced by Bank under this Agreement, provided Borrower (i) provides written notice to Bank of its election to prepay the Term Loan at least thirty (30) days prior to such prepayment, and (ii) pays to Bank on the date of such prepayment, payable to Bank, an amount equal to the sum of (A) all outstanding principal of the Term Loan plus accrued and unpaid interest thereon through the prepayment date, (B)

the Final Payment, (C) the Prepayment Fee, plus (D) all other Obligations that are due and payable, including Bank's Expenses and interest at the Default Rate with respect to any past due amounts.

2.3 Intentionally Omitted.

2.4 Interest Rates, Payments, and Calculations.

(a) Interest Rate. Except as set forth in Section 2.4(b), the Term Loan shall bear interest, on the outstanding Daily Balance thereof, at a floating per annum rate equal to the Index Rate plus six and fifty-two hundredths of one percent (6.52%).

(b) Late Fee; Default Rate. If any payment is not made within ten (10) days after the date such payment is due, Borrower shall pay Bank a late fee equal to the lesser of (i) five percent (5%) of the amount of such unpaid amount or (ii) the maximum amount permitted to be charged under applicable law, not in any case to be less than $25.00. All Obligations shall bear interest, from and after the occurrence and during the continuance of an Event of Default, at a rate equal to five (5) percentage points above the interest rate applicable immediately prior to the occurrence of the Event of Default.

(c) Payments. Interest hereunder shall be due and payable on the first calendar day of each month during the term hereof. Bank shall, at its option, charge such interest, all Bank Expenses, and all Periodic Payments against any of Borrower's deposit accounts (including but not limited to the Designated Deposit Account), in which case those amounts shall thereafter accrue interest at the rate then applicable hereunder. Any interest not paid when due shall be compounded by becoming a part of the Obligations, and such interest shall thereafter accrue interest at the rate then applicable hereunder. All payments shall be free and clear of any taxes, withholdings, duties, impositions or other charges, to the end that Bank will receive the entire amount of any Obligations payable hereunder, regardless of source of payment.

(d) Computation. In the event the Index Rate is changed from time to time hereafter, the applicable rate of interest hereunder shall be increased or decreased, effective as of the day the Index Rate is changed, by an amount equal to such change in the Index Rate. All interest chargeable under the Loan Documents shall be computed on the basis of a three hundred sixty (360) day year for the actual number of days elapsed.

2.5 Crediting Payments. Prior to the occurrence of an Event of Default, Bank shall credit a wire transfer of funds, check or other item of payment to such deposit account or Obligation as Borrower specifies. After the occurrence of an Event of Default, the receipt by Bank of any wire transfer of funds, check, or other item of payment shall be immediately applied to conditionally reduce Obligations, but shall not be considered a payment on account unless such payment is of immediately available federal funds or unless and until such check or other item of payment is honored when presented for payment. Notwithstanding anything to the contrary contained herein, any wire transfer or payment received by Bank after 12:00 noon Pacific time shall be deemed to have been received by Bank as of the opening of business on the immediately following Business Day. Whenever any payment to Bank under the Loan Documents would otherwise be due (except by reason of acceleration) on a date that is not a Business Day, such payment shall instead be due on the next Business Day, and additional fees or interest, as the case may be, shall accrue and be payable for the period of such extension.

2.6 Fees. Borrower shall pay to Bank the following:

(a) Facility Fee. On the Closing Date, a Facility Fee equal to Thirty-Five Thousand Dollars ($35,000) which shall be nonrefundable; Borrower has paid to Bank a deposit of $35,000 (the "Good Faith Deposit") to initiate Bank's due diligence review process. The Good Faith Deposit will be applied to the Facility Fee due on the Closing Date;

(b) Final Payment. The Final Payment, when due hereunder;

(c) Prepayment Fee. The Prepayment Fee, when due hereunder;

(d) Bank Expenses. On the Closing Date, all Bank Expenses incurred through the Closing Date, including reasonable attorneys' fees and expenses and, after the Closing Date, all Bank Expenses, including reasonable attorneys' fees and expenses, as and when they are incurred by Bank.

2.7 Term. This Agreement shall become effective on the Closing Date and, subject to Section 13.7, shall continue in full force and effect for so long as any Obligations (other than inchoate indemnity obligations) remain outstanding or Bank has any obligation to make Credit Extensions under this Agreement. Notwithstanding the foregoing, Bank shall have the right to terminate its obligation to make Credit Extensions under this Agreement immediately and without notice upon the occurrence and during the continuance of an Event of Default. Notwithstanding termination, Bank's Lien on the Collateral shall remain in effect for so long as any Obligations (other than inchoate indemnity obligations) are outstanding. Upon full and final payment and satisfaction, in cash, of all Obligations (other than inchoate indemnity obligations), and the full and final termination of all of Bank's obligations and commitments to make Credit Extensions, Bank shall, at Borrower's sole cost and expense, release the security interest in the Collateral granted under this Agreement and any other Loan Document.

2.8 Extension of Maturity. Notwithstanding anything contained herein to the contrary, Bank shall have the right, in its sole and absolute discretion, to extend the Term Loan Maturity Date to the tenth day of the month next following the actual Term Loan Maturity Date as stated in this Agreement.

3. CONDITIONS OF LOANS.

3.1 Conditions Precedent to Initial Credit Extension. The obligation of Bank to make the initial Credit Extension is subject to the condition precedent that Bank shall have received, in form and substance satisfactory to Bank, the following:

(a) this Agreement;

(b) a certificate of the Secretary of Borrower with respect to incumbency and resolutions authorizing the execution and delivery of this Agreement;

(c) UCC National Form Financing Statement;

(d) the Warrant;

(e) agreement to provide insurance;

(f) payment of the fees and Bank Expenses then due specified in Section 2.6 hereof;

(g) current financial statements of Borrower;

(h) evidence that Borrower has consummated the Equity Event, receipt of which hereby is acknowledged by Bank;

(i) a payoff letter from PWB, in respect of the Existing Indebtedness;

(j) evidence that (i) the Liens securing the Existing Indebtedness will be terminated and (ii) the documents and/or filings evidencing the perfection of such Liens, including without limitation any financing statements and/or control agreements, have or will, concurrently with the initial Credit Extension, be terminated; and

(k) such other documents, and completion of such other matters, as Bank may reasonably deem necessary or appropriate.

3.2 Conditions Precedent to all Credit Extensions. The obligation of Bank to make each Credit Extension, including the initial Credit Extension, is further subject to the following conditions:

(a) timely receipt by Bank of (i) the Advance Request Form in the form of Exhibit B-1 attached hereto; and (ii) the Disbursement Letter in the form of Exhibit B-2 attached hereto;

(b) the representations and warranties contained in Section 5 shall be true and correct in all material respects on and as of the date of such Advance Request Form and Disbursement Letter, and on the Funding Date of each Credit Extension as though made at and as of each such date, provided that those representations and warranties expressly referring to another date shall be true, correct and complete in all material respects as of such date, and no Event of Default shall have occurred and be continuing, or would exist after giving effect to such Credit Extension. The making of each Credit Extension shall be deemed to be a representation and warranty by Borrower on the date of such Credit Extension as to the accuracy of the facts referred to in this Section 3.2; and

(c) to the extent not delivered at the Closing Date, a duly executed original Warrants, in number, form and content acceptable to Bank with respect to each Credit Extension made by Bank after the Closing Date.

3.3 Post-Closing Condition. As soon as possible, but no later than thirty (30) days after the Closing Date, Borrower shall deliver to Bank, in form and substance satisfactory to Bank, the following:

(a) a landlord waiver for each of Borrower's leased locations at (i) 9540 Towne Centre Drive #100, San Diego, CA 92121 and (ii) 9640 Towne Centre Drive #100, San Diego, CA 92121; and

(b) an equipment holder's acknowledgment for each of (i) 5206 Eastgate Mall, San Diego CA 92121 and (ii) 9890 Pacific Heights Blvd. San Diego CA 92121.

3.4 Procedures for Borrowing. Subject to the prior satisfaction of all other applicable conditions to the making of the Term Loan set forth in this Agreement, to obtain the Term Loan, Borrower shall notify Bank (which notice shall be irrevocable) by electronic mail, facsimile, or telephone by 12:00 noon Pacific time three (3) Business Days prior to the date the Term Loan is to be made. Together with any such electronic, facsimile or telephonic notification, Borrower shall deliver to Bank by electronic mail or facsimile a completed Disbursement Letter executed by a Responsible Officer or his or her designee, together with the Warrant, in form and content reasonably acceptable to Bank. Bank may rely on any telephone notice given by a person whom Bank reasonably believes is a Responsible Officer or designee. On the Funding Date, Bank shall credit and/or transfer (as applicable) to the Designated Deposit Account, the amount of the Term Loan.

4. CREATION OF SECURITY INTEREST.

4.1 Grant of Security Interest. Borrower grants and pledges to Bank a continuing security interest in all presently existing and hereafter acquired or arising Collateral in order to secure prompt repayment of any and all Obligations and in order to secure prompt performance by Borrower of each of its covenants and duties under the Loan Documents (other than the Warrant). Except as set forth in the Schedule and Permitted Liens, such security interest constitutes a valid, first priority security interest in the presently existing Collateral, and will constitute a valid, first priority security interest in Collateral acquired after the date hereof.

4.2 Delivery of Additional Documentation Required. Borrower shall from time to time execute and deliver to Bank, at the request of Bank, all Negotiable Collateral, all financing statements and other documents that Bank may reasonably request, in form satisfactory to Bank, to perfect and continue the perfection of Bank's security interests in the Collateral and in order to fully consummate all of the transactions contemplated under the Loan Documents. Borrower from time to time may deposit with Bank specific time deposit accounts to secure specific Obligations. Borrower authorizes Bank to hold such balances in pledge and to decline to honor any drafts thereon or any request by Borrower or any other Person to pay or otherwise transfer any part of such balances for so long as such Obligations are outstanding.

4.3 Right to Inspect. Bank (through any of its officers, employees, or agents) shall have the right, upon reasonable prior notice, from time to time during Borrower's usual business hours but no more than once

a year (unless an Event of Default has occurred and is continuing), to inspect Borrower's Books and to make copies thereof and to check, test, and appraise the Collateral in order to verify Borrower's financial condition or the amount, condition of, or any other matter relating to, the Collateral.

4.4 Pledge of Collateral. Borrower hereby pledges, assigns and grants to Bank, a security interest in all the Shares, together with all proceeds and substitutions thereof, all cash, stock and other moneys and property paid thereon, all rights to subscribe for securities declared or granted in connection therewith, and all other cash and noncash proceeds of the foregoing, as security for the performance of the Obligations. No later than thirty (30) days after the Closing Date, the certificate or certificates for the Shares will be delivered to Bank, accompanied by an instrument of assignment duly executed in blank by Borrower. To the extent required by the terms and conditions governing the Shares, Borrower shall cause the books of each entity whose Shares are part of the Collateral and any transfer agent to reflect the pledge of the Shares. Upon the occurrence and during the continuance of an Event of Default hereunder, Bank may effect the transfer of any securities included in the Collateral (including but not limited to the Shares) into the name of Bank and cause new (as applicable) certificates representing such securities to be issued in the name of Bank or its transferee. Borrower will execute and deliver such documents, and take or cause to be taken such actions, as Bank may reasonably request to perfect or continue the perfection of Bank's security interest in the Shares. Unless an Event of Default shall have occurred and be continuing, Borrower shall be entitled to exercise any voting rights with respect to the Shares and to give consents, waivers and ratifications in respect thereof, provided that no vote shall be cast or consent, waiver or ratification given or action taken which would be inconsistent with any of the terms of this Agreement or which would constitute or create any violation of any of such terms. All such rights to vote and give consents, waivers and ratifications shall terminate upon the occurrence and during the continuance of an Event of Default.

5. REPRESENTATIONS AND WARRANTIES.

Borrower represents and warrants as follows:

5.1 Due Organization and Qualification. Borrower is a corporation duly existing under the laws of its state of incorporation and qualified and licensed to do business in any other state in which the conduct of its business or its ownership of property requires that it be so qualified. except where the failure to do so could not reasonably be expected to have a Material Adverse Effect. Each Subsidiary of Borrower is a corporation or other organization duly existing under the laws of its jurisdiction of formation and qualified and licensed to do business in any other jurisdiction in which the conduct of its business or its ownership of property requires that it be so qualified except where the failure to do so could not reasonably be expected to have a Material Adverse Effect.

5.2 Due Authorization; No Conflict. The execution, delivery, and performance of the Loan Documents are within Borrower's powers, have been duly authorized, and are not in conflict with nor constitute a breach of any provision contained in Borrower's Certificate of Incorporation or Bylaws, nor will they constitute an event of default under any material agreement to which Borrower is a party or by which Borrower is bound. Borrower is not in default under any material agreement to which it is a party or by which it is bound.

5.3 No Prior Encumbrances. Borrower has good and marketable title to its property, free and clear of Liens, except for Permitted Liens.

5.4 Bona Fide Accounts. The Accounts are bona fide existing obligations. The property and services giving rise to such Accounts have been delivered or rendered to the account debtor or to the account debtor's agent for immediate and unconditional acceptance by the account debtor. Borrower has not received notice of actual or imminent Insolvency Proceeding of any account debtor.

5.5 Merchantable Inventory. All Inventory is in all material respects of good and marketable quality, free from all material defects, except for Inventory for which adequate reserves have been made.

5.6 Intellectual Property. Borrower is the sole owner of the Intellectual Property, except for non-exclusive licenses granted by Borrower to its customers in the ordinary course of business. To the best of Borrower's knowledge, each of the Patents is valid and enforceable, and no part of the Intellectual Property material

to Borrower's business has been judged invalid or unenforceable, in whole or in part, and no claim has been made that any part of the Intellectual Property material to Borrower's business violates the rights of any third party. Except as set forth in the Schedule, Borrower's rights as a licensee of intellectual property do not give rise to more than five percent (5%) of its gross revenue in any given month, including without limitation revenue derived from the sale, licensing, rendering or disposition of any product or service. Except as set forth in the Schedule, Borrower is not a party to, or bound by, any material agreement that restricts the grant by Borrower of a security interest in Borrower's rights under such agreement except for Permitted Liens and customary anti-assignment provisions.

5.7 Name; Location of Chief Executive Office. Except as disclosed in the Schedule, Borrower has not done business under any name other than that specified on the signature page hereof. The chief executive office of Borrower is located at the address indicated in Section 10 hereof. or as notified to Bank in compliance with Section 7.2. Except as set forth in the Schedule and except for locations containing (i) less than Two Hundred Fifty Thousand Dollars ($250,000) in Borrower's assets or property in the aggregate or (ii) mobile equipment consisting of laptop computers and related hardware and software, all Borrower's Inventory and Equipment is located only at the location set forth in Section 10 hereof.

5.8 Litigation. Except as set forth in the Schedule or in a written notice to Bank in accordance with Section 6.3(d), there are no actions or proceedings pending by or against Borrower or any Subsidiary before any court or administrative agency in which an adverse decision could have a Material Adverse Effect, or a material adverse effect on Borrower's interest or Bank's security interest in the Collateral.

5.9 No Material Adverse Change in Financial Statements. All consolidated and consolidating financial statements related to Borrower and any Subsidiary that Bank has received from Borrower fairly present in all material respects Borrower's financial condition as of the date thereof and Borrower's consolidated and consolidating results of operations for the period then ended. There has not been a material adverse change in the consolidated or the consolidating financial condition of Borrower since the date of the most recent of such financial statements submitted to Bank.

5.10 Solvency, Payment of Debts. Borrower is solvent and able to pay its debts (including trade debts) as they mature.

5.11 Regulatory Compliance. Borrower and each Subsidiary have met the minimum funding requirements of ERISA with respect to any employee benefit plans subject to ERISA, and no event has occurred resulting from Borrower's failure to comply with ERISA that could result in Borrower's incurring any material liability. Borrower is not an "investment company" or a company "controlled" by an "investment company" within the meaning of the Investment Company Act of 1940. Borrower is not engaged principally, or as one of the important activities, in the business of extending credit for the purpose of purchasing or carrying margin stock (within the meaning of Regulations T and U of the Board of Governors of the Federal Reserve System). Borrower has complied with all the provisions of the Federal Fair Labor Standards Act. Borrower has not violated any statutes, laws, ordinances or rules applicable to it, violation of which could have a Material Adverse Effect.

5.12 Environmental Condition. Except as disclosed in the Schedule, none of Borrower's or any Subsidiary's properties or assets has ever been used by Borrower or any Subsidiary or, to the best of Borrower's knowledge, by previous owners or operators, in the disposal of, or to produce, store, handle, treat, release, or transport, any hazardous waste or hazardous substance other than in accordance with applicable law; to the best of Borrower's knowledge, none of Borrower's properties or assets has ever been designated or identified in any manner pursuant to any environmental protection statute as a hazardous waste or hazardous substance disposal site, or a candidate for closure pursuant to any environmental protection statute; no lien arising under any environmental protection statute has attached to any revenues or to any real or personal property owned by Borrower or any Subsidiary; and neither Borrower nor any Subsidiary has received a summons, citation, notice, or directive from the Environmental Protection Agency or any other federal, state or other governmental agency concerning any action or omission by Borrower or any Subsidiary resulting in the releasing, or otherwise disposing of hazardous waste or hazardous substances into the environment.

5.13 Taxes. Borrower and each Subsidiary have filed or caused to be filed all tax returns, or extensions to file such returns, required to be filed, and have paid, or have made adequate provision for the payment

of, all taxes reflected therein, except for taxes that are currently being contested in good faith, by appropriate proceedings promptly instituted and diligently prosecuted by the Borrower or Subsidiary and for which adequate reserves are maintained.

5.14 Subsidiaries. Borrower does not own any stock, partnership interest or other equity securities of any Person, except for Permitted Investments.

5.15 Government Consents. Borrower and each Subsidiary have obtained all material consents, approvals and authorizations of, made all declarations or filings with, and given all notices to, all governmental authorities that are necessary for the continued operation of Borrower's business as currently conducted.

5.16 Accounts. Except as disclosed on the Schedule or permitted by Section 6.7, none of Borrower's nor any Subsidiary's cash or cash equivalents is maintained or invested with a Person other than Bank or Bank's affiliates.

5.17 Shares. Borrower has full power and authority to create a first lien on the Shares and no disability or contractual obligation exists that would prohibit Borrower from pledging the Shares pursuant to this Agreement. To Borrower's knowledge, there are no subscriptions, warrants, rights of first refusal or other restrictions on transfer relative to, or options exercisable with respect to the Shares. The Shares have been and will be duly authorized and validly issued, and are fully paid and non-assessable. To Borrower's knowledge, the Shares are not the subject of any present or threatened suit, action, arbitration, administrative or other proceeding, and Borrower knows of no reasonable grounds for the institution of any such proceedings.

5.18 Use of Proceeds. Borrower shall use the proceeds of the Credit Extensions solely as working capital and to fund its general business requirements in accordance with the provisions of this Agreement, and not for personal, family, household or agricultural purposes. A portion of the proceeds of the Term Loan shall be used by Borrower to repay the Existing Indebtedness in full on the Closing Date.

5.19 Full Disclosure. No representation, warranty or other statement made by Borrower in any certificate or written statement furnished to Bank contains any untrue statement of a material fact or omits to state a material fact necessary in order to make the statements contained in such certificates or statements not misleading. The Bank acknowledges that the projections and forecasts provided by Borrower in good faith and based upon reasonable assumptions are not to be viewed as facts and that actual results during the period or periods covered by any such projections and forecasts may differ from the projected or forecasted results.

6. AFFIRMATIVE COVENANTS.

Borrower shall do all of the following:

6.1 Good Standing. Borrower shall maintain its corporate existence and good standing in its jurisdiction of incorporation and maintain qualification in each other jurisdiction in which it is required under applicable law except where the failure to be so qualified could not reasonably be expected to have a Material Adverse Effect. Borrower shall cause each of its Subsidiaries to maintain its organizational existence and good standing in its jurisdiction of formation and maintain qualification in each other jurisdiction in which it is required under applicable law except where the failure to be so qualified could not reasonably be expected to have a Material Adverse Effect. Borrower shall maintain, and shall cause each of its Subsidiaries to maintain, in force all licenses, approvals and agreements, the loss of which could have a Material Adverse Effect.

6.2 Government Compliance. Borrower shall meet, and shall cause each Subsidiary to meet, the minimum funding requirements of ERISA with respect to any employee benefit plans subject to ERISA. Borrower shall comply, and shall cause each Subsidiary to comply, with all statutes, laws, ordinances and government rules and regulations to which it is subject, noncompliance with which could have a Material Adverse Effect.

6.3 Financial Statements, Reports, Certificates. Borrower shall deliver the following to Bank: (a) as soon as available, but in any event within thirty (30) days after the end of each calendar month, a company prepared consolidated balance sheet, income statement, and cash flow statement covering Borrower's consolidated operations during such period, prepared in accordance with GAAP, consistently applied, in a form acceptable to Bank and certified by a Responsible Officer; (b) as soon as available, but in any event within one hundred eighty (180) days after the end of Borrower's fiscal year, audited consolidated financial statements of Borrower prepared in accordance with GAAP, consistently applied, together with an unqualified opinion on such financial statements of an independent certified public accounting firm reasonably acceptable to Bank; (c) copies of all statements, reports and notices sent or made available generally by Borrower to its security holders or to any holders of Subordinated Debt and, if applicable, all reports on Forms 10-K and 10-Q filed with the Securities and Exchange Commission; (d) promptly upon receipt of notice thereof, a report of any legal actions pending or threatened against Borrower or any Subsidiary that could result in damages or costs to Borrower or any Subsidiary of One Hundred Thousand Dollars ($100,000) or more; (e) as soon as available, but in any event within forty-five (45) days after the end of each fiscal year of Borrower, (i) annual operating budgets (including income statements, balance sheets and cash flow statements, by month) for the upcoming fiscal year of Borrower, and (ii) annual financial projections for the following fiscal year as approved by Borrower's board of directors, together with any related business forecasts used in the preparation of such annual financial projections; and (f) such budgets, sales projections, operating plans or other financial information as Bank may reasonably request from time to time.

Borrower shall deliver to Bank with the monthly financial statements a Compliance Certificate signed by a Responsible Officer in substantially the form of Exhibit D hereto.

Bank shall have a right from time to time hereafter to audit Borrower's Accounts and appraise Collateral at Borrower's expense, provided that such audits will be conducted no more often than once per year unless an Event of Default has occurred and is continuing.

6.4 Inventory; Returns. Borrower shall keep all Inventory in good and marketable condition, free from all material defects except for Inventory for which adequate reserves have been made. Returns and allowances, if any, as between Borrower and its account debtors shall be on the same basis and in accordance with the usual customary practices of Borrower, as they exist at the time of the execution and delivery of this Agreement. Borrower shall promptly notify Bank of all returns and recoveries and of all disputes and claims, where the return, recovery, dispute or claim involves more than One Hundred Thousand Dollars ($100,000).

6.5 Taxes. Borrower shall make, and shall cause each Subsidiary to make, due and timely payment or deposit of all material federal, state, and local taxes, assessments, or contributions required of it by law, and will execute and deliver to Bank, on demand, appropriate certificates attesting to the payment or deposit thereof; and Borrower will make, and will cause each Subsidiary to make, timely payment or deposit of all material tax payments and withholding taxes required of it by applicable laws, including, but not limited to, those laws concerning F.I.C.A., F.U.T.A., state disability, and local, state, and federal income taxes, and will, upon request, furnish Bank with proof satisfactory to Bank indicating that Borrower or a Subsidiary has made such payments or deposits; provided that Borrower or a Subsidiary need not make any payment if the amount or validity of such payment is contested in good faith by appropriate proceedings and is reserved against (to the extent required by GAAP) by Borrower.

6.6 Insurance.

(a) Borrower, at its expense, shall keep the Collateral insured against loss or damage by fire, theft, explosion, sprinklers, and all other hazards and risks, and in such amounts, as ordinarily insured against by other owners in similar businesses conducted in the locations where Borrower's business is conducted on the date hereof. Borrower shall also maintain insurance relating to Borrower's business, ownership and use of the Collateral in amounts and of a type that are customary to businesses similar to Borrower's.

(b) All such policies of insurance shall be in such form, with such companies, and in such amounts as are reasonably satisfactory to Bank. All such policies of property insurance shall contain a lender's loss payable endorsement, in a form reasonably satisfactory to Bank, showing Bank as an additional loss payee thereof, and all liability insurance policies shall show the Bank as an additional insured and shall specify that the

insurer must give at least twenty (20) days (ten (10) days notice for non-payment of premium) notice to Bank before canceling its policy for any reason. Upon Bank's request, Borrower shall deliver to Bank certified copies of such policies of insurance and evidence of the payments of all premiums therefor. All proceeds payable under any such policy shall, at the option of Bank, be payable to Bank to be applied on account of the Obligations.

6.7 Accounts. Borrower shall (i) within ninety (90) days of the Closing Date (the "Transition Period"), maintain and shall cause each of its Domestic Subsidiaries to maintain its primary depository, operating, and investment accounts with Bank or Bank's affiliates, and (ii) endeavor to utilize and shall cause each of its Subsidiaries to endeavor to utilize Bank's International Banking Division for any international banking services required by Borrower, including, but not limited to, foreign currency wires, hedges, and swaps. Notwithstanding the foregoing, during the Transition Period (x) Borrower and its Domestic Subsidiaries shall not maintain more than One Million Dollars ($1,000,000) in the aggregate in accounts outside of Bank or Bank's affiliate; provided that, in addition to the foregoing amount, the Foreign Support Account may maintain up to Two Hundred Fifty Thousand Dollars ($250,000.00) and the Square 1 Cash Collateral Accounts may maintain up to Two Hundred Thousand Dollars ($200,000.00); and (y) all such primary depository, operating, and investment accounts of Borrower and its Domestic Subsidiaries, except for the Square 1 Cash Collateral Accounts, shall, within ten (10) days of the Closing Date, be subject to control agreements in favor of, and in form and content reasonably acceptable to, Bank. For sake of clarity, but subject to the preceding requirements and limitations, Borrower (A) shall be permitted to maintain the SVB Accounts indefinitely, and (B) must close the Square 1 Accounts within ninety (90) days of the Closing Date.

6.8 Term Sheet and Funding Milestone; Minimum Cash. On or before May 31, 2016, Borrower shall have received a term sheet (the "Post-Close Term Sheet") for the sale of at least Fifteen Million Dollars ($15,000,000) of Borrower's equity securities (the "Post-Close Equity"), on terms and from investors reasonably acceptable to Bank, which Post-Close Term sheet must be executed on or before June 30, 2016. Borrower shall have received the Post-Close Equity on or before August 31, 2016. Notwithstanding anything to the contrary in Section 6.7, Borrower shall at all times from the Closing Date through receipt of the Post-Close Equity maintain in an account with Bank not less than One Million Dollars ($1,000,000).

6.9 Performance to Plan; Minimum Cash. Borrower's actual trailing six-month revenues, as of any date of determination, shall be no less than seventy-five percent (75%) of Borrower's projected revenues (the "Revenue Covenant"), as set forth in the table attached as Exhibit C hereto; provided that Borrower shall not be required to comply with the Revenue Covenant as long as Borrower at all times maintains a ratio of (i) minimum unrestricted cash in accounts with Bank to (ii) Indebtedness to Bank, of at least 1.25 to 1.00.

6.10 Intellectual Property Rights.

(a) Borrower shall, concurrently with the delivery of the monthly Compliance Certificate, give Bank written notice of any applications or registrations of intellectual property rights filed with the United States Patent and Trademark Office, including the date of such filing and the registration or application numbers, if any, and the filing of any applications or registrations with the United States Copyright Office, including the title of such intellectual property rights to be registered, as such title will appear on such applications or registrations, and the date such applications or registrations will be filed.

(b) Bank may audit Borrower's Intellectual Property to confirm compliance with this Section, provided such audit may not occur more often than once per year, unless an Event of Default has occurred and is continuing. Bank shall have the right, but not the obligation, to take, at Borrower's sole expense, any actions that Borrower is required under this Section to take but which Borrower fails to take, after 15 days' notice to Borrower. Borrower shall reimburse and indemnify Bank for all reasonable costs and reasonable expenses incurred in the reasonable exercise of its rights under this Section.

6.11 Formation or Acquisition of Subsidiaries. Notwithstanding and without limiting the negative covenants contained in Sections 7.3 and 7.7 hereof, at the time that Borrower or any guarantor forms any direct or indirect Subsidiary or acquires any direct or indirect Subsidiary after the Closing Date, Borrower and such guarantor shall (a) cause such new Domestic Subsidiary to provide to Bank (i) a joinder to this Agreement, to cause such Domestic Subsidiary to become a co-borrower hereunder or (ii) a Guaranty and security agreement, to cause

such Domestic Subsidiary to become a guarantor hereunder; in each case, together with such appropriate financing statements and/or Control Agreements, all in form and substance satisfactory to Bank (including being sufficient to grant Bank a first priority Lien (subject to Permitted Liens) in and to the assets of such newly formed or acquired Domestic Subsidiary), (b) provide to Bank appropriate certificates and powers and financing statements, pledging all of the Shares in such new Subsidiary, in form and substance satisfactory to Bank, and (c) provide to Bank all other documentation in form and substance satisfactory to Bank, which in its opinion is appropriate with respect to the execution and delivery of the applicable documentation referred to above. Any document, agreement, or instrument executed or issued pursuant to this Section shall be a Loan Document.

6.12 Further Assurances. At any time and from time to time Borrower shall execute and deliver such further instruments and take such further action as may reasonably be requested by Bank to effect the purposes of this Agreement.

7. NEGATIVE COVENANTS.

Borrower will not do any of the following without the Bank's prior written consent (not to be unreasonably withheld):

7.1 Dispositions. Convey, sell, lease, transfer or otherwise dispose of (collectively, a "Transfer"), or permit any of its Subsidiaries to Transfer, all or any part of its business or property, other than: (i) Transfers of Inventory in the ordinary course of business; (ii) Transfers of non-exclusive licenses and similar arrangements for the use of the property of Borrower or its Subsidiaries in the ordinary course of business; and licenses of Intellectual Property that could not result in a legal transfer of title of the licensed property that may be exclusive in respects other than territory and that may be exclusive as to territory only as to discrete geographical areas outside of the United States; (iii) Transfers of worn-out or obsolete Equipment which was not financed by Bank.; (iv) Permitted Liens and Permitted Investments; (v) Transfers between Borrower and one or more Domestic Subsidiaries that are guarantors of the Obligations or co-borrowers hereunder; (vi) Transfers from any Subsidiary to Borrower; and (vii) Transfers from Borrower to one or more Foreign Subsidiaries in the form of payment by Borrower for services provided by such Subsidiary(ies) pursuant to cost plus expense reimbursement arrangements entered into in the ordinary course of business.

7.2 Change in Business; Change in Control or Executive Office. Engage in any business, or permit any of its Subsidiaries to engage in any business, other than the businesses currently engaged in by Borrower and any business substantially similar or related thereto (or incidental thereto); or cease to conduct business in the manner conducted by Borrower as of the Closing Date; or suffer or permit a Change in Control; or without thirty (30) days prior written notification to Bank, relocate its chief executive office or state of incorporation or change its legal name; or without Bank's prior written consent, change the date on which its fiscal year ends.

7.3 Mergers or Acquisitions. Merge or consolidate, or permit any of its Subsidiaries to merge or consolidate, with or into any other business organization (other than mergers or consolidations of a Subsidiary into another Subsidiary or into Borrower, with Borrower being the surviving entity), or acquire, or permit any of its Subsidiaries to acquire, all or substantially all of the capital stock or property of another Person.

7.4 Indebtedness. Create, incur, assume or be or remain liable with respect to any Indebtedness, or permit any Subsidiary so to do, other than Permitted Indebtedness.

7.5 Encumbrances. Create, incur, assume or suffer to exist any Lien with respect to any of its property (including without limitation, its Intellectual Property), or assign or otherwise convey any right to receive income, including the sale of any Accounts, or permit any of its Subsidiaries to do so, except for Permitted Liens, or agree with any Person other than Bank not to grant a security interest in, or otherwise encumber, any of its property (including without limitation, its Intellectual Property), or permit any Subsidiary to do so, except for Permitted Liens and customary anti-assignment provisions.

7.6 Distributions. Pay any dividends or make any other distribution or payment on account of or in redemption, retirement or purchase of any capital stock, or permit any of its Subsidiaries to do so, except

that (i) Borrower may repurchase the stock of former employees pursuant to stock repurchase agreements as long as an Event of Default does not exist prior to such repurchase or would not exist after giving effect to such repurchase., (ii) Borrower may convert any of its convertible securities into other securities pursuant to the terms of such convertible securities or otherwise in exchange thereof, (iii) Borrower may pay dividends solely in common stock, and (iv) Subsidiaries of Borrower may pay dividends or make distributions to Borrower.

7.7 Investments. Directly or indirectly acquire or own, or make any Investment in or to any Person, or permit any of its Subsidiaries so to do, other than Permitted Investments; or maintain or invest any of its cash or cash equivalents with a Person other than Bank or Bank's affiliates or permit any of its Subsidiaries to do so unless such Person has entered into an account control agreement with Bank in form and substance satisfactory to Bank except as provided in Section 6.7; or suffer or permit any Subsidiary to be a party to, or be bound by, an agreement that restricts such Subsidiary from paying dividends or otherwise distributing property to Borrower.

7.8 Transactions with Affiliates. Directly or indirectly enter into or permit to exist any material transaction with any Affiliate of Borrower except for (i) transactions that are in the ordinary course of Borrower's business, upon fair and reasonable terms that are no less favorable to Borrower than would be obtained in an arm's length transaction with a non-affiliated Person., (ii) sales of equity securities and unsecured debt financings so long as all such Indebtedness is Subordinated Debt, (iii) Investments permitted under sub-clauses (a), (f), (g), (h), or (k) of the definition of Permitted Investments, and (iv) transactions between or among Borrower and any of its Subsidiaries that are otherwise permitted hereunder.

7.9 Subordinated Debt. Make any payment in respect of any Subordinated Debt, or permit any of its Subsidiaries to make any such payment, except in compliance with the terms of such Subordinated Debt, or amend any provision contained in any documentation relating to the Subordinated Debt, except in compliance with the terms of such Subordinated Debt, without Bank's prior written consent.

7.10 Inventory and Equipment. Store the Inventory or the Equipment with a bailee, warehouseman, or other third party in an aggregate amount of more than Two Hundred Fifty Thousand Dollars ($250,000) unless the third party has been notified of Bank's security interest and Bank (a) has received an acknowledgment from the third party that it is holding or will hold the Inventory or Equipment for Bank's benefit or (b) is in pledge possession of the warehouse receipt, where negotiable, covering such Inventory or Equipment. Except as set forth on the Schedule and except for mobile equipment consisting of laptop computers and related hardware and software, store or maintain any Equipment or Inventory in an aggregate amount of more than Two Hundred Fifty Thousand Dollars ($250,000) at a location other than the location set forth in Section 10 of this Agreement.

7.11 Compliance. Become an "investment company" or be controlled by an "investment company," within the meaning of the Investment Company Act of 1940, or become principally engaged in, or undertake as one of its important activities, the business of extending credit for the purpose of purchasing or carrying margin stock, or use the proceeds of any Credit Extension for such purpose. Fail to meet the minimum funding requirements of ERISA, permit a Reportable Event or Prohibited Transaction, as defined in ERISA, to occur, fail to comply with the Federal Fair Labor Standards Act or violate any law or regulation, which violation could have a Material Adverse Effect, or a material adverse effect on the Collateral or the priority of Bank's Lien on the Collateral, or permit any of its Subsidiaries to do any of the foregoing.

7.12 Assets in Foreign Subsidiaries. Permit Foreign Subsidiaries to hold or maintain, at any time, assets of an aggregate value in excess of (i) Two Hundred Fifty Thousand Dollars ($250,000.00) in the case of BioNano Genomics UK, Ltd. and (ii) One Hundred Fifty Thousand Dollars ($150,000.00) in the case of BioNano Genomics (Shanghai) Trading Co., Ltd., calculated on a dollar equivalent basis.

8. EVENTS OF DEFAULT.

Any one or more of the following events shall constitute an Event of Default by Borrower under this Agreement:

8.1 Payment Default. If Borrower fails to pay, when due, any of the Obligations;

8.2 Covenant Default.

(a) If Borrower fails to perform any obligation under Article 6 or violates any of the covenants contained in Article 7 of this Agreement; or

(b) If Borrower fails or neglects to perform or observe any other material term, provision, condition, covenant contained in this Agreement, in any of the Loan Documents, or in any other present or future agreement between Borrower and Bank and as to any default under such other term, provision, condition or covenant that can be cured, has failed to cure such default within ten days after Borrower receives notice thereof or any officer of Borrower becomes aware thereof; provided, however, that if the default cannot by its nature be cured within the ten day period or cannot after diligent attempts by Borrower be cured within such ten day period, and such default is likely to be cured within a reasonable time, then Borrower shall have an additional reasonable period (which shall not in any case exceed 30 days) to attempt to cure such default, and within such reasonable time period the failure to have cured such default shall not be deemed an Event of Default but no Credit Extensions will be made.

8.3 Material Adverse Effect. If there occurs any circumstance or circumstances that could reasonably be expected to have a Material Adverse Effect;

8.4 Attachment. If any portion of Borrower's assets valued in excess of Two Hundred Fifty Thousand Dollars ($250,000) is attached, seized, subjected to a writ or distress warrant, or is levied upon, or comes into the possession of any trustee, receiver or person acting in a similar capacity and such attachment, seizure, writ or distress warrant or levy has not been removed, discharged or rescinded within twenty (20) days, or if Borrower is enjoined, restrained, or in any way prevented by court order from continuing to conduct all or any material part of its business affairs, or if a judgment or other claim becomes a lien or encumbrance upon any material portion of Borrower's assets valued in excess of Two Hundred Fifty Thousand Dollars ($250,000), or if a notice of lien, levy, or assessment is filed of record with respect to any of Borrower's assets valued in excess of Two Hundred Fifty Thousand Dollars ($250,000) by the United States Government, or any department, agency, or instrumentality thereof, or by any state, county, municipal, or governmental agency, and the same is not paid within twenty (20) days after Borrower receives notice thereof, provided that none of the foregoing shall constitute an Event of Default where such action or event is stayed or an adequate bond has been posted pending a good faith contest by Borrower (provided that no Credit Extensions will be required to be made during such cure period);

8.5 Insolvency. If Borrower becomes insolvent, or if an Insolvency Proceeding is commenced by Borrower, or if an Insolvency Proceeding is commenced against Borrower and is not dismissed or stayed within forty-five (45) days (provided that no Credit Extensions will be made prior to the dismissal of such Insolvency Proceeding);

8.6 Other Agreements. If there is a default by Borrower or other failure of Borrower to perform in any agreement to which Borrower is a party or by which it is bound resulting in a right by a third party or parties, whether or not exercised, to accelerate the maturity of any Indebtedness in an amount in excess of Two Hundred Fifty Thousand Dollars ($250,000) or which could reasonably be expected to have a Material Adverse Effect; provided, however, that the Event of Default under this Section caused by the occurrence of a breach or default under such other agreement shall be cured or waived for purposes of this Agreement upon Bank receiving written notice from the party asserting such breach or default of such cure or waiver of the breach or default under such other agreement, if at the time of such cure or waiver under such other agreement (x) Bank has not declared an Event of Default under this Agreement and/or exercised any rights with respect thereto; (y) any such cure or waiver does not result in an Event of Default under any other provision of this Agreement or any Loan Document; and (z)

in connection with any such cure or waiver under such other agreement, the terms of any agreement with such third party are not modified or amended in any manner which could in the good faith business judgment of Bank be materially less advantageous to Borrower or any guarantor;

8.7 Judgments. If a judgment or judgments for the payment of money in an amount, individually or in the aggregate, of at least One Hundred Thousand Dollars ($100,000) (not covered by independent third-party insurance as to which liability has been accepted by such insurance carrier) shall be rendered against Borrower and shall remain unsatisfied and unstayed for a period of twenty (20) days (provided that no Credit Extensions will be made prior to the satisfaction or stay of such judgment); or

8.8 Misrepresentations. If any material misrepresentation or material misstatement exists now or hereafter in any warranty or representation set forth herein or in any certificate delivered to Bank by any Responsible Officer pursuant to this Agreement or to induce Bank to enter into this Agreement or any other Loan Document.

8.9 Guaranty. If any guaranty of all or a portion of the Obligations (a "Guaranty") ceases for any reason to be in full force and effect, or any guarantor fails to perform any obligation under any Guaranty or a security agreement securing any Guaranty (collectively, the "Guaranty Documents"), or any event of default occurs under any Guaranty Document or any guarantor revokes or purports to revoke a Guaranty, or any material misrepresentation or material misstatement exists now or hereafter in any warranty or representation set forth in any Guaranty Document or in any certificate delivered to Bank in connection with any Guaranty Document, or if any of the circumstances described in Sections 8.3 through 8.8 occur with respect to any guarantor or any guarantor dies or becomes subject to any criminal prosecution.

9. BANK'S RIGHTS AND REMEDIES.

9.1 Rights and Remedies. Upon the occurrence and during the continuance of an Event of Default, Bank may, at its election, without notice of its election and without demand, do any one or more of the following, all of which are authorized by Borrower:

(a) Declare all Obligations, whether evidenced by this Agreement, by any of the other Loan Documents, or otherwise, immediately due and payable (provided that upon the occurrence of an Event of Default described in Section 8.5, all Obligations shall become immediately due and payable without any action by Bank);

(b) Cease advancing money or extending credit to or for the benefit of Borrower under this Agreement or under any other agreement between Borrower and Bank;

(c) Settle or adjust disputes and claims directly with account debtors for amounts, upon terms and in whatever order that Bank reasonably considers advisable;

(d) Make such payments and do such acts as Bank considers necessary or reasonable to protect its security interest in the Collateral. Borrower agrees to assemble the Collateral if Bank so requires, and to make the Collateral available to Bank as Bank may designate. Borrower authorizes Bank to enter the premises where the Collateral is located, to take and maintain possession of the Collateral, or any part of it, and to pay, purchase, contest, or compromise any encumbrance, charge, or lien which in Bank's determination appears to be prior or superior to its security interest and to pay all expenses incurred in connection therewith. With respect to any of Borrower's owned premises, Borrower hereby grants Bank a license to enter into possession of such premises and to occupy the same, without charge, in order to exercise any of Bank's rights or remedies provided herein, at law, in equity, or otherwise;

(e) Set off and apply to the Obligations any and all (i) balances and deposits of Borrower held by Bank, or (ii) indebtedness at any time owing to or for the credit or the account of Borrower held by Bank;

(f) Ship, reclaim, recover, store, finish, maintain, repair, prepare for sale, advertise for sale, and sell (in the manner provided for herein) the Collateral. Bank is hereby granted a license or other right, solely pursuant to the provisions of this Section 9. 1, to use, without charge, Borrower's labels, patents, copyrights, rights of use of any name, trade secrets, trade names, trademarks, service marks, and advertising matter, or any property of a similar nature, as it pertains to the Collateral, in completing production of, advertising for sale, and selling any Collateral and, in connection with Bank's exercise of its rights under this Section 9. 1, Borrower's rights under all licenses and all franchise agreements shall inure to Bank's benefit;

(g) Dispose of the Collateral by way of one or more contracts or transactions, for cash or on terms, in such manner and at such places (including Borrower's premises) as Bank determines is commercially reasonable, and apply any proceeds to the Obligations in whatever manner or order Bank deems appropriate;

(h) Bank may credit bid and purchase at any public sale; and

(i) Any deficiency that exists after disposition of the Collateral as provided above will be paid immediately by Borrower.

9.2 Power of Attorney. Effective only upon the occurrence and during the continuance of an Event of Default, Borrower hereby irrevocably appoints Bank (and any of Bank's designated officers, or employees) as Borrower's true and lawful attorney to: (a) send requests for verification of Accounts or notify account debtors of Bank's security interest in the Accounts; (b) endorse Borrower's name on any checks or other forms of payment or security that may come into Bank's possession; (c) sign Borrower's name on any invoice or bill of lading relating to any Account, drafts against account debtors, schedules and assignments of Accounts, verifications of Accounts, and notices to account debtors; (d) dispose of any Collateral; (e) make, settle, and adjust all claims under and decisions with respect to Borrower's policies of insurance; (f) settle and adjust disputes and claims respecting the accounts directly with account debtors, for amounts and upon terms which Bank determines to be reasonable; and (g) to file, in its sole discretion, one or more financing or continuation statements and amendments thereto, relative to any of the Collateral. The appointment of Bank as Borrower's attorney in fact, and each and every one of Bank's rights and powers, being coupled with an interest, is irrevocable until all of the Obligations (other than inchoate indemnity obligations) have been fully repaid and performed and Bank's obligation to provide Credit Extensions hereunder is terminated.

9.3 Accounts Collection. At any time after the occurrence and during the continuance of an Event of Default, (i) Bank may notify any Person owing funds to Borrower of Bank's security interest in such funds and verify the amount of such Account and (ii) Borrower shall collect all amounts owing to Borrower for Bank, receive in trust all payments as Bank's trustee, and immediately deliver such payments to Bank in their original form as received from the account debtor, with proper endorsements for deposit.

9.4 Bank Expenses. If Borrower fails to pay any amounts or furnish any required proof of payment due to third persons or entities, as required under the terms of this Agreement, then Bank may do any or all of the following after reasonable notice to Borrower: (a) make payment of the same or any part thereof; (b) set up such reserves under a loan facility in Section 2.1 as Bank deems necessary to protect Bank from the exposure created by such failure; or (c) obtain and maintain insurance policies of the type discussed in Section 6.6 of this Agreement, and take any action with respect to such policies as Bank deems prudent. Any amounts so paid or deposited by Bank shall constitute Bank Expenses, shall be immediately due and payable, and shall bear interest at the then applicable rate hereinabove provided, and shall be secured by the Collateral. Any payments made by Bank shall not constitute an agreement by Bank to make similar payments in the future or a waiver by Bank of any Event of Default under this Agreement.

9.5 Bank's Liability for Collateral. So long as Bank complies with reasonable banking practices, Bank shall not in any way or manner be liable or responsible for: (a) the safekeeping of the Collateral; (b) any loss or damage thereto occurring or arising in any manner or fashion from any cause; (c) any diminution in the value thereof; or (d) any act or default of any carrier, warehouseman, bailee, forwarding agency, or other person whomsoever. All risk of loss, damage or destruction of the Collateral shall be borne by Borrower.

9.6 Remedies Cumulative. Bank's rights and remedies under this Agreement, the Loan Documents, and all other agreements shall be cumulative. Bank shall have all other rights and remedies not inconsistent herewith as provided under the Code, by law, or in equity. No exercise by Bank of one right or remedy shall be deemed an election, and no waiver by Bank of any Event of Default on Borrower's part shall be deemed a continuing waiver. No delay by Bank shall constitute a waiver, election, or acquiescence by it. No waiver by Bank shall be effective unless made in a written document signed on behalf of Bank and then shall be effective only in the specific instance and for the specific purpose for which it was given.

9.7 Demand; Protest. Borrower waives demand, protest, notice of protest, notice of default or dishonor, notice of payment and nonpayment, notice of any default, nonpayment at maturity, release, compromise, settlement, extension, or renewal of accounts, documents, instruments, chattel paper, and guarantees at any time held by Bank on which Borrower may in any way be liable.

10. NOTICES.

All notices, consents, requests, approvals, demands, or other communication by any party to this Agreement or any other Loan Document must be in writing and shall be deemed to have been validly served, given, or delivered: (a) upon the earlier of actual receipt and three (3) Business Days after deposit in the U.S. mail, first class, registered or certified mail return receipt requested, with proper postage prepaid; (b) upon transmission, when sent by electronic mail or facsimile transmission; (c) one (1) Business Day after deposit with a reputable overnight courier with all charges prepaid; or (d) when delivered, if hand-delivered by messenger, all of which shall be addressed to the party to be notified and sent to the address, facsimile number, or email address indicated below. Bank or Borrower may change its mailing or electronic mail address or facsimile number by giving the other party written notice thereof in accordance with the terms of this Section 10.

If to Borrower:	BIONANO GENOMICS, INC. 9640 Towne Centre Dr., #100 San Diego, CA 92121 Attn: Robert Erik Holmlin, Ph.D., CEO EMAIL: eholmlin@bionanogenomics.com
If to Bank:	Bridge Bank, a division of Western Alliance Bank 55 Almaden Boulevard, Suite 100 San Jose, CA 95113 Attn: Loan Operations
With a copy to:	Bridge Bank, a division of Western Alliance Bank 12220 El Camino Real, Suite 100 San Diego, CA 2130 Attn: Robert C. Lake, SVP, Head of Life Sciences EMAIL: rob.lake@bridgebank.com

The parties hereto may change the address at which they are to receive notices hereunder, by notice in writing in the foregoing manner given to the other.

11. CHOICE OF LAW AND VENUE; JURY TRIAL WAIVER.

This Agreement shall be governed by, and construed in accordance with, the internal laws of the State of California, without regard to principles of conflicts of law. Each of Borrower and Bank hereby submits to the exclusive jurisdiction of the state and Federal courts located in the County of Santa Clara, State of California. BORROWER AND BANK EACH HEREBY WAIVE THEIR RESPECTIVE RIGHTS TO A JURY TRIAL OF ANY CLAIM OR CAUSE OF ACTION BASED UPON OR ARISING OUT OF ANY OF THE LOAN DOCUMENTS OR ANY OF THE TRANSACTIONS CONTEMPLATED THEREIN, INCLUDING CONTRACT CLAIMS, TORT CLAIMS, BREACH OF DUTY CLAIMS, AND ALL OTHER COMMON LAW OR STATUTORY CLAIMS. EACH PARTY RECOGNIZES AND AGREES THAT THE FOREGOING WAIVER CONSTITUTES A MATERIAL INDUCEMENT FOR IT TO ENTER INTO THIS AGREEMENT. EACH

PARTY REPRESENTS AND WARRANTS THAT IT HAS REVIEWED THIS WAIVER WITH ITS LEGAL COUNSEL AND THAT IT KNOWINGLY AND VOLUNTARILY WAIVES ITS JURY TRIAL RIGHTS FOLLOWING CONSULTATION WITH LEGAL COUNSEL.

12. JUDICIAL REFERENCE PROVISION.

12.1 In the event the Jury Trial Waiver set forth above is not enforceable, the parties elect to proceed under this Judicial Reference Provision.

12.2 With the exception of the items specified in Section 12.3, below, any controversy, dispute or claim (each, a "Claim") between the parties arising out of or relating to this Agreement or any other document, instrument or agreement between the undersigned parties (collectively in this Section, the "Loan Documents"), will be resolved by a reference proceeding in California in accordance with the provisions of Sections 638 et seq. of the California Code of Civil Procedure ("CCP"), or their successor sections, which shall constitute the exclusive remedy for the resolution of any Claim, including whether the Claim is subject to the reference proceeding. Except as otherwise provided in the Loan Documents, venue for the reference proceeding will be in the state or federal court in the county or district where the real property involved in the action, if any, is located or in the state or federal court in the county or district where venue is otherwise appropriate under applicable law (the "Court").

12.3 The matters that shall not be subject to a reference are the following: (i) nonjudicial foreclosure of any security interests in real or personal property, (ii) exercise of self-help remedies (including, without limitation, set-off), (iii) appointment of a receiver and (iv) temporary, provisional or ancillary remedies (including, without limitation, writs of attachment, writs of possession, temporary restraining orders or preliminary injunctions). This reference provision does not limit the right of any party to exercise or oppose any of the rights and remedies described in clauses (i) and (ii) or to seek or oppose from a court of competent jurisdiction any of the items described in clauses (iii) and (iv). The exercise of, or opposition to, any of those items does not waive the right of any party to a reference pursuant to this reference provision as provided herein.

12.4 The referee shall be a retired judge or justice selected by mutual written agreement of the parties. If the parties do not agree within ten (10) days of a written request to do so by any party, then, upon request of any party, the referee shall be selected by the Presiding Judge of the Court (or his or her representative). A request for appointment of a referee may be heard on an ex parte or expedited basis, and the parties agree that irreparable harm would result if ex parte relief is not granted. Pursuant to CCP § 170.6, each party shall have one peremptory challenge to the referee selected by the Presiding Judge of the Court (or his or her representative).

12.5 The parties agree that time is of the essence in conducting the reference proceedings. Accordingly, the referee shall be requested, subject to change in the time periods specified herein for good cause shown, to (i) set the matter for a status and trial-setting conference within fifteen (15) days after the date of selection of the referee, (ii) if practicable, try all issues of law or fact within one hundred twenty (120) days after the date of the conference and (iii) report a statement of decision within twenty (20) days after the matter has been submitted for decision.

12.6 The referee will have power to expand or limit the amount and duration of discovery. The referee may set or extend discovery deadlines or cutoffs for good cause, including a party's failure to provide requested discovery for any reason whatsoever. Unless otherwise ordered based upon good cause shown, no party shall be entitled to "priority" in conducting discovery, depositions may be taken by either party upon seven (7) days written notice, and all other discovery shall be responded to within fifteen (15) days after service. All disputes relating to discovery which cannot be resolved by the parties shall be submitted to the referee whose decision shall be final and binding.

12.7 Except as expressly set forth herein, the referee shall determine the manner in which the reference proceeding is conducted including the time and place of hearings, the order of presentation of evidence, and all other questions that arise with respect to the course of the reference proceeding. All proceedings and hearings conducted before the referee, except for trial, shall be conducted without a court reporter, except that when any party so requests, a court reporter will be used at any hearing conducted before the referee, and the referee will be provided a courtesy copy of the transcript. The party making such a request shall have the obligation to arrange

for and pay the court reporter. Subject to the referee's power to award costs to the prevailing party, the parties will equally share the cost of the referee and the court reporter at trial.

12.8 The referee shall be required to determine all issues in accordance with existing case law and the statutory laws of the State of California. The rules of evidence applicable to proceedings at law in the State of California will be applicable to the reference proceeding. The referee shall be empowered to enter equitable as well as legal relief, enter equitable orders that will be binding on the parties and rule on any motion which would be authorized in a court proceeding, including without limitation motions for summary judgment or summary adjudication. The referee shall issue a decision at the close of the reference proceeding which disposes of all claims of the parties that are the subject of the reference. Pursuant to CCP § 644, such decision shall be entered by the Court as a judgment or an order in the same manner as if the action had been tried by the Court and any such decision will be final, binding and conclusive. The parties reserve the right to appeal from the final judgment or order or from any appealable decision or order entered by the referee. The parties reserve the right to findings of fact, conclusions of laws, a written statement of decision, and the right to move for a new trial or a different judgment, which new trial, if granted, is also to be a reference proceeding under this provision.

12.9 If the enabling legislation which provides for appointment of a referee is repealed (and no successor statute is enacted), any dispute between the parties that would otherwise be determined by reference procedure will be resolved and determined by arbitration. The arbitration will be conducted by a retired judge or justice, in accordance with the California Arbitration Act § 1280 through § 1294.2 of the CCP as amended from time to time. The limitations with respect to discovery set forth above shall apply to any such arbitration proceeding.

12.10 THE PARTIES RECOGNIZE AND AGREE THAT ALL CONTROVERSIES, DISPUTES AND CLAIMS RESOLVED UNDER THIS REFERENCE PROVISION WILL BE DECIDED BY A REFEREE AND NOT BY A JURY. AFTER CONSULTING (OR HAVING HAD THE OPPORTUNITY TO CONSULT) WITH COUNSEL OF ITS, HIS OR HER OWN CHOICE, EACH PARTY KNOWINGLY AND VOLUNTARILY, AND FOR THE MUTUAL BENEFIT OF ALL PARTIES, AGREES THAT THIS REFERENCE PROVISION WILL APPLY TO ANY CONTROVERSY, DISPUTE OR CLAIM BETWEEN OR AMONG THEM ARISING OUT OF OR IN ANY WAY RELATED TO, THIS AGREEMENT OR THE OTHER LOAN DOCUMENTS.

13. GENERAL PROVISIONS.

13.1 Successors and Assigns. This Agreement shall bind and inure to the benefit of the respective successors and permitted assigns of each of the parties; provided, however, that neither this Agreement nor any rights hereunder may be assigned by Borrower without Bank's prior written consent, which consent may be granted or withheld in Bank's sole discretion. Bank shall have the right without the consent of or notice to Borrower to sell, transfer, negotiate, or grant participation in all or any part of, or any interest in, Bank's obligations, rights and benefits hereunder.

13.2 Indemnification. Borrower shall defend, indemnify and hold harmless Bank and its officers, employees, and agents against: (a) all obligations, demands, claims, and liabilities (collectively, "Claims") claimed or asserted by any other party in connection with the transactions contemplated by this Agreement; and (b) all losses or Bank Expenses in any way suffered, incurred, or paid by Bank as a result of or in any way arising out of, following, or consequential to transactions between Bank and Borrower whether under this Agreement, or otherwise (including without limitation reasonable attorneys' fees and expenses), except as to (a) or (b) for Claims, losses or Bank Expenses caused by Bank's gross negligence or willful misconduct.

13.3 Time of Essence. Time is of the essence for the performance of all obligations set forth in this Agreement.

13.4 Severability of Provisions. Each provision of this Agreement shall be severable from every other provision of this Agreement for the purpose of determining the legal enforceability of any specific provision.

13.5 Amendments in Writing, Integration. Neither this Agreement nor the Loan Documents can be amended or terminated orally. All prior agreements, understandings, representations, warranties, and negotiations between the parties hereto with respect to the subject matter of this Agreement and the Loan Documents, if any, are merged into this Agreement and the Loan Documents.

13.6 Counterparts. This Agreement may be executed in any number of counterparts and by different parties on separate counterparts, each of which, when executed and delivered, shall be deemed to be an original, and all of which, when taken together, shall constitute but one and the same Agreement.

13.7 Survival. All covenants, representations and warranties made in this Agreement shall continue in full force and effect so long as any Obligations (other than inchoate indemnity obligations) remain outstanding or Bank has any obligation to make Credit Extensions to Borrower. The obligations of Borrower to indemnify Bank with respect to the expenses, damages, losses, costs and liabilities described in Section 13.2 shall survive until all applicable statute of limitations periods with respect to actions that may be brought against Bank have run.

13.8 Confidentiality. In handling any confidential information Bank and all employees and agents of Bank, including but not limited to accountants, shall exercise the same degree of care that it exercises with respect to its own proprietary information of the same types to maintain the confidentiality of any non-public information thereby received or received pursuant to this Agreement except that disclosure of such information may be made (i) to the subsidiaries or affiliates of Bank in connection with their present or prospective business relations with Borrower, provided that such subsidiaries or affiliates are bound by confidentiality obligations substantially the same as those of this Section, (ii) to prospective transferees or purchasers of any interest in the Credit Extensions, provided that commercially reasonable efforts have been undertaken to cause them to enter into a comparable confidentiality agreement in favor of Borrower, (iii) as required by law, regulations, rule or order, subpoena, judicial order or similar order, (iv) as may be required in connection with the examination, audit or similar investigation of Bank and (v) as Bank may determine in connection with the enforcement of any remedies hereunder. Confidential information hereunder shall not include information that either: (a) is in the public domain or in the knowledge or possession of Bank when disclosed to Bank, or becomes part of the public domain after disclosure to Bank through no fault of Bank; or (b) is disclosed to Bank by a third party, provided Bank does not have actual knowledge that such third party is prohibited from disclosing such information.

13.9 Patriot Act Notice. Bank notifies Borrower that, pursuant to the requirements of the USA Patriot Act, Title III of Pub. L. 107-56 (signed into law on October 26, 2001) (the " Patriot Act "), it is required to obtain, verify and record information that identifies Borrower, which information includes names and addresses and other information that will allow Bank to identify the Borrower in accordance with the Patriot Act.

14. NOTICE OF FINAL AGREEMENT.

BY SIGNING THIS DOCUMENT EACH PARTY REPRESENTS AND AGREES THAT: (A) THIS WRITTEN AGREEMENT REPRESENTS THE FINAL AGREEMENT BETWEEN THE PARTIES, (B) THERE ARE NO UNWRITTEN ORAL AGREEMENTS BETWEEN THE PARTIES, AND (C) THIS WRITTEN AGREEMENT MAY NOT BE CONTRADICTED BY EVIDENCE OF ANY PRIOR, CONTEMPORANEOUS, OR SUBSEQUENT ORAL AGREEMENTS OR UNDERSTANDINGS OF THE PARTIES.

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IN WITNESS WHEREOF, the parties hereto have caused this Agreement to be executed as of the date first above written.

BIONANOGENOMICS, INC., a Delaware corporation

By: /s/ R. Erik Holmlin
Title: CEO

WESTERN ALLIANCE BANK, an Arizona Corporation

By: _____
Title:

[Signature Page to Loan and Security Agreement]

IN WITNESS WHEREOF, the parties hereto have caused this Agreement to be executed as of the date first above written.

BIONANOGENOMICS, INC., a Delaware corporation

By: _____
Title:

WESTERN ALLIANCE BANK, an Arizona Corporation

By: /s/ Lindsay Schwallie
Title: VP, Portfolio Management

EXHIBIT A

DEBTOR: **BIONANO GENOMICS, INC.**

SECURED PARTY: **WESTERN ALLIANCE BANK, an Arizona Corporation**

COLLATERAL DESCRIPTION ATTACHMENT
TO LOAN AND SECURITY AGREEMENT

All personal property of Borrower (herein referred to as "Borrower" or "Debtor") whether presently existing or hereafter created or acquired, and wherever located, including, but not limited to:

(a) all accounts (including health-care-insurance receivables), chattel paper (including tangible and electronic chattel paper), deposit accounts, documents (including negotiable documents), equipment (including all accessions and additions thereto), general intangibles (including payment intangibles and software), goods (including fixtures), instruments (including promissory notes), inventory (including all goods held for sale or lease or to be furnished under a contract of service, and including returns and repossessions), investment property (including securities and securities entitlements), letter of credit rights, money, and all of Debtor's books and records with respect to any of the foregoing, and the computers and equipment containing said books and records;

(b) any and all cash proceeds and/or noncash proceeds of any of the foregoing, including, without limitation, insurance proceeds, and all supporting obligations and the security therefor or for any right to payment. All terms above have the meanings given to them in the California Uniform Commercial Code, as amended or supplemented from time to time.

Notwithstanding the foregoing, the Collateral shall not include any Intellectual Property (as defined in the Loan and Security Agreement dated as of March 8, 2016 between Debtor and Secured Party), now owned or hereafter acquired; provided, however, that the Collateral shall include all accounts and general intangibles that consist of rights to payment and proceeds from the sale, licensing or disposition of all or any part, or rights in, the foregoing (the "Rights to Payment"). Notwithstanding the foregoing, if a judicial authority (including a U.S. Bankruptcy Court) holds that a security interest in the underlying Intellectual Property is necessary to have a security interest in the Rights to Payment, then the Collateral shall automatically, and effective as of the Closing Date, include the Intellectual Property to the extent necessary to permit perfection of Bank's security interest in the Rights to Payment.

Notwithstanding the foregoing, the Collateral shall not include (i) more than 65% of the presently existing and hereafter arising issued and outstanding shares of capital stock owned by Borrower of any Foreign Subsidiary which shares entitle the holder thereof to vote for directors or any other matter. or (ii) any property that is financed by a third party permitted by clause (a) or (c) of the definition of "Permitted Liens" hereunder to the extent prohibited by the terms of such agreement, provided that upon the termination or lapse of any such prohibition, such property (and any accessions, attachments, replacements or improvements thereon) shall be deemed to be Collateral hereunder and shall be subject to the security interest granted.

EXHIBIT B-1

ADVANCE REQUEST FORM

(To be submitted no later than 3:00 PM to be considered for same day processing)

To: Western Alliance Bank, an Arizona corporation

Fax: (408) 282-1681

Date:

From: BIONANO GENOMICS, INC.
Borrower's Name

/s/ R. Erik Holmlin
Authorized Signature

R. Erik Holmlin
Authorized Signer's Name (please print)

1-858-888-7610
Phone Number

To Account # 2003069

Borrower hereby requests funding in the amount of $7,000,000 in accordance with the Term Loan as defined in the Loan and Security Agreement dated as of March , 2016.

Borrower hereby authorizes Bank to rely on facsimile stamp signatures and treat them as authorized by Borrower for the purpose of requesting the above advance.

All representations and warranties of Borrower stated in the Loan and Security Agreement are true, correct and complete in all material respects as of the date of this Advance Request; provided that those representations and warranties expressly referring to another date shall be true, correct and complete in all material respects as of such date.

Capitalized terms used herein and not otherwise defined have the meanings set forth in the Loan and Security Agreement.

EXHIBIT B-2

Form of Disbursement Letter

[see attached]

DISBURSEMENT LETTER

March 8, 2016

The undersigned, being the duly elected and acting of BIONANO GENOMICS, INC. ("**Borrower**"), does hereby certify to **WESTERN ALLIANCE BANK**, an Arizona corporation ("**Bank**"), in connection with that certain Loan and Security Agreement dated as of March 8, 2016, by and among Borrower and Bank (the "**Loan Agreement**"; with other capitalized terms used below having the meanings ascribed thereto in the Loan Agreement) that:

1. The representations and warranties made by Borrower in Section 5 of the Loan Agreement and in the other Loan Documents are true and correct in all material respects as of the date hereof; provided that those representations and warranties expressly referring to another date shall be true, correct and complete in all material respects as of such date.

2. No event or condition has occurred and is continuing that would constitute an Event of Default under the Loan Agreement or any other Loan Document.

3. Borrower is in compliance with the covenants and requirements contained in Sections 4, 6 and 7 of the Loan Agreement.

4. All conditions referred to in Section 3 of the Loan Agreement to the making of the Loan to be made on or about the date hereof have been satisfied or waived by Bank.

5. No Material Adverse Effect has occurred.

6. The undersigned is a Responsible Officer.

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7. The proceeds of the Term Loan shall be disbursed as follows:

Disbursement from Bank:		
Loan Amount	$	7,000,000
Plus:		
—Deposit Received	$	35,000
Less:		
—Facility Fee	($	35,000)
—Existing Debt Payoff to be remitted to Pacific Western Bank per the Payoff Letter dated March , 2016	($5,006,808.34)	
— Bank's Legal Fees	($	)*
Net Proceeds due from Bank:	$	
TOTAL TERM LOAN NET PROCEEDS FROM BANK	$	

8. The aggregate net proceeds of the Term Loan shall be transferred to the Designated Deposit Account as follows:

Account Name:	BIONANO GENOMICS, INC.
Bank Name:	Bridge Bank, a division of Western Alliance Bank
Bank Address:	55 Almaden Boulevard San Jose, CA 95113
Account Number:	101608149
ABA Number:	121143260

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* Legal fees and costs are through the Closing Date. Post-closing legal fees and costs, payable after the Closing Date, to be invoiced and paid post-closing.

Dated as of the date first set forth above.

BORROWER:

BIONANO GENOMICS, INC., a Delaware corporation

By _____
Name:
Title:

BANK:

WESTERN ALLIANCE BANK, an Arizona corporation

By _____
Name:
Title:

[Signature Page to Disbursement Letter]

EXHIBIT C

	Jan-16	Feb-16	Mar-16	Apr-16	May-16	Jun-16	Jul-16	Aug-16	Sep-16	Oct-16	Nov-16	Dec-16
Revenues (Proj)	$ 496,409	$ 512,852	$ 518,575	$ 662,925	$ 684,821	$ 692,502	$ 835,745	$ 863,412	$ 873,090	$ 953,446	$ 984,975	$ 1,064,599
T6M Revenues									$ 4,612,495	$ 4,903,016	$ 5,203,170	$ 5,575,267
75% of Plan									$ 3,459,371	$ 3,677,262	$ 3,902,378	$ 4,181,450
Tested									16-Oct	16-Nov	16-Dec	17-Jan

	Jan-17	Feb-17	Mar-17	Apr-17	May-17	Jun-17	Jul-17	Aug-17	Sep-17	Oct-17	Nov-17	Dec-17
Revenues (Proj)	$ 910,065	$ 949,203	$ 957,147	$ 1,654,226	$ 1,725,883	$ 1,752,225	$ 1,814,216	$ 1,891,057	$ 1,906,653	$ 2,407,623	$ 2,508,047	$ 2,549,533
T6M Revenues	$ 5,649,586	$ 5,735,378	$ 5,819,435	$ 6,520,216	$ 7,261,124	$ 7,948,750	$ 8,852,901	$ 9,794,754	$ 10,744,260	$ 11,497,657	$ 12,279,821	$ 13,077,129
75% of Plan	$ 4,237,190	$ 4,301,533	$ 4,364,576	$ 4,890,162	$ 5,445,843	$ 5,961,562	$ 6,639,676	$ 7,346,066	$ 8,058,195	$ 8,623,243	$ 9,209,865	$ 9,807,846
Tested	17-Feb	17-Mar	17-Apr	17-May	17-Jun	17-Jul	17-Aug	17-Sep	17-Oct	17-Nov	17-Dec	18-Jan

	Jan-18	Feb-18	Mar-18	Apr-18	May-18	Jun-18	Jul-18	Aug-18	Sep-18	Oct-18	Nov-18	Dec-18
Revenues (Proj)	$ 2,256,687	$ 2,321,830	$ 2,360,944	$ 3,082,118	$ 3,170,082	$ 3,224,082	$ 4,672,129	$ 4,804,822	$ 4,887,110	$ 5,477,237	$ 5,631,587	$ 5,738,380
T6M Revenues	$ 13,519,599	$ 13,950,372	$ 14,404,663	$ 15,079,158	$ 15,741,193	$ 16,415,743	$ 18,831,185	$ 21,314,178	$ 23,840,343	$ 26,235,462	$ 28,696,967	$ 31,211,265
75% of Plan	$ 10,139,699	$ 10,462,779	$ 10,803,497	$ 11,309,368	$ 11,805,895	$ 12,311,807	$ 14,123,389	$ 15,985,633	$ 17,880,258	$ 19,676,596	$ 21,522,725	$ 23,408,449
Tested	18-Feb	18-Mar	18-Apr	18-May	18-Jun	18-Jul	18-Aug	18-Sep	18-Oct	18-Nov	18-Dec	19-Jan

EXHIBIT D

COMPLIANCE CERTIFICATE

TO: WESTERN ALLIANCE BANK, an Arizona corporation

FROM: BIONANO GENOMICS, INC.

The undersigned authorized officer of BIONANO GENOMICS, INC. hereby certifies that in accordance with the terms and conditions of the Loan and Security Agreement between Borrower and Bank (the "Agreement"), (i) Borrower is in complete compliance for the period ending _____ with all required covenants except as noted below and (ii) all representations and warranties of Borrower stated in the Agreement are true and correct in all material respects as of the date hereof except as noted below; provided that those representations and warranties expressly referring to another date shall be true, correct and complete in all material respects as of such date. Attached herewith are the required documents supporting the above certification. The Officer further certifies that these are prepared in accordance with Generally Accepted Accounting Principles (GAAP) and are consistently applied from one period to the next except as explained in an accompanying letter or footnotes.

Please indicate compliance status by circling Yes/No under "Complies" column.

Reporting Covenant	Required	Complies	
Annual financial statements (CPA Audited)	FYE within 180 days	Yes	No
Monthly financial statements and Compliance Certificate	Prior to each Credit Extension, and monthly within 30 days	Yes	No
10K and 10Q	(as applicable)	Yes	No
Annual operating budget, sales projections and operating plans approved by board of directors	Annually no later than 45 days after the beginning of each fiscal year	Yes	No
Deposit balances with Bank	$ _____		
Deposit balance outside Bank	$ _____		

Financial Covenant	Required	Actual	Complies	
Term Sheet and Funding Milestone ($15MM)	Term sheet received by 5/31/2016	$_____	Yes	No
	Term sheet executed by 6/30/2016	$_____	Yes	No
	Funded by 8/31/2016	$_____	Yes	No
Minimum Cash with Bank	$1,000,000, through receipt of $15MM Funding Milestone	_____;	Yes	No
Performance to Plan (monthly; T6M)	At least 75% of the projections (see Exhibit C)	____ %	Yes	No

Comments Regarding Exceptions: See Attached.

Sincerely,

_____
SIGNATURE

_____
TITLE

BANK USE ONLY

Received by: _____
AUTHORIZED SIGNER

Date: _____

Verified: _____
AUTHORIZED SIGNER

Date: _____

Compliance Status	Yes	No

DATE

[Signature Page to Disbursement Letter]

SCHEDULE OF EXCEPTIONS

Permitted Indebtedness (Section 1.1)

None

Permitted Investments (Section 1.1)

Two Subsidiaries:

(1) BioNano Genomics UK, Ltd.

(2) BioNano Genomics (Shanghai) Trading Co., Ltd.

Borrower maintains cash Investments in the above two Subsidiaries not exceeding the amounts set forth in Section 7.12.

Permitted Liens (Section 1.1)

Liens on the collateral described in that certain financing statement # 2012 2040246 filed by Webbank in the State of Delaware on May 25, 2012 [to be terminated soon after the Closing Date]

Inbound Licenses (Section 5.6)

Borrower's rights as a licensee of intellectual property under the inbound licenses set forth below may give rise to more than five percent (5%) of its gross revenue in any given month, including without limitation revenue derived from the sale, licensing, rendering or disposition of any product or service.

- License Agreement by and between Princeton University and the Company, effective as of January 7, 2004, as amended
- Supply and License Agreement by and between Life Technologies Corporation and the Company effective as of February 15, 2010
- License Agreement by and between Howard Florey Institute and the Company effective as of January 1, 2010
- Sublicense Agreement by and between Industry 3200 and the Company effective as of December 27, 2013
- License Agreement by and between Q Biotechnology C.V. and the Company effective as of May 1, 2014
- License Agreement by and between New York University and the Company effective as of November 4, 2013

Prior Names (Section 5.7)

BioNanomatrix, Inc.

Locations (Section 5.7; Section 7.10)

(1) Borrower has engaged the following company for self-storage space:

Public Storage, 9890 Pacific Heights Blvd., San Diego, CA 92121
Storage West, 5206 Eastgate Mall, San Diego, CA 92121

(2) Borrower maintains a second office at the following location:

9540 Towne Centre Drive, Suite 100
San Diego, CA 92121

Litigation (Section 5.8)

None

Environmental Condition (Section 5.12)

None

Accounts (Section 5.16)

1. SQ1 Bank Business Checking account # 2003069;
2. SQ1 Bank Money Market Business account # 2003150;
3. SQ1 Bank Money Market Collateral account # 7057099; and
4. SQ1 Bank Money Market Collateral account # 2020048;Collectively, the accounts referred to in 1-4 above, the "**Square 1 Accounts**," and the accounts referred to in 3-4 above, the "**Square 1 Cash Collateral Accounts**;"
5. Silicon Valley Bank US General Account # 3300928342 USD (the "**Foreign Support Account**");
6. Silicon Valley Bank Corporate Deposit Account #20113773 EUR;
7. Silicon Valley Bank Operating Account # 20106483 GBP; and
8. Silicon Valley Bank China Capital Account # 100 100 1000000918 USD.
Collectively, the accounts referred to in 5-8 above, the "**SVB Accounts**."

CORPORATE RESOLUTIONS TO BORROW

Borrower: BIONANO GENOMICS, INC. **Date:** March 8, 2016

I, the undersigned Secretary or Assistant Secretary of BIONANO GENOMICS, INC. (the "Corporation"), HEREBY CERTIFY that the Corporation is organized and existing under and by virtue of the laws of the State of Delaware.

I FURTHER CERTIFY that attached hereto as Attachments 1 and 2 are true and complete copies of the Certificate of Incorporation, as amended, and the Restated Bylaws of the Corporation, each of which is in full force and effect on the date hereof.

I FURTHER CERTIFY that at a meeting of the Directors of the Corporation, duly called and held, at which a quorum was present and voting (or by other duly authorized corporate action in lieu of a meeting), the following resolutions (the "Resolutions") were adopted.

BE IT RESOLVED, that any one (1) of the following named officers, employees, or agents of this Corporation, whose actual signatures are shown below:

NAMES	POSITION	ACTUAL SIGNATURES

acting for and on behalf of this Corporation and as its act and deed be, and they hereby are, authorized and empowered:

Borrow Money. To borrow from time to time from Western Alliance Bank, an Arizona corporation ("Bank"), on such terms as may be agreed upon between the officers, employees, or agents of the Corporation and Bank, such sum or sums of money as in their judgment should be borrowed, without limitation.

Execute Loan Documents. To execute and deliver to Bank that certain Loan and Security Agreement dated as of (the "Loan Agreement") and any other agreement entered into between Corporation and Bank in connection with the Loan Agreement, including any amendments, all as amended or extended from time to time (collectively, with the Loan Agreement, the "Loan Documents"), and also to execute and deliver to Bank one or more renewals, extensions, modifications, refinancings, consolidations, or substitutions for the Loan Documents, or any portion thereof.

Grant Security. To grant a security interest to Bank in the Collateral described in the Loan Documents, which security interest shall secure all of the Corporation's Obligations, as described in the Loan Documents.

Negotiate Items. To draw, endorse, and discount with Bank all drafts, trade acceptances, promissory notes, or other evidences of indebtedness payable to or belonging to the Corporation or in which the Corporation may have an interest, and either to receive cash for the same or to cause such proceeds to be credited to the account of the Corporation with Bank, or to cause such other disposition of the proceeds derived therefrom as they may deem advisable.

Warrants. To issue Bank warrants to purchase the Corporation's capital stock.

Letters of Credit. To execute letter of credit applications and other related documents pertaining to Bank's issuance of letters of credit.

Corporate Credit Cards. To execute corporate credit card applications and agreements and other related documents pertaining to Bank's provision of corporate credit cards.

Further Acts. In the case of lines of credit, to designate additional or alternate individuals as being authorized to request advances thereunder, and in all cases, to do and perform such other acts and things, to pay any and all fees and costs, and to execute and deliver such other documents and agreements as they may in their discretion deem reasonably necessary or proper in order to carry into effect the provisions of these Resolutions.

BE IT FURTHER RESOLVED, that any and all acts authorized pursuant to these resolutions and performed prior to the passage of these resolutions are hereby ratified and approved, that these Resolutions shall remain in full force and effect and Bank may rely on these Resolutions until written notice of their revocation shall have been delivered to and received by Bank. Any such notice shall not affect any of the Corporation's agreements or commitments in effect at the time notice is given.

I FURTHER CERTIFY that the officers, employees, and agents named above are duly elected, appointed, or employed by or for the Corporation, as the case may be, and occupy the positions set forth opposite their respective names; that the foregoing Resolutions now stand of record on the books of the Corporation; and that the Resolutions are in full force and effect and have not been modified or revoked in any manner whatsoever.

IN WITNESS WHEREOF, I have hereunto set my hand on the date set forth above and attest that the signatures set opposite the names listed above are their genuine signatures.

CERTIFIED AND ATTESTED BY:

X_____
Secretary or Assistant Secretary of Borrower

ATTACHMENT A

CERTIFICATE OF INCORPORATION

ATTACHMENT B

BYLAWS OF THE CORPORATION

INSURANCE AUTHORIZATION LETTER

In accordance with the insurance coverage requirements of the Loan and Security Agreement __, 2016 (the "Agreement") between Western Alliance Bank, an Arizona corporation ("Bank"), and BIONANO GENOMICS, INC. ("Borrower"), coverage is to be provided as set forth below:

COVERAGE: All risk including liability and property damage.

INSURED: BIONANO GENOMICS, INC.

LOCATION(s) OF COLLATERAL:

1.

Insuring Agent:	Barney and Barney
Address:	9171 Towne Centre Drive, Suite 510 San Diego, CA 92122 Attn: Mark Nash
Phone Number:	(858) 587-7595
Fax Number:	(858) 909-9813

ADDITIONAL INSURED AND LOSS PAYEE:

Bank, as its interests may appear below.

BANK:

Bridge Bank, a division of Western Alliance Bank
55 Almaden Blvd.
San Jose, CA 95113
Attn: Note Department
Fax # 408-689-8542
Phone # 408-423-8500

The above coverage is to be provided prior to funding the Agreement. Borrower hereby agrees to pay for the coverage above and by signing below acknowledges its obligation to do so.

Signature: /s/ R. Erik Holmlin

Title: CEO

Date:

Exhibit 10.16

FIRST AMENDMENT TO LOAN AND SECURITY AGREEMENT

This First Amendment to Loan and Security Agreement (this "Amendment") is entered into as of December 9, 2016, by and between WESTERN ALLIANCE BANK, an Arizona corporation ("Bank") and BIONANO GENOMICS, INC. ("Borrower").

RECITALS

Borrower and Bank are parties to that certain Loan and Security Agreement dated as of March 8, 2016, as amended from time to time (the "Agreement"). The parties desire to amend the Agreement in accordance with the terms of this Amendment.

NOW, THEREFORE, the parties agree as follows:

1. The following defined terms in Section 1.1 of the Agreement hereby are added, amended or restated as follows:

"Amortization Date" is April 8, 2017; provided, however, if Borrower achieves either (i) the Irys Milestone or (ii) the New Equity Milestone, then the Amortization Date shall be extended to October 8, 2017; provided further, however, that if Borrower achieves both (i) the Irys Milestone and (ii) the New Equity Milestone, then the Amortization Date shall be further extended to April 8, 2018.

"First Amendment Effective Date" means December 9, 2016.

"New Equity Milestone" means Borrower's receipt, on or after December 1, 2016 and on or before the date immediately preceding the date that would otherwise be the Amortization Date, of at least Fifteen Million Dollars ($15,000,000) of gross cash proceeds (provided that Borrower shall only incur a reasonable amount of transaction expenses in connection therewith) from the sale or issuance of its equity securities or Subordinated Debt to investors and on terms and conditions reasonably acceptable to Bank."

"Warrant" means that certain Warrant to Purchase Stock issued by Borrower to Bank on the Closing Date and that certain Warrant to Purchase Stock issued by Borrower to Bank on the First Amendment Effective Date, as the same may be amended from time to time.

2. Section 2.2(b) of the Agreement hereby is amended and restated in its entirety to read as follows:

"(b) Repayment. Borrower shall make monthly payments of interest only, in arrears, commencing on the first (1st) Payment Date following the Funding Date of the Term Loan, and continuing on the Payment Date of each successive month thereafter through and including the Payment Date immediately preceding the Amortization Date. Borrower agrees to pay, on the Funding Date of the Term Loan, any initial partial monthly interest payment otherwise due for the period between the Funding Date of the Term Loan and the first Payment Date thereof. Commencing on the Amortization Date, and continuing on the Payment Date of each month thereafter, Borrower shall make equal monthly payments of principal, together with applicable interest, in arrears, to Bank, as calculated by Bank (which calculations shall be deemed correct absent manifest error) based upon: (1) the amount of the Term Loan, (2) the effective rate of interest, as determined in Section 2.4(a), and (3) a repayment schedule equal to (i) if the Amortization Date is April 8, 2017, thirty-six (36) months, (ii) if the Amortization Date is October 8, 2017, thirty (30) months and (iii) if the Amortization Date is April 8, 2018, twenty-four (24) months. All unpaid principal and accrued and unpaid interest with respect to the Term Loan is due and payable in full on the Term Loan Maturity Date. The Term Loan may only be prepaid in accordance with Sections 2.2(c) and 2.2(d)."

3. Section 6.8 of the Agreement hereby is amended and restated in its entirety to read as follows:

"6.8 Funding Milestone. On or after December 1, 2016 and on or before April 30, 2017, Borrower shall have received at least Five Million Dollars ($5,000,000) of gross cash proceeds (provided that Borrower shall only incur a reasonable amount of transaction expenses in connection therewith) from the sale or issuance of its equity securities or Subordinated Debt to investors and on terms and conditions reasonably acceptable to Bank."

4. Section 6.9 of the Agreement hereby is amended and restated in its entirety to read as follows:

"6.9 Performance to Plan; Minimum Cash. Borrower's actual trailing six-month revenues, as of any date of determination, shall be no less than seventy-five percent (75%) of Borrower's projected revenues (the "Revenue Covenant"), as set forth in the table attached as Exhibit C hereto and updated in accordance with Borrower's annual financial projections delivered to Bank pursuant to Section 6.3(e) hereof; provided that Borrower shall not be required to comply with the Revenue Covenant as long as Borrower at all times maintains a ratio of (i) minimum unrestricted cash in accounts with Bank to (ii) Indebtedness to Bank, of at least 0.75 to 1.00."

5. Exhibit D to the Agreement hereby is replaced with Exhibit D attached hereto.

6. No course of dealing on the part of Bank or its officers, nor any failure or delay in the exercise of any right by Bank, shall operate as a waiver thereof, and any single or partial exercise of any such right shall not preclude any later exercise of any such right. Bank's failure at any time to require strict performance by Borrower of any provision shall not affect any right of Bank thereafter to demand strict compliance and performance. Any suspension or waiver of a right must be in writing signed by an officer of Bank.

7. Unless otherwise defined, all initially capitalized terms in this Amendment shall be as defined in the Agreement. The Agreement, as amended hereby, shall be and remain in full force and effect in accordance with its respective terms and hereby is ratified and confirmed in all respects. Except as expressly set forth herein, the execution, delivery, and performance of this Amendment shall not operate as a waiver of, or as an amendment of, any right, power, or remedy of Bank under the Agreement, as in effect prior to the date hereof.

8. Borrower represents and warrants that the Representations and Warranties contained in the Agreement are true and correct as of the date of this Amendment, and that no Event of Default has occurred and is continuing.

9. As a condition to the effectiveness of this Amendment, Bank shall have received, in form and substance satisfactory to Bank, the following:

(a) this Amendment, duly executed by Borrower;

(b) a Certificate of the Secretary of Borrower with respect to incumbency and resolutions authorizing the execution and delivery of this Amendment;

(c) a Warrant to Purchase Stock, duly executed by Borrower;

(d) an amendment fee in the amount of Fifteen Thousand Dollars ($15,000), which may be debited from any of Borrower's accounts;

(e) all reasonable Bank Expenses incurred through the date of this Amendment, which may be debited from any of Borrower's accounts; and

(f) such other documents, and completion of such other matters, as Bank may reasonably deem necessary or appropriate.

10. This Amendment may be executed in two or more counterparts, each of which shall be deemed an original, but all of which together shall constitute one instrument.

[*Balance of Page Intentionally Left Blank*]

IN WITNESS WHEREOF, the undersigned have executed this Amendment as of the first date above written.

BIONANOGENOMICS, INC.

By: /s/ R. Erik Holmlin
Title: CEO

WESTERN ALLIANCE BANK, an Arizona Corporation

By:
Title:

[Signature Page to First Amendment to Loan and Security Agreement]

IN WITNESS WHEREOF, the undersigned have executed this Amendment as of the first date above written.

BIONANOGENOMICS, INC.

By: _____
Title:

WESTERN ALLIANCE BANK, an Arizona Corporation

By: /s/ Lindsay Schwallie
Title: VP, Portfolio Management

[Signature Page to First Amendment to Loan and Security Agreement]

EXHIBIT C

[see attached]

	Financial Performance for 2017												
	January	*February*	*March*	*April*	*May*	*June*	*July*	*August*	*September*	*October*	*November*	*December*	*Full Year*
Revenue:													
Instrument	$395,000	$691,250	$987,500	$691,250	$691,250	$1,234,375	$691,250	$691,250	$1,481,250	$641,875	$395,000	$1,283,750	$9,875,000
Cartridge	$76,320	$133,560	$190,800	$133,560	$133,560	$238,500	$133,560	$133,560	$286,200	$124,020	$76,320	$248,040	$1,908,000
Kit	$38,160	$66,780	$95,400	$66,780	$66,780	$119,250	$66,780	$66,780	$100,966	$62,010	$38,160	$62,010	$849,856
Other	$35,000	$38,000	$41,000	$45,000	$55,000	$58,000	$65,000	$69,000	$75,000	$75,000	$75,000	$44,000	$675,000
Service	$29,167	$29,167	$29,167	$29,167	$29,167	$29,167	$29,167	$29,167	$29,167	$29,167	$29,167	$29,167	$350,000
Grant													$0
Total Revenue	$573,647	$958,757	$1,343,867	$965,757	$975,757	$1,679,292	$985,757	$989,757	$1,972,582	$932,072	$613,647	$1,666,967	$13,657,856
COGS:													
Total COGS	$224,940	$367,896	$585,852	$367,896	$367,896	$704,982	$367,896	$367,896	$832,258	$344,070	$224,940	$754,004	$5,510,521
Gross Margin	$348,707	$590,861	$758,015	$597,861	$607,861	$974,310	$617,861	$621,861	$1,140,324	$588,002	$388,707	$912,963	$8,147,334
GM%	*60.8%*	*61.6%*	*56.4%*	*61.9%*	*62.3%*	*58.0%*	*62.7%*	*62.8%*	*57.8%*	*63.1%*	*63.3%*	*54.8%*	*59.7%*
Operating Expenses:													
Operations	$51,667	$51,667	$51,667	$51,667	$51,667	$51,667	$51,667	$51,667	$51,667	$51,667	$51,667	$51,667	$620,000
General & Administrative	$508,333	$508,333	$508,333	$508,333	$508,333	$508,333	$508,333	$508,333	$508,333	$508,333	$508,333	$508,333	$6,100,000
Sales & Marketing	$551,750	$551,750	$551,750	$551,750	$551,750	$551,750	$551,750	$551,750	$551,750	$551,750	$551,750	$551,750	$6,621,000
Research	$205,691	$205,691	$205,691	$205,691	$205,691	$205,691	$205,691	$205,691	$205,691	$205,691	$205,691	$205,691	$2,468,293
Development	$890,810	$890,810	$890,810	$890,810	$890,810	$890,810	$890,810	$890,810	$890,810	$890,810	$890,810	$890,810	$10,689,721
Total Operating Expenses	$2,208,251	$2,208,251	$2,208,251	$2,208,251	$2,208,251	$2,208,251	$2,208,251	$2,208,251	$2,208,251	$2,208,251	$2,208,251	$2,208,251	$26,499,014
% of Rev	*384.9%*	*230.3%*	*164.3%*	*228.7%*	*226.3%*	*131.5%*	*224.0%*	*223.1%*	*111.9%*	*236.9%*	*359.9%*	*132.5%*	*194.0%*
Total Operating Income	($1,859,544)	($1,617,390)	($1,450,236)	($1,610,390)	($1,600,390)	($1,233,941)	($1,590,390)	($1,586,390)	($1,067,927)	($1,620,249)	($1,819,544)	($1,295,288)	($18,351,680)
Other Expense/Income	$42,000	$42,000	$42,000	$42,000	$42,000	$42,000	$42,000	$42,000	$42,000	$42,000	$42,000	$42,000	$504,000
Net Income	($1,901,544)	($1,659,390)	($1,492,236)	($1,652,390)	($1,642,390)	($1,275,941)	($1,632,390)	($1,628,390)	($1,109,927)	($1,662,249)	($1,861,544)	($1,337,288)	($18,855,680)

EXHIBIT D

COMPLIANCE CERTIFICATE

TO: WESTERN ALLIANCE BANK, an Arizona corporation

FROM: BIONANO GENOMICS, INC.

The undersigned authorized officer of BIONANO GENOMICS, INC. hereby certifies that in accordance with the terms and conditions of the Loan and Security Agreement between Borrower and Bank (the "Agreement"), (i) Borrower is in complete compliance for the period ending _____ with all required covenants except as noted below and (ii) all representations and warranties of Borrower stated in the Agreement are true and correct in all material respects as of the date hereof except as noted below; provided that those representations and warranties expressly referring to another date shall be true, correct and complete in all material respects as of such date. Attached herewith are the required documents supporting the above certification. The Officer further certifies that these are prepared in accordance with Generally Accepted Accounting Principles (GAAP) and are consistently applied from one period to the next except as explained in an accompanying letter or footnotes.

Please indicate compliance status by circling Yes/No under "Complies" column.

Reporting Covenant	**Required**		**Complies**	
Annual financial statements (CPA Audited)	FYE within 180 days		Yes	No
Monthly financial statements and Compliance Certificate	Prior to each Credit Extension, and monthly within 30 days		Yes	No
10K and 10Q	(as applicable)		Yes	No
Annual operating budget, sales projections and operating plans approved by board of directors	Annually no later than 45 days after the beginning of each fiscal year		Yes	No
Deposit balances with Bank	$_____			
Deposit balance outside Bank	$_____			
Financial Covenant	**Required**	**Actual**	**Complies**	
Term Sheet and Funding Milestone ($5MM)		$_____	Yes	No
	Receipt of $5,000,000 of gross cash proceeds from the sale or issuance of its equity securities or Subordinated Debt	$_____	Yes	No
		$_____	Yes	No
Minimum Cash with Bank	ratio of (i) minimum unrestricted cash in accounts with Bank to (ii) Indebtedness to Bank, of at least 0.75 to 1.00	_____;	Yes	No
	Funding Milestone	_____		
Performance to Plan (monthly; T6M)	At least 75% of the projections (see Exhibit C)	_____%	Yes	No

Comments Regarding Exceptions: See Attached.

Sincerely,

BANK USE ONLY

Received by: _____
AUTHORIZED SIGNER

Date: _____

SIGNATURE

TITLE

DATE

Verified: _____
AUTHORIZED SIGNER

Date: _____

Compliance Status Yes No

CORPORATE RESOLUTIONS TO BORROW

Borrower: BIONANO GENOMICS, INC.

I, the undersigned Secretary or Assistant Secretary of BIONANO GENOMICS, INC. (the "Corporation"), HEREBY CERTIFY that the Corporation is organized and existing under and by virtue of the laws of the State of Delaware.

I FURTHER CERTIFY that attached hereto as Attachments 1 and 2 are true and complete copies of the Certificate of Incorporation, as amended, and the Bylaws of the Corporation, each of which is in full force and effect on the date hereof.

I FURTHER CERTIFY that at a meeting of the Directors of the Corporation, duly called and held, at which a quorum was present and voting (or by other duly authorized corporate action in lieu of a meeting), the following resolutions (the "Resolutions") were adopted.

BE IT RESOLVED, that any one (1) of the following named officers, employees, or agents of this Corporation, whose actual signatures are shown below:

NAMES	POSITION	ACTUAL SIGNATURES
R. Erik Holmlin	CEO	/s/ R. Erik Holmlin

acting for and on behalf of this Corporation and as its act and deed be, and they hereby are, authorized and empowered:

Borrow Money. To borrow from time to time from Western Alliance Bank, an Arizona corporation ("Bank"), on such terms as may be agreed upon between the officers, employees, or agents of the Corporation and Bank, such sum or sums of money as in their judgment should be borrowed, without limitation.

Execute Loan Documents. To execute and deliver to Bank that certain Loan and Security Agreement dated as March 8, 2016 (the "Loan Agreement") and any other agreement entered into between Corporation and Bank in connection with the Loan Agreement, including any amendments, all as amended or extended from time to time, including but not limited to that certain First Amendment to Loan and Security Agreement dated as of December ___, 2016 (collectively, with the Loan Agreement, the "Loan Documents"), and also to execute and deliver to Bank one or more renewals, extensions, modifications, refinancings, consolidations, or substitutions for the Loan Documents, or any portion thereof.

Grant Security. To grant a security interest to Bank in the Collateral described in the Loan Documents, which security interest shall secure all of the Corporation's Obligations, as described in the Loan Documents.

Negotiate Items. To draw, endorse, and discount with Bank all drafts, trade acceptances, promissory notes, or other evidences of indebtedness payable to or belonging to the Corporation or in which the Corporation may have an interest, and either to receive cash for the same or to cause such proceeds to be credited to the account of the Corporation with Bank, or to cause such other disposition of the proceeds derived therefrom as they may deem advisable.

Warrants. To issue Bank warrants to purchase the Corporation's capital stock.

Letters of Credit. To execute letter of credit applications and other related documents pertaining to Bank's issuance of letters of credit.

Corporate Credit Cards. To execute corporate credit card applications and agreements and other related documents pertaining to Bank's provision of corporate credit cards.

Further Acts. In the case of lines of credit, to designate additional or alternate individuals as being authorized to request advances thereunder, and in all cases, to do and perform such other acts and things, to pay any and all fees and costs, and to execute and deliver such other documents and agreements as they may in their discretion deem reasonably necessary or proper in order to carry into effect the provisions of these Resolutions.

BE IT FURTHER RESOLVED, that any and all acts authorized pursuant to these resolutions and performed prior to the passage of these resolutions are hereby ratified and approved, that these Resolutions shall remain in full force and effect and Bank may rely on these Resolutions until written notice of their revocation shall have been delivered to and received by Bank. Any such notice shall not affect any of the Corporation's agreements or commitments in effect at the time notice is given.

I FURTHER CERTIFY that the officers, employees, and agents named above are duly elected, appointed, or employed by or for the Corporation, as the case may be, and occupy the positions set forth opposite their respective names; that the foregoing Resolutions now stand of record on the books of the Corporation; and that the Resolutions are in full force and effect and have not been modified or revoked in any manner whatsoever.

IN WITNESS WHEREOF, I have hereunto set my hand on December __, 2016 and attest that the signatures set opposite the names listed above are their genuine signatures.

CERTIFIED AND ATTESTED BY:

/s/ Tom Coll

Exhibit 10.17

SECOND AMENDMENT TO LOAN AND SECURITY AGREEMENT

This Second Amendment to Loan and Security Agreement (this "Amendment") is entered into as of May 2, 2017, by and between WESTERN ALLIANCE BANK, an Arizona corporation ("Bank") and BIONANO GENOMICS, INC. ("Borrower").

RECITALS

Borrower and Bank are parties to that certain Loan and Security Agreement dated as of March 8, 2016 (as amended from time to time, including but not limited to that certain First Amendment to Loan and Security Agreement dated as of December 9, 2016, the "Agreement"). The parties desire to amend the Agreement in accordance with the terms of this Amendment.

Borrower is currently in default under the Agreement due to Borrower's failure to comply with the Indebtedness restrictions as set forth in Section 7.4 of the Agreement (as in effect prior to the date hereof) (the "Existing Default").

NOW, THEREFORE, the parties agree as follows:

1. The following defined term hereby is added to Section 1.1 of the Agreement as follows:

"Second Amendment Effective Date" means May 2, 2017.

2. Subsection (h) and Subsection (i) of the defined term "Permitted Indebtedness" in Section 1.1 of the Agreement hereby are amended and restated as follows:

"(h) Indebtedness related to a corporate credit facility not to exceed Fifty Thousand Dollars ($50,000) in the aggregate provided by PWB to Borrower, for a period ending not later than sixty (60) days after the Second Amendment Effective Date;

(i) Indebtedness related to a corporate credit facility not to exceed Two Hundred Thousand Dollars ($200,000) in the aggregate provided by American Express to Borrower (which facility will replace the corporate credit facility provided by PWB to Borrower unless such facility is provided by Bank to Borrower instead);"

3. Borrower hereby acknowledges and Bank hereby waives the Existing Default.

4. No course of dealing on the part of Bank or its officers, nor any failure or delay in the exercise of any right by Bank, shall operate as a waiver thereof, and any single or partial exercise of any such right shall not preclude any later exercise of any such right. Bank's failure at any time to require strict performance by Borrower of any provision shall not affect any right of Bank thereafter to demand strict compliance and performance. Any suspension or waiver of a right must be in writing signed by an officer of Bank.

5. Unless otherwise defined, all initially capitalized terms in this Amendment shall be as defined in the Agreement. The Agreement, as amended hereby, shall be and remain in full force and effect in accordance with its respective terms and hereby is ratified and confirmed in all respects. Except as expressly set forth herein, the execution, delivery, and performance of this Amendment shall not operate as a waiver of, or as an amendment of, any right, power, or remedy of Bank under the Agreement, as in effect prior to the date hereof.

6. Borrower represents and warrants that the Representations and Warranties contained in the Agreement are true and correct as of the date of this Amendment, and that no Event of Default has occurred and is continuing.

7. As a condition to the effectiveness of this Amendment, Bank shall have received, in form and substance satisfactory to Bank, the following:

(a) this Amendment, duly executed by Borrower;

(b) all reasonable Bank Expenses incurred through the date of this Amendment, which may be debited from any of Borrower's accounts; and

(c) such other documents, and completion of such other matters, as Bank may reasonably deem necessary or appropriate.

8. This Amendment may be executed in two or more counterparts, each of which shall be deemed an original, but all of which together shall constitute one instrument.

[Balance of Page Intentionally Left Blank]

IN WITNESS WHEREOF, the undersigned have executed this Amendment as of the first date above written.

BIONANO GENOMICS, INC.

By: /s/ R. Erik Holmlin

Title: CEO

WESTERN ALLIANCE BANK, an Arizona corporation

By: /s/ Lindsay Fouty

Title: VP Portfolio Management

[*Signature Page to Second Amendment to Loan and Security Agreement*]

THIRD AMENDMENT TO LOAN AND SECURITY AGREEMENT

This Third Amendment to Loan and Security Agreement (this "Amendment") is entered into as of November 20, 2017, by and between WESTERN ALLIANCE BANK, an Arizona corporation ("Bank") and BIONANO GENOMICS, INC., a Delaware corporation ("Borrower").

RECITALS

Borrower and Bank are parties to that certain Loan and Security Agreement dated as of March 8, 2016, as amended from time to time, including by that certain First Amendment to Loan and Security Agreement dated as of December 9, 2016, and that certain Second Amendment to Loan and Security Agreement dated as of May 2, 2017 (collectively, the "Agreement"). The parties desire to amend the Agreement in accordance with the terms of this Amendment.

NOW, THEREFORE, the parties agree as follows:

1. The following defined terms in Section 1.1 of the Agreement hereby are added, amended or restated as follows:

"Third Amendment Effective Date" means November 20, 2017."

2. New subsection (e) hereby is added to the end of Section 2.6 of the Agreement to read as follows:

"(e) **Third Amendment Fee**. An amendment fee equal to Seventeen Thousand Five Hundred Dollars ($17,500) (the "Third Amendment Fee") which shall be nonrefundable, due on the earliest to occur of (a) the Term Loan Maturity Date, or (b) the acceleration of any Term Loan, or (c) the prepayment of a Term Loan pursuant to Section 2.2(c) or (d)."

3. Section 6.8 of the Agreement hereby is amended and restated in its entirety to read as follows:

"6.8 Funding Milestones.

(i) On or after the Third Amendment Effective Date and on or before November 27, 2017, Borrower shall have received at least One Million Five Hundred Thousand Dollars ($1,500,000) of gross cash proceeds (provided that Borrower shall only incur a reasonable amount of transaction expenses in connection therewith) from the sale or issuance of its equity securities or Subordinated Debt to investors and on terms and conditions reasonably acceptable to Bank.

(ii) On or after the Third Amendment Effective Date and on or before December 31, 2017, Borrower shall have received at least Fifteen Million Dollars ($15,000,000) (excluding amounts received in connection with 6.8(i)) of gross cash prgceeds (provided that Borrower shall only incur a reasonable amount of transaction expenses in connection therewith) from the sale or issuance of its equity securities or Subordinated Debt to investors and on terms and conditions reasonably acceptable to Bank."

4. Exhibit C to the Agreement hereby is replaced with Exhibit C attached hereto.

5. Exhibit D to the Agreement hereby is replaced with Exhibit D attached hereto.

6. No course of dealing on the part of Bank or its officers, nor any failure or delay in the exercise of any right by Bank, shall operate as a waiver thereof, and any single or partial exercise of any such right shall not preclude any later exercise of any such right. Bank's failure at any time to require strict performance by Borrower of any provision shall not affect any right of Bank thereafter to demand strict compliance and performance. Any suspension or waiver of a right must be in writing signed by an officer of Bank.

IN WITNESS WHEREOF, the undersigned have executed this Amendment as of the first date above written.

BIONANOGENOMICS, INC., a Delaware corporation

By: /s/ R. Erik Holmlin

Name R. Erik Holmlin

Title: CEO

WESTERN ALLIANCE BANK, an Arizona corporation

By: /s/ Lindsay Fouty

Name: Lindsay Fouty

Title: VP, Portfolio Management

[*Signature Page to Third Amendment to Loan and Security Agreement*]

EXHIBIT C

2017 annual financial projections (effective as of September 30, 2017)

[to be attached]

	Financial *Performance for 2017*											
	January	***February***	***March***	***April***	***May***	***June***	***July***	***August***	***September***	***October***	***November***	***December***	***Full Year***
Revenue:													
Instrument	$13,700	$7,659	$1,341,799	$794,847	$330,998	$657,989	$1,179,420	$304,200	$810.000	$540,000	$540,000	$1,080,000	$7,600,612
Cartridge	$16,958	$83,660	$60,090	$85,065	$17,383	$51,361	$102,174	$45,000	$134,000	$94,200	$94,200	$139,750	$923,841
Kit	$18,245	$24,844	$26,893	$22,421	$21,320	$34,050	$35,857	$38,200	$40,200	$32,970	$32,970	$41,925	$369,894
Other	$40,421	$40,421	$38,963	$46,849	$39,928	$41,711	$57,885	$43,000	$40,000	$40,000	$40,000	$40 000	$509,178
Service	$0	$0	$0	$0	$30,000	$15,000	$0	$25,000	$5,000	$5,000	$5,000	$5,000	$90,000
Grant													$0
Total Revenue	$89,324	$156,584	$1,467,745	$949,182	$439,629	$800,111	$1,375,336	$455,400	$1,029,200	$712,170	$712,170	$1,306,675	$9,493,525
Total COGS	$41,899	$53,578	$1,186,116	$592,872	$278,326	$457,664	$871,520	$251,768	$597,168	$419,289	$419,289	$764,192	$5,933,680
Gross Margin	$47,425	$103,006	$281,629	$356,309	$161,304	$342,446	$503,816	$203,632	$432,032	$292,881	$292,881	$542,483	$3,559,845
GM%	*53.1%*	*65.8%*	*19.2%*	*37.5%*	*36.7%*	*42.8%*	*36.6%*	*44.7%*	*42.0%*	*41.1%*	*41.1%*	*41.5%*	*37.5%*
Operating Expenses:													
Operations	$125,771	$140,448	$134,904	$142,828	$156,464	$192,303	$153,144	$153,144	$124,835	$123,585	$123,585	$124,835	$1,695,846
General & Administrative	$402,408	$323,674	$538,195	$345,803	$343,881	$657,919	$468,612	$643,881	$518,506	$341,150	$329,150	$468,506	$5,381,686
Sales & Marketing	$547,824	$461,654	$793,393	$721,478	$454,213	$599,853	$489,833	$489,833	$804,506	$473,199	$454,099	$804,506	$7,094,389
Research	$111,001	$128,959	$163,839	$139,702	$126,091	$173,282	$114,639	$114,639	$0	$0	$0	$0	$1,072,152
Development	$920,535	$790,998	$948,410	$985,590	$1,011,837	$797,226	$804,952	$804,952	$548,518	$488,995	$494,995	$548,518	$9,145,525
Total Operating Expenses	$2,107,539	$1,845,733	$2,578,741	$2,335,400	$2,092,485	$2,420,582	$2,031,180	$2,206,449	$1,996,365	$1,426,929	$1,401,829	$1,946,365	$24,389,599
% of Rev	*2359.4%*	*1178.7%*	*175.7%*	*246.0%*	*476.0%*	*302.5%*	*147.7%*	*484.5%*	*194.0%*	*200.4%*	*196.8%*	*149.0%*	*256.9%*
Total Operating Income	($2,060,114)	($1,742,727)	($2,297,112)	($1,979,091)	($1,931,182)	($2,078,136)	($1,527,364)	($2,002,817)	($1,564,333)	($1,134,048)	($1,108,948)	($1,403,882)	($20,829,754)
Other Expense/(Income)	$45,324	$45,988	$89,357	$48,950	$49,138	$6,927	$69,778	$45,000	$45,000	$45,000	$45,000	$45,000	$580,462
Net Income	($2,105,438)	($1,788,715)	($2,386,469)	($2,028,042)	($1,980,319)	($2,085,063)	($1,597,142)	($2,047,817)	($1,609,333)	($1,179,048)	($1,153,948)	($1,448,882)	($21,410,216)

	Financial Performance for 2017												
	January	*February*	*March*	*April*	*May*	*June*	*July*	*August*	*September*	*October*	*November*	*December*	*Full Year*
Balance Sheet													
Assets:													
Cash	3,690,459	6,002,291	4,793,007	2,843,537	3,188,432	5,714,454	4,557,885	4,791,410	3,281,887	2,297,680	1,639,603	83,057	
Receivables	1,490,768	1,219,876	1,983,595	2,281,781	1,440,721	1,409,137	2,131,773	1,951,773	2,130,773	2,042,773	1,725,743	2,320,248	
Prepaid	1,388,023	1,624,149	3,585,679	3,183,223	3,863,488	3,903,122	2,624,011	3,224,011	2,954,011	2,954,011	2,954,011	2,554,011	
Inventory	1,838,196	1,931,940	2,095,794	2,097,262	1,712,060	1,544,022	2,158,299	2,158,299	1,958,299	1,958,299	2,008,299	2,008,299	
Other Current Assets	34,942	24,523	29,894	25,606	7,838	3,148	3,148	3,148	3,148	3,148	3,148	3,148	
Current Assets	8,442,388	10,802,778	12,487,970	10,431,409	10,212,538	12,573,883	11,475,115	12,128,641	10,328,118	9,255,910	8,330,803	6,968,762	
PP&E	3,797,088	3,696,791	3,626,030	3,511,898	3,552,463	3,445,249	3,338,034	3,381,019	3,277,019	3,189,988	3,087,957	2,985,926	
Intangible Assets	0	0	0	0	0	0	0	0	0	0	0	0	
Other Non-Current Assets	69,619	67,308	64,997	62,686	0	0	0	0	0	0	0	0	
Non-Current Assets	3,866,707	3,764,099	3,691,027	3,574,584	3,552,463	3,445,249	3,338,034	3,381,019	3,277,019	3,189,988	3,087,957	2,985,926	
TOTAL ASSETS	12,309,095	14,566,876	16,178,996	14,005,993	13,765,002	16,019,132	14,813,149	15,509,660	13,605,137	12,445,898	11,418,761	9,954,689	
Liabilities:													
Accounts Payable	976,172	800,585	2,374,274	1,579,108	1,468,825	1,311,368	1,565,397	1,565,397	1,445,397	1,445,397	1,545,397	1,545,397	
Unearned Revenue	570,774	555,021	534,348	502,160	372,898	366,977	364,771	376,771	374,271	371,771	369,271	366,771	
Other Current Liabilities	2,277,994	2,362,163	2,392,354	2,582,442	3,307,167	3,187,148	3,473,172	3,473,172	3,473,172	3,473,172	3,473,172	3,473,172	
Payroll Liabilities	1,621,893	804,389	1,126,400	1,155,482	1,081,551	1,443,132	1,382,738	1,132,738	992,738	1,027,738	1,069,738	1,069,738	
Tax Liabilities	111,677	112,831	136,746	127,471	149,197	150,663	151,391	151,391	151,391	151,391	151,391	151,391	
Short-Term Debt	1,944,444	2,138,889	2,333,333	2,527,778	2,640,769	2,835,214	3,029,658	3,224,102	3,418,546	3,612,990	3,807,434	4,001,878	
Current Liabilities	7,502,954	6,773,876	8,897,457	8,474,440	9,020,408	9,294,502	9,967,127	9,923,571	9,855,515	10,082,459	10,416,403	10,608,347	
Long-Term Debt	5,055,556	4,861,111	4,666,667	4,472,222	4,051,102	3,858,969	3,666,835	3,474,701	3,282,567	3,090,433	2,898,299	2,706,165	
Other Long-Term Liability	980,386	967,970	955,555	943,139	930,724	918,308	900,579	885,579	870,579	855,579	840,579	825,579	
Long-Term Liabilities	6,035,942	5,829,082	5,622,222	5,415,362	4,981,826	4,777,277	4,567,414	4,360,280	4,153,146	3,946,012	3,738,878	3,531,744	
TOTAL LIABILITIES	13,538,895	12,602,958	14,519,678	13,889,802	14,002,234	14,071,779	14,534,541	14,283,851	14,008,661	14,028,471	14,155,281	14,140,091	
				(12,416)	(12,416)	(12,416)	(17,730)		(15,000)	(15,000)	(15,000)	(15,000)	
Equity:													
Share Capital	6,871	6,871	6,871	6,871	11,853	11,853	11,853	6,870	6,870	6,870	6,870	6,870	
Additional Paid-in-Capital	112,167,907	117,167,907	119,257,907	119,757,907	121,381,439	125,682,444	125,630,763	128,630,763	128,630,763	128,630,763	128,630,763	128,630,763	
Warrants	4,487,807	4,487,807	4,487,407	4,487,807	4,585,312	4,585,312	4,585,312	4,585,312	4,585,312	4,585,312	4,585,312	4,585,312	
Share Issue Costs	(1,031,112)	(1,049,372)	(1,056,037)	(1,068,500)	(1,153,677)	(1,171,749)	(1,184,743)	(1,184,743)	(1,204,743)	(1,204,743)	(1,204,743)	(1,204,743)	
Shareholders Equity	115,631,473	120,613,213	122,696,547	123,184,084	124,824,927	129,107,859	129,043,183	132,038,201	132,018,201	132,018,201	132,018,201	132,018,201	
Retained Earnings (Loss)	($116,861,272)	($118,649,292)	($121,037,227)	($123,067,891)	($125,062,159)	($127,160,506)	($128,764,575)	($130,812,392)	($132,421,725)	($133,600,773)	($134,754,721)	($136,203,603)	
TOTAL EQUITY	($1,229,800)	$1,963,921	$1,659,320	$116,193	($237,232)	$1,947,353	$278,638	$1,225,808	($403,525)	($1,582,572)	($2,736,520)	($4,185,402)	
TOTAL LIABILITIES & EQUITY	12,309,096	14,566,879	16,178,999	14,005,995	13,765,002	16,019,132	14,813,149	15,509,660	13,605,137	12,445,899	11,418,761	9,954,689	
	1	$2	$2	$2	$0	$0	$0	$0	$0	$0	$0	$0	

Cash Flow Statement	Financial Performance for 2017												
	January	*February*	*March*	*April*	*May*	*June*	*July*	*August*	*September*	*October*	*November*	*December*	*Full Year*
Operating:													
Net Income	($2,105,438)	($1,788,020)	($2,387,934)	($2,030,665)	($1,991,349)	($2,098,347)	($1,604,069)	($2,047,817)	($1,609,333)	($1,179,045)	($1,153,948)	($1,448,882)	($21,444,850)
Depreciation	107,215	107,215	107,215	107,215	130,300	107,215	107,215	104,341	104,341	104,341	104,341	104,341	$1,285,293
Amortization	0	0	0	0	0	0	0	0	0	0	0	0	
Convertible Debt interest	0	0	0	0	(308,128)	2,311	2,111	0	0	0	0	0	
Stock-Based Compensation Expense	0	0	90,000	0	0	90,000	0	0	0	0	0	0	
Deferred Tax Asset	0	0	0	0	0	0	0	0	0	0	0	0	
Total Items not affecting cash	107,215	107,215	197,215	107,215	(177,828)	199,526	109,526	104,341	104,341	104,341	104,341	104,341	
Investments	0	0	0	0	0	0	0	0	0	0	0	0	
Receivables	641,561	270,892	(763,719)	(298,186)	841,060	(212,916)	(478,135)	180,000	(179,000)	88,000	317,030	(594,505)	
Prepaid	87,399	(263,126)	(1,961,530)	402,457	(680,265)	(39,634)	1,279,111	(600,000)	270,000	0	0	400,000	
Inventory	(40,871)	(93,744)	(163,854)	(1,463)	385,202	168,038	(614,277)	0	200,000	0	(50,000)	0	
Other Current Assets	(10,420)	10,420	(5,371)	4,288	17,769	4,689	0	0	0	0	0	0	
Accounts Payable	(49,166)	(175,587)	1,573,689	(795,166)	(110,283)	(157,457)	254,029	0	(120,000)	0	100,000	0	
Other Current Liabilities	(340,673)	68,416	9,519	157,900	595.463	118,560	39,318	12,000	(2,500)	(2,500)	(2,500)	(2,500)	
Payroll Liabilities	45,752	(817,504)	322,012	29,082	(73,931)	361,581	(60,394)	(250,000)	(140,000)	35,000	42,000	0	
Federal Tax Liabilities	0	0	0	0	0	0	0	0	0	0	0	0	
State & Local Tax Liabilities	0	0	0	0	0	0	0	0	0	0	0	0	
Sales Tax Liabilities	218	1,154	23,916	(9,276)	21,727	1,466	728	0	0	0	0	0	
Non-Current Liabilities	(52,215)	(12,416)	(12,416)	(12,416)	(12,416)	(12,416)	(17,730)	(15,000)	(15,000)	(15,000)	(15,000)	(15,000)	
Changes in non-cash operating working capital	281,584	(984,496)	(977,755)	(522,786)	984,325	231,911	402,650	(673,000)	13,500	105,500	391,530	(212,005)	
Total Operating Cash Flow	(1,716,639)	(2,665,301)	(3,168,474)	(2,446,236)	(1,184,852)	(1,666,910)	(1,091,893)	(2,616,476)	(1,491,492)	(969,207)	(658,077)	(1,556,546)	($21,232,103)
Investing:													
Property, Plant, and Equipment	$0	($6,918)	($36,454)	$6,918	($170,865)	$0	$0	($150,000)	($13,031)	$0			($370,350)
Intangible Assets	$0	$0	$0	$0	$0	0	0	0	0	0	0	0	
Other Non-Current Assets	$2,311	$2,311	$2,311	$2,311	$62,686	0	0	0	0	0	0	0	
Total Investing Cash Flow	**2,311**	**(4,607)**	**(34,143)**	**9,228**	**(108,179)**	-	-	**(150,000)**	**(23,031)**	-	-	-	
Financing:													
Cash Provided (Used) by Debt	0	0	0	0	0	0	0	0	0	0	0	0	
Provided (Used) by Common Stock	0	0	0	0	0	0	0	0	0	0	0	0	
Cash Provided (Used) by Series A	0	0	0	0	0	0	0	0	0	0	0	0	
Cash Provided (Used) by Series B	0	0	0	0	0	0	0	0	0	0	0	0	
Provided (Used) by Series B Extension	0	0	0	0	0	0	0	0	0	0	0	0	
Cash Provided (Used) by Series C	0	0	0	0	0	0	0	0	0	0	0	0	
Cash Provided (Used) by Series D	0	(18,260)	(6,666)	(12,463)	(11,161)	(18,073)	(12,994)	0	0	0	0	0	
Cash Provided (Used) by Series D-1	0	5,000,000	2,000,000	500,000	1,649,087	4,211,005	(51,682)	3,000,000	(5,000)	(15,000)	0	0	
Total Financing Cash Flow	-	**4,981,740**	**1,993,334**	**487,537**	**1,637,926**	**4,192,932**	**(64,676)**	**3,000,000**	**(5,000)**	**(15,000)**	-	-	**16,208,794**
NET CASH FLOW	(1,714,328)	2,311,833	(1,209,283)	(1,949,470)	344,895	2,526,022	(1,156,569)	233,524	(1,509,523)	(984,207)	(658,077)	(3,556,546)	(5,321,730)
Cash, Beginning of Period	5,404,787	3,690,459	6,002,291	4,793,008	2,843,538	3,188,432	5,714,454	4,557,886	4,791,410	3,281,887	2,297,680	1,639,603	
Cash, End of Period	3,690,459	6,002,291	4,793,008	2,843,538	3,188,432	5,714,434	4,557,886	4,791,410	3,281,887	2,297,680	1,639,603	83,057	

EXHIBIT D

COMPLIANCE CERTIFICATE

TO: WESTERN ALLIANCE BANK, an Arizona corporation

FROM: BIONANO GENOMICS, INC.

The undersigned authorized officer of BIONANO GENOMICS, INC. hereby certifies that in accordance with the terms and conditions of the Loan and Security Agreement between Borrower and Bank (the "Agreement"), (i) Borrower is in complete compliance for the period ending _____ with all required covenants except as noted below and (ii) all representations and warranties of Borrower stated in the Agreement are true and correct in all material respects as of the date hereof except as noted below; provided that those representations and warranties expressly referring to another date shall be true, correct and complete in all material respects as of such date. Attached herewith are the required documents supporting the above certification. The Officer further certifies that these are prepared in accordance with Generally Accepted Accounting Principles (GAAP) and are consistently applied from one period to the next except as explained in an accompanying letter or footnotes.

Please indicate compliance status by circling Yes/No under "Complies" column.

Reporting Covenant	Required	Complies	
Annual financial statements (CPA Audited)	FYE within 180 days	Yes	No
Monthly financial statements and Compliance Certificate	Prior to each Credit Extension, and monthly within 30 days	Yes	No
10K and 10Q	(as applicable)	Yes	No
Annual operating budget, sales projections and operating plans approved by board of directors	Annually no later than 45 days after the beginning of each fiscal year	Yes	No
Deposit balances with Bank	$_____		
Deposit balance outside Bank	$_____		

Financial Covenant	Required	Actual	Complies	
Funding Milestones	Receipt of (i) $1,500,000 on or before November 27, 2017 and (ii) $15,000,000 on or before December 31, 2017 of gross cash proceeds from the sale or issuance of its equity securities or Subordinated Debt	$_____	Yes	No
		$_____	Yes	No
		$_____	Yes	No
Minimum Cash with Bank	ratio of (i) minimum unrestricted cash in accounts with Bank to (ii) Indebtedness to Bank, of at least 0.75 to 1.00	_____: _____	Yes	No
Performance to Plan (monthly; T6M)	At least 75% of the ___% projections (see Exhibit C)		Yes	No

Comments Regarding Exceptions: See Attached.

Sincerely,

SIGNATURE

TITLE

DATE

BANK USE ONLY

Received by: _____
AUTHORIZED SIGNER

Date: _____

Verified: _____
AUTHORIZED SIGNER

Date: _____

Compliance Status Yes No

CORPORATE RESOLUTIONS TO BORROW

Borrower: BIONANO GENOMICS, INC.

I, the undersigned Secretary or Assistant Secretary of BIONANO GENOMICS, INC. (the "Corporation"), HEREBY CERTIFY that the Corporation is organized and existing under and by virtue of the laws of the State of Delaware.

I FURTHER CERTIFY that attached hereto as Attachments 1 and 2 are true and complete copies of the Certificate of Incorporation, as amended, and the Bylaws of the Corporation, each of which is in full force and effect on the date hereof.

I FURTHER CERTIFY that at a meeting of the Directors of the Corporation, duly called and held, at which a quorum was present and voting (or by other duly authorized corporate action in lieu of a meeting), the following resolutions (the "Resolutions") were adopted.

BE IT RESOLVED, that any one (1) of the following named officers, employees, or agents of this Corporation, whose actual signatures are shown below:

NAMES	POSITION	ACTUAL SIGNATURES

acting for and on behalf of this Corporation and as its act and deed be, and they hereby are, authorized and empowered:

Borrow Money. To borrow from time to time from Western Alliance Bank, an Arizona corporation ("Bank"), on such terms as may be agreed upon between the officers, employees, or agents of the Corporation and Bank, such sum or sums of money as in their judgment should be borrowed, without limitation.

Execute Loan Documents. To execute and deliver to Bank that certain Loan and Security Agreement dated as March 8, 2016 (the "Loan Agreement") and any other agreement entered into between Corporation and Bank in connection with the Loan Agreement, including any amendments, all as amended or extended from time to time, including but not limited to that certain First Amendment to Loan and Security Agreement dated as of December 9, 2016 and that certain Second Amendment to Loan and Security Agreement dated as of May 2, 2017 (collectively, with the Loan Agreement, the "Loan Documents"), and also to execute and deliver to Bank one or more renewals, extensions, modifications, refinancings, consolidations, or substitutions for the Loan Documents, or any portion thereof.

Grant Security. To grant a security interest to Bank in the Collateral described in the Loan Documents, which security interest shall secure all of the Corporation's Obligations, as described in the Loan Documents.

Negotiate Items. To draw, endorse, and discount with Bank all drafts, trade acceptances, promissory notes, or other evidences of indebtedness payable to or belonging to the Corporation or in which the Corporation may have an interest, and either to receive cash for the same or to cause such proceeds to be credited to the account of the Corporation with Bank, or to cause such other disposition of the proceeds derived therefrom as they may deem advisable.

Warrants. To issue Bank warrants to purchase the Corporation's capital stock.

Letters of Credit. To execute letter of credit applications and other related documents pertaining to Bank's issuance of letters of credit.

Corporate Credit Cards. To execute corporate credit card applications and agreements and other related documents pertaining to Bank's provision of corporate credit cards.

Further Acts. In the case of lines of credit, to designate additional or alternate individuals as being authorized to request advances thereunder, and in all cases, to do and perform such other acts and things, to pay any and all fees and costs, and to execute and deliver such other documents and agreements as they may in their discretion deem reasonably necessary or proper in order to carry into effect the provisions of these Resolutions.

BE IT FURTHER RESOLVED, that any and all acts authorized pursuant to these resolutions and performed prior to the passage of these resolutions are hereby ratified and approved, that these Resolutions shall remain in full force and effect and Bank may rely on these Resolutions until written notice of their revocation shall have been delivered to and received by Bank. Any such notice shall not affect any of the Corporation's agreements or commitments in effect at the time notice is given.

I FURTHER CERTIFY that the officers, employees, and agents named above are duly elected, appointed, or employed by or for the Corporation, as the case may be, and occupy the positions set forth opposite their respective names; that the foregoing Resolutions now stand of record on the books of the Corporation; and that the Resolutions are in full force and effect and have not been modified or revoked in any manner whatsoever.

IN WITNESS WHEREOF, I have hereunto set my hand on November 20, 2017 and attest that the signatures set opposite the names listed above are their genuine signatures.

CERTIFIED AND ATTESTED BY:

X_____

Exhibit 10.19

FORBEARANCE AND FOURTH AMENDMENT TO LOAN AND SECURITY AGREEMENT

This Forbearance and Fourth Amendment to Loan and Security Agreement (this "Amendment") is entered into as of February 9, 2018, by and between WESTERN ALLIANCE BANK, an Arizona corporation ("Bank") and BIONANO GENOMICS, INC., a Delaware corporation ("Borrower").

RECITALS

A. Borrower and Bank are parties to that certain Loan and Security Agreement dated as of March 8, 2016, as amended from time to time, including by that certain First Amendment to Loan and Security Agreement dated as of December 9, 2016, that certain Second Amendment to Loan and Security Agreement dated as of May 2, 2017; and that certain Third Amendment to Loan and Security Agreement dated as of November 20, 2017 (collectively, the "Loan Agreement"). The parties desire to amend the Loan Agreement in accordance with the terms of this Amendment.

B. As of the date hereof, there is owing under the Loan Agreement a principal amount (not including, to the extent applicable, any contingent obligations, e.g. those arising out of any undrawn letters of credit issued by Bank for Borrower's benefit), accrued and unpaid interest, legal fees and costs, plus all other outstanding amounts and costs of enforcement due under the Loan Agreement. Such amount, plus accruing interest and costs and accrued and accruing attorneys' fees and costs are hereinafter referred to herein as the "Existing Debt."

C. Event of Defaults have occurred and exist under Section 6.8(b) of the Loan Agreement as a result of Borrower's failure on or before December 31, 2017 to provide evidence satisfactory to Bank that Borrower received at least Fifteen Million Dollars ($15,000,000) from the sale or issuance of its equity securities or Subordinated Debt (the "Existing Default"). The Existing Default entitles Bank immediately to enforce all the remedies set forth in the Loan Agreement. Borrower has asked Bank to forbear from exercising those remedies as a result of the Existing Default, and Bank has agreed, provided Borrower enters into this Amendment

NOW, THEREFORE, the parties agree as follows:

1. Defined Terms. Capitalized terms not otherwise defined herein shall have the same meanings as set forth in the Loan Agreement.

2. Acknowledgement of Liability. As of the date of this Amendment, Borrower owes Bank an amount equal to the Existing Debt. Borrower reaffirms all of its obligations under the Loan Agreement and hereby forever waives and relinquishes any and all claims, set-offs or defenses that Borrower may now have with respect to the payment of sums due to Bank and the performance of other obligations under the Loan Agreement. The security interests granted to Bank in the Loan Agreement in the Collateral remain perfected, first priority liens.

3. Forbearance. Borrower acknowledges the existence of the Existing Default under the Loan Agreement. Borrower further acknowledges and agrees that Bank is not in any way agreeing to waive such Existing Default as a result of this Amendment or the performance by the parties of their respective obligations hereunder or thereunder. Subject to the conditions contained herein and performance by Borrower of all of the terms of this Amendment and the Loan Agreement after the date hereof, Bank shall, until the earliest of (i) June 30, 2018 or (ii) such date that there shall occur any further Event of Default (the "Forbearance Period"), forbear from exercising any remedies that it may have against Borrower as a result of the occurrence of the Existing Default. This forbearance shall not be deemed a continuing waiver or forbearance with respect to any Event of Default of a similar nature that may occur after the date of this Amendment. If Borrower has, after the Fourth Amendment effective date but on or before June 30, 2018, (i) delivered to Bank evidence, satisfactory to Bank in its sole discretion, that Borrower has received at least Twenty-One Million Dollars ($21,000,000) of gross cash proceeds (provided that Borrower shall only incur a reasonable amount of transaction expenses in connection therewith) from the sale of its equity securities to investors and on terms and conditions reasonably acceptable to Bank, or (ii) the occurrence of a Liquidity Event which has resulted in all Obligations owing from Borrower to Bank being repaid in full in cash, and Borrower has otherwise complied with this Agreement, the Existing Default shall be automatically waived. Such forbearance or

waiver does not apply to any other Event of Default or other failure by Borrower to perform in accordance with the Loan Agreement or this Amendment

4. Amendments. The Loan Agreement is hereby amended as follows:

4.1 The following defined terms in Section 1.1 of the Loan Agreement hereby are added, amended or restated as follows:

"Amortization Date" is July 8, 2018; provided, however, if Borrower has delivered to Bank evidence, satisfactory to Bank in its sole discretion, that Borrower has received at least Twenty-One Million Dollars ($21,000,000) of gross cash proceeds (provided that Borrower shall only incur a reasonable amount of transaction expenses in connection therewith) from the sale of its equity securities to investors and on terms and conditions reasonably acceptable to Bank, in accordance with the requirements set forth in Section 6.8 hereof, then the Amortization Date shall automatically be extended to October 8, 2018.

"IP Agreement" is that certain Intellectual Property Security Agreement entered into by and between Borrower and Bank dated as of the Fourth Amendment Effective Date, as such may be amended from time to time.

"IP Release Event" is the period beginning on the date Borrower has delivered to Bank evidence, satisfactory to Bank in its sole discretion, that Borrower has received at least Twenty-One Million Dollars ($21,000,000) of gross cash proceeds (provided that Borrower shall only incur a reasonable amount of transaction expenses in connection therewith) from the sale of its equity securities to investors and on terms and conditions reasonably acceptable to Bank, in accordance with the requirements set forth in Section 6.8 hereof.

"Fourth Amendment Effective Date" means February 9, 2018.

"Liquidity Event" is any of the following: (a) a sale or other disposition by Borrower of all or substantially all of its assets; (b) a merger or consolidation of Borrower into or with another person or entity, where the holders of Borrower's outstanding voting equity securities as of immediately prior to such merger or consolidation hold less than a majority of the issued and outstanding voting equity securities of the successor or surviving person or entity as of immediately following the consummation of such merger or consolidation; (c) any sale, in a single transaction or series of related transactions, by the holders of Borrower's outstanding voting equity securities, to one or more buyers, of such securities, where such holders do not, as of immediately following the consummation of such transaction(s), continue to hold at least a majority of Borrower's issued and outstanding voting equity securities; or (d) Borrower's initial public offering and sale of its common stock or other common voting equity securities pursuant to an effective registration statement under the Securities Act of 1933, as amended.

4.2 New Subsection (f) of Section 2.6 of the Loan Agreement hereby is added to the end of Section 2.6 of the Loan Agreement to read as follows:

"**(f) Fourth Amendment Fee.** An amendment fee equal to Seventy Thousand Dollars ($70,000) (the "Fourth Amendment Fee") which shall be nonrefundable, due on the earliest to occur of (a) the Term Loan Maturity Date, or (b) the acceleration of any Term Loan, or (c) the prepayment of a Term Loan pursuant to Section 2.2(c) or (d)."

4.3 New Subsection (g) of Section 2.6 of the Loan Agreement hereby is added to the end of Section 2.6 of the Loan Agreement to read as follows:

"**(g) Success Fee.** A success fee equal to Two Hundred Ten Thousand Dollars ($210,000) (the "Success Fee") which shall be nonrefundable, due on the occurrence of a Liquidity Event. This Section 2.6(g) shall survive the termination of this Agreement."

4.4 Section 6.8 of the Loan Agreement hereby is amended and restated in its entirety to read as follows:

"**6.8 Funding Milestone.** On or after the Fourth Amendment Effective Date, Borrower shall have received gross cash proceeds (provided that Borrower shall only incur a reasonable amount of transaction expenses in connection therewith) from the sale of its equity securities to investors and on terms and conditions reasonably acceptable to Bank in the following amounts for the following deadlines: (i) Six Million Dollars ($6,000,000) by no later than February 12, 2018; (ii) an additional (and not cumulative with the dollar amount received that is applicable to satisfying Section 6.8(i) hereof) Three Million Dollars ($3,000,000) by no later than April 13, 2018; and (iii) an additional (and not cumulative with the dollar amounts received that are applicable to satisfying Section 6.8(i) and Section 6.8(ii) hereof) Twelve Million Dollars ($12,000,000) by no later than June 30, 2018."

4.5 Section 6.10 of the Loan Agreement hereby is amended and restated in its entirety to read as follows:

"**6.10 Intellectual Property Rights.**

(a) Borrower shall, (i) concurrently with the delivery of the monthly Compliance Certificate, give Bank written notice of any applications or registrations of intellectual property rights filed with the United States Patent and Trademark Office, including the date of such filing and the registration or application numbers, if any, and the filing of any applications or registrations with the United States Copyright Office, including the title of such intellectual property rights to be registered, as such title will appear on such applications or registrations, and the date such applications or registrations will be filed and (ii) prior to the occurrence of the IP Release Event, prior to the filing of any such applications or registrations, shall execute such documents as Bank may reasonably request for Bank to maintain its perfection in such intellectual property rights to be registered by Borrower, and upon the request of Bank, shall file such documents simultaneously with the filing of any such applications or registrations. Upon filing any such applications or registrations with the United States Copyright Office, Borrower shall promptly provide Bank with (i) a copy of such applications or registrations, without the exhibits, if any, thereto, (ii) evidence of the filing of any documents requested by Bank to be filed for Bank to maintain the perfection and priority of its security interest in such intellectual property rights, and (iii) the date of such filing.

(b) Bank may audit Borrower's Intellectual Property to confirm compliance with this Section, provided such audit may not occur more often than (i) prior to the occurrence of the IP Release Event twice per year and (ii) after the occurrence of the IP Release Event, once per year, unless an Event of Default has occurred and is continuing. Bank shall have the right, but not the obligation, to take, at Borrower's sole expense, any actions that Borrower is required under this Section to take but which Borrower fails to take, after 15 days' notice to Borrower. Borrower shall reimburse and indemnify Bank for all reasonable costs and reasonable expenses incurred in the reasonable exercise of its rights under this Section."

4.6 Exhibit A to the Loan Agreement hereby is replaced with Exhibit A attached hereto.

4.7 Exhibit D to the Loan Agreement hereby is replaced with Exhibit D attached hereto.

5. Default. In addition to all other Event(s) of Default under the Loan Agreement, the following shall constitute an Event of Default under this Amendment: Borrower's failure to pay any amount when due under this Amendment or to perform any covenant or other agreement contained in this Amendment or any other document entered into pursuant hereto.

6. Repayment. Borrower shall continue to make all payments as they become due under the LoanAgreement.

7. Ratification by Borrower of Bank's First Priority Security Interest in Collateral. Borrower hereby confirms and ratifies Bank's first priority lien and security interest in and to all Collateral, including all property described on Exhibit A hereto. Borrower shall execute such security agreements, financing statements and other documents as Bank may from time to time reasonably request to carry out the terms of this Amendment and the Loan Agreement. Borrower authorizes Bank to file such financing statements and amendments relating to the Collateral. Such liens and security interests shall secure all of the obligations of Borrower under this Amendment and the Loan Agreement.

8. Receipt and Application of Payments. All payments hereunder and under the Loan Agreementmay, at Bank's option, first be applied against Bank Expenses and accrued and unpaid interest, and the balance against the principal portion of the Existing Debt in reverse order of maturity, all in Bank's sole and absolute discretion. Acceptance by Bank of any payment in an amount less than the amount then due shall be deemed an acceptance on account only, and the failure to pay the entire amount then due shall be and continue to be an Event of Default pursuant to this Amendment, and at any time thereafter and until the entire amount then due has been paid, Bank shall be entitled to exercise all rights conferred upon it herein or in the Loan Agreement upon the occurrence of an Event of Default. To the extent that Bank receives any payment or benefit and such payment or benefit, or any part thereof, is required to be repaid to a trustee, receiver, or any other party under any bankruptcy act, state or federal law, common law or equitable cause, then to the extent of such payment or benefit, the Existing Debt, or any part thereof intended to be satisfied shall be revived and continued in full force and effect as if such payment or benefit had not been made, shall accrue interest at the highest rate applicable to any portion thereof, shall be secured by the Collateral and payable on demand.

9. Representations and Warranties.

9.1 Borrower hereby represents and warrants that no Event of Default or failure of condition has occurred or exists, or would exist with notice or lapse of time or both under any of the Loan Agreement, other than the Existing Default.

9.2 The forbearance period granted pursuant to the terms of this Amendment is reasonable and is based upon the projections of Borrower.

9.3 All representations and warranties of Borrower in this Amendment and the Loan Agreement are true and correct as of the date hereof, and shall survive the execution of this Amendment.

9.4 All of Borrower's deposit accounts (including operating and payroll accounts) and investment accounts are with Bank other than those permitted under the Loan Agreement.

10. Rights and Remedies.

10.1 Upon the occurrence and during the continuance of an Event of Default, Bank may, at its election, without notice of its election and without demand, do any one or more of the following, all of which are authorized by Borrower:

(a) Without notice to Borrower, set off and apply to the amounts due and owing under the Loan Agreement and this Amendment:

(i) any and all cash or certificates of deposit held by Bank for whatever purpose; and

(ii) indebtedness at any time owing to or for the credit or the account of Borrower held by Bank.

(b) Take action against Borrower for payment under the Loan Agreement and this Amendment;

(c) Demand that Borrower (i) deposit cash with Bank in an amount equal to the amount of any Letters of Credit remaining undrawn, as collateral security for the repayment of any future drawings under such Letters of Credit, and (ii) pay in advance all Letter of Credit fees scheduled to be paid or payable over the remaining term of the Letters of Credit, and Borrower shall promptly deposit and pay such amounts; and/or

(d) Exercise any right and remedy authorized by the Loan Agreement and/or this Amendment and/or applicable law.

10.2 Bank's rights and remedies under this Amendment, the Loan Agreement and all other agreements shall be cumulative. Bank shall have all other rights and remedies not inconsistent herewith as provided under the Code, by law, or in equity. No exercise by Bank of one right or remedy shall be deemed an election, and no waiver by Bank of any Event of Default on the part of Borrower shall be deemed a continuing waiver. No delay by Bank shall constitute a waiver, election, or acquiescence by it. Bank shall have the right to take any action it deems necessary against Borrower in order to enforce or perfect, or to realize on its security interest in the Collateral.

11. Power of Attorney. Effective only upon the occurrence and during the continuance of an Event of Default, Borrower hereby irrevocably appoints Bank (and any of Bank's designated officers, or employees) as Borrower's true and lawful attorney to: (a) send requests for verification of Accounts or notify account debtors of Bank's security interest in the Accounts; (b) endorse Borrower's name on any checks or other forms of payment or security that may come into Bank's possession; (c) sign Borrower's name on any invoice or bill of lading relating to any Account, drafts against account debtors, schedules and assignments of Accounts, verifications of Accounts, and notices to account debtors; (d) dispose of any Collateral; (e) make, settle, and adjust all claims under and decisions with respect to Borrower's policies of insurance; (f) settle and adjust disputes and claims respecting the accounts directly with account debtors, for amounts and upon terms which Bank determines to be reasonable; (g) to modify, in its sole discretion, any intellectual property security agreement entered into between Borrower and Bank without first obtaining Borrower's approval of or signature to such modification by amending Exhibits A, B, and C, thereof, as appropriate, to include reference to any right, title or interest in any Copyrights, Patents or Trademarks acquired by Borrower after the execution hereof or to delete any reference to any right, title or interest in any Copyrights, Patents or Trademarks in which Borrower no longer has or claims to have any right, title or interest; and (h) to file, in its sole discretion, one or more financing or continuation statements and amendments thereto, relative to any of the Collateral without the signature of Borrower where permitted by law; provided Bank may exercise such power of attorney to sign the name of Borrower on any of the documents described in clauses (g) and (h) above, regardless of whether an Event of Default has occurred. The appointment of Bank as Borrower's attorney in fact, and each and every one of Bank's rights and powers, being coupled with an interest, is irrevocable until all of the Obligations have been fully repaid and performed and Bank's obligation to provide advances hereunder is terminated.

12. Conditions Precedent. The effectiveness of this Amendment is subject to Bank's receipt of all of the following:

(a) this Amendment, duly executed by Borrower;

(b) an IP Agreement, duly executed by Borrower;

(c) a UCC Financing Statement Amendment;

(d) a Certificate of the Secretary of Borrower with respect to incumbency and resolutions authorizing the execution and delivery of this Amendment;

(e) all reasonable Bank Expenses incurred through the date of this Amendment, which may be debited from any of Borrower's accounts; and

(f) such other documents, and completion of such other matters, as Bank may reasonably deem necessary or appropriate.

13. Waiver of Notice and Cure. Borrower acknowledges that Events of Default have occurred under the Loan Agreement that, but for this Amendment, would have entitled Bank to exercise all the remedies available to Bank under the Loan Agreement and applicable law. Borrower waives all notices of default and rights to cure that are otherwise provided in the Loan Agreement or applicable law, including, but not limited to, rights to notice and redemption under California Uniform Commercial Code sections 9611, 9620 and 9623. Borrower further waives any claim that a sale or other disposition by Bank of the Collateral is not commercially reasonable because Bank disclaims any warranties with respect to such sale or other disposition, including, without limitation, disclaimers of warranties relating to title, possession, quiet enjoyment, or the like. Borrower recognizes that Bank may be unable to effect a public sale of any or all the Collateral, by reason of certain prohibitions contained in federal securities laws and applicable state securities laws or otherwise, and may be compelled to resort to one or more private sales thereof to a restricted group of purchasers which will be obliged to agree, among other things, to acquire such securities for their own account for investment and not with a view to the distribution or resale thereof. Borrower acknowledges and agrees that any such private sale may result in prices and other terms less favorable than if such sale were a public sale and, notwithstanding such circumstances, agrees that any such private sale shall be deemed to have been made in a commercially reasonable manner. Bank shall be under no obligation to delay a sale of any of the Collateral for the period of time necessary to permit the issuer thereof to register such securities for public sale under federal securities laws or under applicable state securities laws, even if such issuer would agree to do so.

14. Release.

14.1 Borrower acknowledges that Bank would not enter into this Amendment without Borrower's assurance hereunder. Except for the obligations arising hereafter under this Amendment, Borrower hereby absolutely discharges and releases Bank, any person or entity that has obtained any interest from Bank under the Loan Agreement and each of Bank's and such entity's former and present partners, stockholders, officers, directors, employees, successors, assignees, agents and attorneys from any known or unknown claims which Borrower now has against Bank of any nature, including any claims that Borrower, its successors, counsel, and advisors may in the future discover they would have now had if they had known facts not now known to them, whether founded in contract, in tort or pursuant to any other theory of liability, including but not limited to any claims arising out of or related to the Loan Agreement or the transactions contemplated thereby.

14.2 Borrower waives the provisions of California Civil Code Section 1542, which states:

A GENERAL RELEASE DOES NOT EXTEND TO CLAIMS WHICH THE CREDITOR DOES NOT KNOW OR SUSPECT TO EXIST IN HIS FAVOR AT THE TIME OF EXECUTING THE RELEASE, WHICH IF KNOWN BY HIM MUST HAVE MATERIALLY AFFECTED HIS SETTLEMENT WITH THE DEBTOR.

14.3 The provisions, waivers and releases set forth in this section are binding upon Borrower and Borrower's shareholders, agents, employees, assigns and successors in interest. The provisions, waivers and releases of this section shall inure to the benefit of Bank and its agents, employees, officers, directors, assigns and successors in interest.

14.4 Borrower warrants and represents that Borrower is the sole and lawful owner of all right, title and interest in and to all of the claims released hereby and Borrower has not heretofore voluntarily, by operation of law or otherwise, assigned or transferred or purported to assign or transfer to any person any such claim or any portion thereof. Borrower shall indemnify and hold harmless Bank from and against any claim, demand, damage, debt, liability (including payment of attorneys' fees and costs actually incurred whether or not litigation is commenced) based on or arising out of any assignment or transfer.

14.5 The provisions of this section shall survive payment in full of the Obligations, full performance of all the terms of this Amendment and the Loan Agreement, and/or Bank's actions to exercise any remedy available under the Loan Agreement or otherwise.

15. Further Assurances. Borrower will take such other actions as Bank may reasonably request from time to time to perfect or continue Bank's security interests in Borrower's property, and to accomplish the objectives of this Amendment.

16. Consultation of Counsel. Borrower acknowledges that Borrower has had the opportunity to be represented by legal counsel of its own choice throughout all of the negotiations that preceded the execution of this Amendment. Borrower has executed this Amendment after reviewing and understanding each provision of this Amendment and without reliance upon any promise or representation of any person or persons acting for or on behalf of Bank. Borrower further acknowledges that Borrower and its counsel have had adequate opportunity to make whatever investigation or inquiry they may deem necessary or desirable in connection with the subject matter of this Amendment prior to the execution hereof and the delivery and acceptance of the consideration described herein.

17. Miscellaneous.

17.1 Successors and Assigns. This Amendment shall be binding upon and shall inure to the benefit of Borrower and Bank and their respective successors and assigns; provided, however, that the foregoing shall not authorize any assignment by Borrower of its rights or duties hereunder.

17.2 Integration. This Amendment and any documents executed in connection herewith or pursuant hereto contain the entire agreement between the parties with respect to the subject matter hereof and supersede all prior agreements, understandings, offers and negotiations, oral or written, with respect thereto and no extrinsic evidence whatsoever may be introduced in any judicial or arbitration proceeding, if any, involving this Amendment; except that any financing statements or other agreements or instruments filed by Bank with respect to Borrower shall remain in full force and effect.

17.3 Entire Agreement. This Amendment and the Loan Agreement contain the entire agreement of the parties hereto and supersede any other oral or written agreements or understandings with respect to the subject matter hereof and thereof.

17.4 Course of Dealing; Waivers. No course of dealing on the part of Bank or its officers, nor any failure or delay in the exercise of any right by Bank, shall operate as a waiver thereof, and any single or partial exercise of any such right shall not preclude any later exercise of any such right. Bank's failure at any time to require strict performance by Borrower of any provision shall not affect any right of Bank thereafter to demand strict compliance and performance. Any suspension or waiver of a right must be in writing signed by an officer of Bank.

17.5 Time is of the Essence. Time is of the essence as to each and every term and provision of this Amendment and the other Loan Agreement.

17.6 Counterparts. This Amendment may be signed in counterparts and all of such counterparts when properly executed by the appropriate parties thereto together shall serve as a fully executed document, binding upon the parties.

17.7 Legal Effect. The Loan Agreement remain in full force and effect. If any provision of this Amendment conflicts with applicable law, such provision shall be deemed severed from this Amendment, and the balance of this Amendment shall remain in full force and effect.

17.8 WAIVER OF JURY. BANK AND BORROWER ACKNOWLEDGE AND AGREE THAT THE TIME AND EXPENSE REQUIRED FOR TRIAL BY JURY EXCEED THE TIME AND EXPENSE REQUIRED FOR A BENCH TRIAL AND HEREBY WAIVE, TO THE EXTENT PERMITTED BY LAW, TRIAL BY JURY OF ANY CLAIM OR CAUSE OF ACTION BASED UPON, RELATED TO OR ARISING OUT OF THE TRANSACTIONS CONTEMPLATED BY THE LOAN AGREEMENT, INCLUDING CONTRACT CLAIMS, TORT CLAIMS, BREACH OF DUTY CLAIMS, AND ALL OTHER COMMON LAW OR STATUTORY CLAIMS. EACH PARTY RECOGNIZES AND AGREES THAT THE FOREGOING WAIVER CONSTITUTES A MATERIAL INDUCEMENT FOR IT TO ENTER INTO THIS AMENDMENT.

EACH PARTY REPRESENTS AND WARRANTS THAT IT HAS REVIEWED THIS WAIVER WITH ITS LEGAL COUNSEL AND THAT IT KNOWINGLY AND VOLUNTARILY WAIVES ITS JURY TRIAL RIGHTS FOLLOWING CONSULTATION WITH LEGAL COUNSEL.

18. Assignment and Indemnity. Borrower consents to Bank's assignment of all or any part of Bank's rights under this Amendment and the Loan Agreement. Borrower shall indemnify and defend and hold Bank and any assignee of Bank's interests harmless from any actions, costs, losses or expenses (including attorneys' fees) arising out of such assignment, this Amendment and the Loan Agreement.

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IN WITNESS WHEREOF, the undersigned have executed this Amendment as of the first date above written.

BIONANO GENOMICS, INC., a Delaware corporation

By: /s/ Erik Holmlin
Name: Erik Holmlin
Title: Chief Executive Officer

WESTERN ALLIANCE BANK, an Arizona corporation

By: _____
Name:
Title:

[Signature Page to Forbearance and Fourth Amendment to Loan and Security Agreement]

IN WITNESS WHEREOF, the undersigned have executed this Amendment as of the first date above written.

BIONANO GENOMICS, INC., a Delaware corporation

By: _____
Name:
Title:

WESTERN ALLIANCE BANK, an Arizona corporation

By: /s/ Bill Wicklive
Name: Bill Wicklive
Title: VP, Director of Portfolio Mgmt

[Signature Page to Forbearance and Fourth Amendment to Loan and Security Agreement]

EXHIBIT A

DEBTOR: **BIONANO GENOMICS, INC., a Delaware Corporation**

SECURED PARTY: **WESTERN ALLIANCE BANK, an Arizona Corporation**

COLLATERAL DESCRIPTION ATTACHMENT
TO LOAN AND SECURITY AGREEMENT

All personal property of Borrower (herein referred to as "Borrower" or "Debtor") whether presently existing or hereafter created or acquired, and wherever located, including, but not limited to:

(a) all accounts (including health-care-insurance receivables), chattel paper (including tangible and electronic chattel paper), deposit accounts, documents (including negotiable documents), equipment (including all accessions and additions thereto), general intangibles (including payment intangibles and software), goods (including fixtures), instruments (including promissory notes), inventory (including all goods held for sale or lease or to be furnished under a contract of service, and including returns and repossessions), investment property (including securities and securities entitlements), letter of credit rights, money, and all of Debtor's books and records with respect to any of the foregoing, and the computers and equipment containing said books and records;

(b) any and all cash proceeds and/or noncash proceeds of any of the foregoing, including, without limitation, insurance proceeds, and all supporting obligations and the security therefor or for any right to payment. All terms above have the meanings given to them in the California Uniform Commercial Code, as amended or supplemented from time to time.

Notwithstanding the foregoing, the Collateral shall not include (i) more than 65% of the presently existing and hereafter arising issued and outstanding shares of capital stock owned by Borrower of any Foreign Subsidiary which shares entitle the holder thereof to vote for directors or any other matter. or (ii) any property that is financed by a third party permitted by clause (a) or (c) of the definition of "Permitted Liens" hereunder to the extent prohibited by the terms of such agreement, provided that upon the termination or lapse of any such prohibition, such property (and any accessions, attachments, replacements or improvements thereon) shall be deemed to be Collateral hereunder and shall be subject to the security interest granted.

Notwithstanding the foregoing, at all times after to the IP Release Event, the Collateral shall not include any Intellectual Property (as defined in the Loan and Security Agreement dated as of March 8, 2016 between Debtor and Secured Party) now owned or hereafter acquired; provided, however, that the Collateral shall include (whether before or after the IP Release Event at which time the security interest in Intellectual Property will have been released) all accounts and general intangibles that consist of rights to payment and proceeds from the sale, licensing or disposition of all or any part, or rights in, the foregoing (the "Rights to Payment"). Notwithstanding the foregoing, if a judicial authority (including a U.S. Bankruptcy Court) holds that a security interest in the underlying Intellectual Property is necessary to have a security interest in the Rights to Payment, then the Collateral shall automatically, and effective as of the Closing Date, include the Intellectual Property to the extent necessary to permit perfection of Bank's security interest in the Rights to Payment.

EXHIBIT D
COMPLIANCE CERTIFICATE

TO: WESTERNALLIANCE BANK, an Arizona corporation

FROM: BIONANOGENOMICS, INC.

The undersigned authorized officer of BIONANO GENOMICS, INC. hereby certifies that in accordance with the terms and conditions of the Loan and Security Agreement between Borrower and Bank (the "Agreement"), (i) Borrower is in complete compliance for the period ending _____ with all required covenants except as noted below and (ii) all representations and warranties of Borrower stated in the Agreement are true and correct in all material respects as of the date hereof except as noted below; provided that those representations and warranties expressly referring to another date shall be true, correct and complete in all material respects as of such date. Attached herewith are the required documents supporting the above certification. The Officer further certifies that these are prepared in accordance with Generally Accepted Accounting Principles (GAAP) and are consistently applied from one period to the next except as explained in an accompanying letter or footnotes.

Please indicate compliance status by circling Yes/No under "Complies" column.

Reporting Covenant	Required		Complies	
Annual financial statements (CPA Audited)	FYE within 180 days		Yes	No
Monthly financial statements and Compliance Certificate	Prior to each Credit Extension, and monthly within 30 days		Yes	No
10K and 10Q	(as applicable)		Yes	No
Annual operating budget, sales projections and operating plans approved by board of directors	Annually no later than 45 days after the beginning of each fiscal year		Yes	No
Deposit balances with Bank	$_____			
Deposit balance outside Bank	$_____			
Financial Covenant	**Required**	**Actual**	**Complies**	
Funding Milestones	Receipt of:			
	(i) $6,000,000 by no later than	$_____	Yes	No
	February 12, 2018; (ii) an additional (and not cumulative with the dollar amount received that is applicable to satisfying sub-	$_____	Yes	No
	clause (i) of this paragraph) $3,000,000 by no later than April 13, 2018; and (iii) an additional (and not cumulative with the dollar amounts received that are applicable to sub-clauses (i) and of this paragraph) $12,000,000 by no later than June 30, 2018	$_____	Yes	No
Minimum Cash with Bank	ratio of (i) minimum unrestricted	_____;	Yes	No
	cash in accounts with Bank to (ii)	_____	Yes	No
	Indebtedness to Bank, of at least 0.75 to 1.00			
Performance to Plan (monthly; T6M)	At least 75% of the projections (see Exhibit C)	_____%	Yes	No

Comments Regarding Exceptions: See Attached.

Sincerely,

SIGNATURE

TITLE

DATE

BANK USE ONLY

Received by: _____
AUTHORIZED SIGNER

Date: _____

Verified: _____
AUTHORIZED SIGNER

Date: _____

Compliance Status Yes No

Exhibit 10.20

ORIGINAL
FULLY-EXECUTED

LEASE

BETWEEN

THE IRVINE COMPANY LLC

AND

BIONANO GENOMICS, INC.

LEASE

THIS LEASE is made as of the 16th day of January , 20 12 , by and between **THE IRVINE COMPANY LLC**, a Delaware limited liability company, hereafter called "**Landlord,**" and **BIONANO GENOMICS, INC.**, a Delaware corporation, hereafter called "**Tenant.**"

ARTICLE 1. BASIC LEASE PROVISIONS

Each reference in this Lease to the "**Basic Lease Provisions**" shall mean and refer to the following collective terms, the application of which shall be governed by the provisions in the remaining Articles of this Lease.

1. **Tenant's Trade Name**: N/A

2. **Premises**: Suite No. 100
Address of Building: 9640 Towne Centre Drive, San Diego, CA 92121
Project Description: Eastgate Technology Park
(The Premises are more particularly described in Section 2.1).

3. **Use of Premises**: General office, research and development laboratory for life sciences and manufacturing and distribution of related consumables and other ancillary uses and for no other use.

4. **Estimated Commencement Date**: 6/30/2012

5. **Lease Term**: **60** months, plus such additional days as may be required to cause this Lease to expire on the final day of the calendar month.

6. **Basic Rent**:

Months of Term or Period	Monthly Rate Per Rentable Square Foot	Monthly Basic Rent (rounded to the nearest dollar)
1 to 12	$1.40	$23,250.00
13 to 24	$1.46	$24,246.00
25 to 36	$1.53	$25,409.00
37 to 48	$1.60	$26,571.00
49 to 60	$1.67	$27,734.00

Notwithstanding the above schedule of Basic Rent to the contrary, as long as Tenant is not in Default (as defined in Section 14.1) under this Lease, Tenant shall be entitled to an abatement of 5 full calendar months of Basic Rent in the aggregate amount of $116,250.00 (i.e. $23,250.00 per month) (the "**Abated Basic Rent**") for the 2nd through 6th full calendar months of the Term (the "**Abatement Period**"). In the event Tenant Defaults at any time during the Term and this Lease is terminated, all unamortized Abated Basic Rent shall immediately become due and payable. The payment by Tenant of the Abated Basic Rent in the event of a Default shall not limit or affect any of Landlord's other rights, pursuant to this Lease or at law or in equity. Only Basic Rent shall be abated during the Abatement Period and all other additional rent and other costs and charges specified in this Lease shall remain as due and payable pursuant to the provisions of this Lease.

7. **Expense Recovery Period**: Every twelve month period during the Term (or portion thereof during the first and last Lease years) ending June 30, 2012.

8. **Floor Area of Premises**: approximately **16,607** rentable square feet

Floor Area of Building: approximately 34,612 rentable square feet

9. **Letter of Credit: $ 150,000.00**, as more fully described in Section 4.3

10. **Broker(s)**: Irvine Realty Company ("**Landlord's Broker**") and Hughes Marino ("**Tenant's Broker**")

11. **Parking**: 60 parking spaces in accordance with the provisions set forth in **Exhibit F** to this Lease.

12. **Address for Payments and Notices**:

LANDLORD

Payment Address:

THE IRVINE COMPANY LLC
Department #0288
Los Angeles, CA 90084-0288

Notice Address:

THE IRVINE COMPANY LLC
550 Newport Center Drive
Newport Beach, CA 92660
Attn: Senior Vice President, Property Operations
Irvine Office Properties

with a copy of notices to:

The Irvine Company LLC
9191 Towne Center Drive, Suite 170
San Diego, CA, 92122
Attn:Property Manager

TENANT

BIONANO GENOMICS, INC.
9640 Towne Centre Drive, Suite 100
San Diego, CA 92121
Attn: Garth Monroe, Vice President & CFO
T: (858) 888-7616

LIST OF LEASE EXHIBITS (All exhibits, riders and addenda attached to this Lease are hereby incorporated into and made a part of this Lease):

Exhibit A	Description of Premises
Exhibit B	Operating Expenses
Exhibit C	Utilities and Services
Exhibit D	Tenant's Insurance
Exhibit E	Rules and Regulations
Exhibit F	Parking
Exhibit G	Additional Provisions
Exhibit H	Hazardous Materials Disclosure Statement
Exhibit I	Letter of Credit Template
Exhibit J	Survey Form
Exhibit X	Work Letter
Exhibit Y	Project Description

ARTICLE 2. PREMISES

2.1 LEASED PREMISES. Landlord leases to Tenant and Tenant leases from Landlord the Premises shown in **Exhibit A** (the "**Premises**"), containing approximately the floor area set forth in Item 8 of the Basic Lease Provisions (the "**Floor Area**"). The Premises are located in the building identified in Item 2 of the Basic Lease Provisions (the "**Building**"), which is a portion of the project described in Item 2 (the "**Project**"). Landlord and Tenant stipulate and agree that the Floor Area of Premises set forth in Item 8 of the Basic Lease Provisions is correct.

2.2 ACCEPTANCE OF PREMISES. Landlord shall deliver the Premises to tenant with all interior glass, doors, door closures, hardware, fixtures, electrical, plumbing, life-safety and HVAC in good working order, condition and repair. Tenant acknowledges that neither Landlord nor any representative of Landlord has made any representation or warranty with respect to the Premises, the Building or the Project or the suitability or fitness of either for any purpose, except as set forth in this Lease. Tenant acknowledges that the flooring materials which may be installed within portions of the Premises located on the ground floor of the Building may be limited by the moisture content of the Building slab and underlying soils. The taking of possession or use of the Premises by Tenant for any purpose other than construction shall conclusively establish that the Premises and the Building were in satisfactory condition and in conformity with the provisions of this Lease in all respects, except for those matters which Tenant shall have brought to Landlord's attention on a written punch list. The punch list shall be limited to any items required to (a) comply with the requirements set forth in the first sentence of this Section 2.2, and (b) be accomplished by Landlord under the Work Letter (if any) attached as **Exhibit X**, and shall be delivered to Landlord within 30 days after the Commencement Date (as defined herein). If no punch list items are required of Landlord, by taking possession of the Premises Tenant accepts the improvements in their existing condition, and waives any right or claim against Landlord arising out of the condition of the Premises. Nothing contained in this Section 2.2 shall affect the commencement of the Term or the obligation of Tenant to pay rent. Landlord shall, at its sole cost and expense (and not as Operating Expense), diligently complete all punch list items of which it is notified as provided above.

2.3 LATENT DEFECTS. Landlord shall be responsible for latent defects in the Tenant Improvements of which Tenant notifies Landlord to the extent that the correction of such defects is covered under valid and enforceable warranties given Landlord by contractors or subcontractors performing the Tenant Improvements. Landlord, at its option, may pursue such claims directly or assign any such warranties to Tenant for enforcement.

ARTICLE 3. TERM

3.1 GENERAL. The term of this Lease ("**Term**") shall be for the period shown in Item 5 of the Basic Lease Provisions. The Term shall commence ("**Commencement Date**") on the earlier of (a) the date the Premises are deemed "ready for occupancy" (as hereinafter defined) and possession thereof is delivered to Tenant, or (b) the date Tenant commences its business activities within the Premises. Promptly following request by Landlord, the parties shall memorialize on a form provided by Landlord (the "**Commencement Memorandum**") the actual Commencement Date and the expiration date ("**Expiration Date**") of this Lease; should Tenant fail to execute and return the Commencement Memorandum to Landlord within 5 business days (or provide specific written objections thereto within that period), then Landlord's determination of the Commencement and Expiration Dates as set forth in the Commencement Memorandum shall be conclusive. The Premises shall be deemed "ready for occupancy" when Landlord, to the extent applicable, has (i) substantially completed all the work required to be completed by Landlord pursuant to the Work Letter (if any) attached to this Lease and complied with requirements set forth in Section 2.2 above but for minor punch list matters, and has obtained the requisite governmental approvals for Tenant's occupancy in connection with such work, (ii) has provided reasonable access to the Premises for Tenant so that the Premises may be used without unreasonable interference, and (iii) has put into operation all building services required to be provided by Landlord under this Lease and essential for the use of the Premises by Tenant. Notwithstanding anything to the contrary in this Lease, in no event shall the Commencement Date occur prior to the Estimated Commencement Date.

3.2 DELAY IN POSSESSION. If Landlord, for any reason whatsoever, cannot deliver possession of the Premises to Tenant on or before the Estimated Commencement Date set forth in Item 4 of the Basic Lease Provisions, this Lease shall not be void or voidable nor shall Landlord be liable to Tenant for any resulting loss or damage. However, Tenant shall not be liable for any rent until the Commencement Date occurs as provided in Section 3.1 above, except that if Landlord's failure to substantially complete all work required of Landlord pursuant to Section 3.1(i) above is attributable to any Tenant Delay described in the Work Letter, if any, attached to this Lease, then the Premises shall be deemed ready for occupancy, and Landlord shall be entitled to full performance by Tenant (including the payment of rent), as of the date Landlord would have been able to substantially complete such work and deliver the Premises to Tenant but for Tenant's delay(s); provided, however, that in no event shall the Commencement Date be deemed to have occurred prior to the Estimated Commencement Date.

ARTICLE 4. RENT AND OPERATING EXPENSES

4.1 BASIC RENT. From and after the Commencement Date, Tenant shall pay to Landlord without deduction or offset (except as expressly set forth in this Lease) a Basic Rent for the Premises in the total amount shown (including subsequent adjustments, if any) in Item 6 of the Basic Lease Provisions (the "**Basic Rent**"). If the Commencement Date is other than the first day of a calendar month, any rental adjustment shown in Item 6 shall be deemed to occur on the first day of the next calendar month following

the specified monthly anniversary of the Commencement Date. The Basic Rent shall be due and payable in advance commencing on the Commencement Date and continuing thereafter on the first day of each successive calendar month of the Term, as prorated for any partial month. No demand, notice or invoice shall be required. An installment in the amount of 1 full month's Basic Rent at the initial rate specified in Item 6 of the Basic Lease Provisions shall be delivered to Landlord concurrently with Tenant's execution of this Lease and shall be applied against the Basic Rent first due hereunder; the next installment of Basic Rent shall be due on the first day of the seventh (7th) calendar month of the Term, which installment shall, if applicable, be appropriately prorated to reflect the amount prepaid for that calendar month.

4.2 OPERATING EXPENSES. Tenant shall pay Tenant's Share of Operating Expenses in accordance with **Exhibit B** of this Lease.

4.3 LETTER OF CREDIT. Tenant shall deliver to Landlord, concurrently with Tenant's execution of this Lease, a letter of credit in the amount stated in Item 9 of the Basic Lease Provisions, which letter of credit shall be in form and with the substance of **Exhibit I** attached hereto. The letter of credit shall be issued by Square 1 Bank. The letter of credit shall provide for automatic yearly renewals throughout the Term of this Lease and shall have an outside expiration date (if any) that is not earlier than thirty (30) days after the expiration of the Lease Term. In the event the letter of credit is not continuously renewed through the period set forth above, or upon any breach under this Lease by Tenant, including specifically Tenant's failure to pay Rent or to abide by its obligations under Sections 7.1 and 15.2 below, Landlord shall be entitled to draw upon said letter of credit by the issuance of Landlord's sole written demand to the issuing financial institution. Any such draw shall be without waiver of any rights Landlord may have under this Lease or at law or in equity as a result of any Default hereunder by Tenant.

Subject to the remaining terms of this Section 4.3, and provided that, (i) during the 12 month period immediately preceding the effective date of any reduction of the letter of credit, no monetary Default has occurred under this Lease which remains uncured following any applicable cure period and (ii) Tenant is successful with estimated "Round C" funding and provides written evidence thereof, Tenant shall have the right to reduce the amount of the letter of credit so that the new amount will be $30,507.00. However, notwithstanding anything to the contrary contained herein, if Tenant has been in monetary Default under this Lease at any time prior to the effective date of any reduction of the letter of credit and Tenant has failed to cure such Defaults within any applicable cure period, then Tenant shall have no further right to reduce the amount of the letter of credit as described herein.

If Tenant is entitled to a reduction in the letter of credit, Tenant shall provide Landlord with written notice requesting that the letter of credit be reduced as provided above (the "**Security Reduction Notice**"). If Tenant provides Landlord with a Security Reduction Notice, and Tenant is entitled to reduce the letter of credit as provided herein, Tenant shall promptly provide Landlord with an amendment to the letter of credit in the reduced amount.

ARTICLE 5. USES

5.1 USE. Tenant shall use the Premises only for the purposes stated in Item 3 of the Basic Lease Provisions and for no other use whatsoever. The uses prohibited under this Lease shall include, without limitation, use of the Premises or a portion thereof for (i) offices of any agency or bureau of the United States or any state or political subdivision thereof; (ii) offices or agencies of any foreign governmental or political subdivision thereof; or (iii) schools, temporary employment agencies or other training facilities which are not ancillary to corporate, executive or professional office use. Tenant shall not do or permit anything to be done in or about the Premises which will in any way unreasonably interfere with the rights or quiet enjoyment of other occupants of the Building or the Project, or use or allow the Premises to be used for any unlawful purpose, nor shall Tenant permit any nuisance or commit any waste in the Premises or the Project. Tenant shall not perform any work or conduct any business whatsoever in the Project other than inside the premises. Tenant shall comply at its expense with all present and future laws, ordinances and requirements of all governmental authorities that pertain to Tenant or its use of the Premises.

5.2 SIGNS. Except for Landlord's standard suite signage identifying Tenant's name and/or logo and except as otherwise provided in **Exhibit G** below, Tenant shall have no right to maintain signs in any location in, on or about the Premises, the Building or the Project and shall not place or erect any signs that are visible from the exterior of the Building. The size, design, graphics, material, style, color and other physical aspects of any permitted sign shall be subject to Landlord's written determination, as determined solely by Landlord, prior to installation, that signage is in compliance with any covenants, conditions or restrictions encumbering the Premises and Landlord's signage program for the Project, as in effect from time to time and approved by the City in which the Premises are located ("**Signage Criteria**"). Prior to placing or erecting any such signs, Tenant shall obtain and deliver to Landlord a copy of any applicable municipal or other governmental permits and approvals, except to Landlord's standard suite signage. Tenant shall be responsible for all costs of any permitted sign, including, without limitation, the fabrication, installation, maintenance and removal thereof and the cost of any permits therefor, except that Landlord shall pay for the initial installation costs only of the standard suite signage. If Tenant fails to maintain its sign in good condition, or if Tenant fails to remove same upon termination of this Lease and repair and restore any damage caused by the sign or its removal, Landlord may do so at Tenant's expense. Landlord shall have the right to temporarily remove any signs in connection with any repairs or maintenance in or upon the Building; provided that Landlord shall use commercially reasonable efforts to minimize the amount of time that Tenant's sign is obstructed and/or removed. The term "**sign**" as used in

this Section shall include all signs, designs, monuments, displays, advertising materials, logos, banners, projected images, pennants, decals, pictures, notices, lettering, numerals or graphics.

5.3 HAZARDOUS MATERIALS.

(a) For purposes of this Lease, the term "**Hazardous Materials**" means (i) any "hazardous material" as defined in Section 25501(0) of the California Health and Safety Code, (ii) hydrocarbons, polychlorinated biphenyls or asbestos, (iii) any toxic or hazardous materials, substances, wastes or materials as defined pursuant to any other applicable state, federal or local law or regulation, and (iv) any other substance or matter which may result in liability to any person or entity as a result of such person's possession, use, storage, release or distribution of such substance or matter under any statutory or common law theory.

(b) Tenant shall not cause or permit any Hazardous Materials to be brought upon, stored, used, generated, released or disposed of on, under, from or about the Premises (including without limitation the soil and groundwater thereunder) without the prior written consent of Landlord, which consent may be given or withheld in Landlord's sole and absolute discretion. Notwithstanding the foregoing, Tenant shall have the right, without obtaining prior written consent of Landlord, to utilize within the Premises a reasonable quantity of standard office products that may contain Hazardous Materials (such as photocopy toner, "White Out", and the like), provided however, that (i) Tenant shall maintain such products in their original retail packaging, shall follow all instructions on such packaging with respect to the storage, use and disposal of such products, and shall otherwise comply with all applicable laws with respect to such products, and (ii) all of the other terms and provisions of this Section 5.3 shall apply with respect to Tenant's storage, use and disposal of all such products. Landlord may, in its sole and reasonable discretion, place such conditions as Landlord deems appropriate with respect to Tenant's use, storage and/or disposal of any Hazardous Materials requiring Landlord's consent. Tenant understands that Landlord may utilize an environmental consultant to assist in determining conditions of approval in connection with the storage, use, release, and/or disposal of Hazardous Materials by Tenant on or about the Premises, and/or to conduct periodic inspections of the storage, generation, use, release and/or disposal of such Hazardous Materials by Tenant on and from the Premises, and Tenant agrees that any costs incurred by Landlord in connection therewith shall be reimbursed by Tenant to Landlord as additional rent hereunder upon demand.

(c) Prior to the execution of this Lease, Tenant shall complete, execute and deliver to Landlord a Hazardous Material Survey Form (the "**Survey Form**") in the form of **Exhibit J** attached hereto. Landlord hereby pre-approves the Hazardous Material Form submitted by Tenant on January 9, 2012 and the use of the Hazardous Materials in the Premises described therein. The completed Survey Form shall be deemed incorporated into this Lease for all purposes, and Landlord shall be entitled to rely fully on the information contained therein. On each anniversary of the Commencement Date until the expiration or sooner termination of this Lease, Tenant shall disclose to Landlord in writing the names and amounts of all Hazardous Materials which were stored, generated, used, released and/or disposed of on, under or about the Premises for the twelve-month period prior thereto, and which Tenant reasonably expects to store, generate, use, release and/or dispose of on, under or about the Premises for the succeeding twelve-month period. In addition, to the extent Tenant is permitted to utilize Hazardous Materials upon the Premises, Tenant shall promptly provide Landlord with complete and legible copies of all the following environmental documents relating thereto: reports filed pursuant to any self-reporting requirements; permit applications, permits, monitoring reports, emergency response or action plans, workplace exposure and community exposure warnings or notices and all other reports, disclosures, plans or documents (even those which may be characterized as confidential) relating to water discharges, air pollution, waste generation or disposal, and underground storage tanks for Hazardous Materials; orders, reports, notices, listings and Correspondence (even those which may be considered confidential) of or concerning the release, investigation, compliance, cleanup, remedial and corrective actions, and abatement of Hazardous Materials; and all complaints, pleadings and other legal documents filed by or against Tenant related to Tenant's storage, generation, use, release and/or disposal of Hazardous Materials.

(d) Landlord and its agents shall have the right, but not the obligation, to inspect, sample and/or monitor the Premises and/or the soil or groundwater thereunder at any time to determine whether Tenant is complying with the terms of this Section 5.3, and in connection therewith Tenant shall provide Landlord with full access to all facilities, records and personnel related thereto. If Tenant is not in compliance with any of the provisions of this Section 5.3, or in the event of a release of any Hazardous Material on, under, from or about the Premises caused or permitted by Tenant, its agents, employees, contractors, licensees, subtenants or invitees, Landlord and its agents shall have the right, but not the obligation, without limitation upon any of Landlord's other rights and remedies under this Lease, to immediately enter upon the Premises without notice and to discharge Tenant's obligations under this Section 5.3 at Tenant's expense, including without limitation the taking of emergency or long-term remedial action. Landlord and its agents shall endeavor to minimize interference with Tenant's business in connection therewith, but shall not be liable for any such interference. In addition, Landlord, at Tenant's expense, shall have the right, but not the obligation, to join and participate in any legal proceedings or actions initiated in connection with any claims arising out of the storage, generation, use, release and/or disposal by Tenant or its agents, employees, contractors, licensees, subtenants or invitees of Hazardous Materials on, under, from or about the Premises.

(e) If the presence of any Hazardous Materials on, under, from or about the Premises or the Project caused by Tenant or its agents, employees, contractors, licensees, subtenants or invitees results

in (i) injury to any person, (ii) injury to or any contamination of the Premises or the Project, or (iii) injury to or contamination of any real or personal property wherever situated, Tenant, at its expense, shall promptly take all actions necessary to return the Premises and the Project and any other affected real or personal property owned by Landlord to the condition existing prior to the introduction of such Hazardous Materials and to remedy or repair any such injury or contamination, including without limitation, any cleanup, remediation, removal, disposal, neutralization or other treatment of any such Hazardous Materials. Notwithstanding the foregoing, Tenant shall not, without Landlord's prior written consent, which consent may be given or withheld in Landlord's sole and absolute discretion, take any remedial action in response to the presence of any Hazardous Materials on, under, from or about the Premises or the Project or any other affected real or personal property owned by Landlord or enter into any similar agreement, consent, decree or other compromise with any governmental agency with respect to any Hazardous Materials claims; provided however, Landlord's prior written consent shall not be necessary in the event that the presence of Hazardous Materials on, under, from or about the Premises or the Project or any other affected real or personal property owned by Landlord (i) imposes an immediate threat to the health, safety or welfare of any individual and (ii) is of such a nature that an immediate remedial response is necessary and it is not possible to obtain Landlord's consent before taking such action. To the fullest extent permitted by law, Tenant shall indemnify, hold harmless, protect and defend (with attorneys acceptable to Landlord) Landlord and any successors to all or any portion of Landlord's interest in the Premises and the Project and any other real or personal property owned by Landlord from and against any and all liabilities, losses, damages, diminution in value, judgments, fines, demands, claims, recoveries, deficiencies, costs and expenses (including without limitation attorneys' fees, court costs and other professional expenses), whether foreseeable or unforeseeable, arising directly or indirectly out of the use, generation, storage, treatment, release, on- or off-site disposal or transportation of Hazardous Materials on, into, from, under or about the Premises, the Building or the Project and any other real or personal property owned by Landlord to the extent caused by Tenant, its agents, employees, contractors, licensees, subtenants or invitees. Such indemnity obligation shall specifically include, without limitation, the cost of any required or necessary repair, restoration, cleanup or detoxification of the Premises, the Building and the Project and any other real or personal property owned by Landlord, the preparation of any closure or other required plans, whether such action is required or necessary during the Term or after the expiration of this Lease and any loss of rental due to the inability to lease the Premises or any portion of the Building or Project as a result of such Hazardous Materials, the remediation thereof or any repair, restoration or cleanup related thereto. If it is at any time discovered that Tenant or its agents, employees, contractors, licensees, subtenants or invitees may have caused the release of any Hazardous Materials on, under, from or about the Premises, the Building or the Project or any other real or personal property owned by Landlord, Tenant shall, at Landlord's request, immediately prepare and submit to Landlord a comprehensive plan, subject to Landlord's approval, specifying the actions to be taken by Tenant to return the Premises, the Building or the Project or any other real or personal property owned by Landlord to the condition existing prior to the introduction of such Hazardous Materials. Upon Landlord's approval of such plan, Tenant shall, at its expense, and without limitation of any rights and remedies of Landlord under this Lease or at law or in equity, immediately implement such plan and proceed to cleanup, remediate and/or remove all such Hazardous Materials in accordance with all applicable laws and as required by such plan and this Lease. The provisions of this Section 5.3(e) shall expressly survive the expiration or sooner termination of this Lease.

(f) Landlord hereby discloses to Tenant, and Tenant hereby acknowledges, certain facts relating to Hazardous Materials at the Project known by Landlord to exist as of the date of this Lease, as more particularly described in **Exhibit H** attached hereto (together with any other Hazardous Materials existing at the Project as of the Commencement Date, "**Pre-Existing Hazardous Materials**"). Tenant shall have no liability or responsibility with respect to the Hazardous Materials facts described in **Exhibit H**, nor with respect to any Hazardous Materials which Tenant proves were not caused by Tenant, its |agents, employees, contractors, licensees, subtenants or invitees. Notwithstanding the preceding two sentences, Tenant agrees to notify its agents, employees, contractors, licensees, subtenants, and invitees of any exposure or potential exposure to Hazardous Materials at the Premises that Landlord brings to Tenant's attention. Tenant hereby acknowledges that this disclosure satisfies any obligation of Landlord to Tenant pursuant to California Health & Safety Code Section 25359.7, or any amendment or substitute thereto or any other disclosure obligations of Landlord. Landlord shall indemnify, protect and hold Tenant harmless from and against any and all liabilities, losses, damages, judgments, fines, demands, claims, recoveries, deficiencies, costs and expenses (including without limitation attorneys' fees, court costs and other professional expenses), whether foreseeable or unforeseeable, arising directly or indirectly out of any Pre-Existing Hazardous Materials.

ARTICLE 6. LANDLORD SERVICES

6.1 UTILITIES AND SERVICES. Landlord and Tenant shall be responsible to furnish those utilities and services to the Premises to the extent provided in **Exhibit C**, subject to the conditions and payment obligations and standards set forth in this Lease. Landlord shall not be liable for any failure to furnish any services or utilities when the failure is the result of any accident or other cause beyond Landlord's reasonable control, nor shall Landlord be liable for damages resulting from power surges or any breakdown in telecommunications facilities or services. Landlord's temporary inability to furnish any services or utilities shall not entitle Tenant to any damages, relieve Tenant of the obligation to pay rent or constitute a constructive or other eviction of Tenant, except that Landlord shall diligently attempt to restore the service or utility promptly. Tenant shall comply with all rules and regulations which Landlord may reasonably establish for the provision of services and utilities, and shall cooperate with all reasonable conservation practices established by Landlord. Landlord shall at all reasonable times have free access to all electrical and mechanical installations of Landlord. In the event that Tenant is

prevented from using, and does not use, the Premises or any portion thereof as a result of (i) any repair, maintenance, alteration or other work performed by Landlord (including those required or permitted by Landlord hereunder), or which Landlord failed to perform, after the Commencement Date and required by this Lease, which substantially interferes with Tenant's use of or ingress to or egress from the Building, the Building parking facility or the Premises, (ii) any failure to provide the services, utilities, or the use of or ingress to and egress from the Building, the Building parking facility or the Premises, required by this Lease, or (iii) the presence of Hazardous Materials (not brought onto the Premises or into the Building by Tenant, its employees, agents or contractors) in violation of applicable law which is required to be remediated, abated, mitigated and/or removed in accordance with applicable law (any such set of circumstances as set forth in items (i), (ii) or (iii) above, to be known as an "**Abatement Event**"), then Tenant shall give Landlord written notice of such Abatement Event, and, if such Abatement Event continues for 5 consecutive business days, or 10 non-consecutive business days in any twelve (12) month period, after Landlord's receipt of any such notice (the "**Eligibility Period**"), then, so long as the cause for the Abatement Event was within the reasonable control of Landlord, rent (including Monthly Installments of Basic Rent, rent adjustments pursuant to Article 4 above and parking charges) ("**Rent**") shall be abated or reduced, as the case may be, after the expiration of the Eligibility Period, for such time that such Abatement Event continues (the "**Abatement Period**"), in the proportion that the rentable area of the portion of the Premises that Tenant is prevented from using, and does not use, bears to the total rentable area of the Premises; provided, however, that in the event that Tenant is prevented from using, and does not use, a portion of the Premises for a period of time in excess of the Eligibility Period and the remaining portion of the Premises is not sufficient to allow Tenant to effectively conduct its business therein, and if Tenant does not conduct its business from such remaining portion, then, so long as the cause for the Abatement Event was within the reasonable control of Landlord, for such time after the expiration of the Eligibility Period during which Tenant is so prevented from effectively conducting its business therein, the Rent for the entire Premises shall be abated for such time as Tenant continues to be so prevented from using, and does not use, the Premises. If, however, Tenant reoccupies any portion of the Premises during the Abatement Period, the Rent allocable to such reoccupied portion, based on the proportion that the rentable area of such reoccupied portion of the Premises bears to the total rentable area of the Premises, shall be payable by Tenant to Landlord from the date Tenant reoccupies such portion of the Premises. To the extent Tenant is entitled to abatement without regard to the Eligibility Period because of an event described in Sections 11 or 12 of this Lease, then the Eligibility Period shall not be applicable.

Notwithstanding anything to the contrary in this Lease, Tenant shall have access to the Premises twenty-four (24) hours per day, seven (7) days per week.

6.2 OPERATION AND MAINTENANCE OF COMMON AREAS. During the Term, Landlord shall operate all Common Areas within the Building and the Project. The term "**Common Areas**" shall mean all areas within the Building and other buildings in the Project which are not held for exclusive use by persons entitled to occupy space, including without limitation parking areas and structures, driveways, sidewalks, landscaped and planted areas, hallways and interior stairwells not located within the premises of any tenant, common electrical rooms, entrances and lobbies, elevators, and restrooms not located within the premises of any tenant.

6.3 USE OF COMMON AREAS. The occupancy by Tenant of the Premises shall include the use of the Common Areas in common with Landlord and with all others for whose convenience and use the Common Areas may be provided by Landlord, subject, however, to compliance with Rules and Regulations described in Article 17 below. Landlord shall at all times during the Term have exclusive control of the Common Areas, and may restrain or permit any use or occupancy, except as otherwise provided in this Lease or in Landlord's rules and regulations. Tenant shall keep the Common Areas clear of any obstruction or unauthorized use related to Tenant's operations. Landlord may temporarily close any portion of the Common Areas for repairs, remodeling and/or alterations, to prevent a public dedication or the accrual of prescriptive rights, or for any other reasonable purpose. Landlord's temporary closure of any portion of the Common Areas for such purposes shall not deprive Tenant of reasonable access to the Premises, and Landlord shall use commercially reasonable efforts to minimize interference with Tenant's business operations in the Premises.

6.4 CHANGES AND ADDITIONS BY LANDLORD. Landlord reserves the right to make alterations or additions to the Building or the Project or to the attendant fixtures, equipment and Common Areas, and such change shall not entitle Tenant to any abatement of rent or other claim against Landlord. No such change shall deprive Tenant of reasonable access to or use of the Premises, and Landlord shall use commercially reasonable efforts to minimize interference with Tenant's business operations in the Premises.

ARTICLE 7. REPAIRS AND MAINTENANCE

7.1 TENANT'S MAINTENANCE AND REPAIR. Subject to Articles 11 and 12, Tenant at its sole expense shall make all repairs necessary to keep the Premises and all improvements and fixtures therein in good condition and repair, excepting ordinary wear and tear. Notwithstanding Section 7.2 below, Tenant's maintenance obligation shall include without limitation all appliances, interior glass, doors, door closures, hardware, fixtures, electrical, plumbing, fire extinguisher equipment and other equipment installed in the Premises and all Alterations constructed by Tenant pursuant to Section 7.3 below, together with any supplemental HVAC equipment servicing only the Premises. All repairs and other work performed by Tenant or its contractors shall be subject to the terms of Sections 7.3 and 7.4 below. Alternatively, should Landlord or its management agent agree to make a repair on behalf of Tenant and at Tenant's request, Tenant shall promptly reimburse Landlord as additional rent for all reasonable costs

incurred (including the standard supervision fee not to exceed five percent (5%)) upon submission of an invoice.

7.2 LANDLORD'S MAINTENANCE AND REPAIR. Subject to Articles 11 and 12, Landlord shall provide service, maintenance and repair with respect to the heating, ventilating and air conditioning ("**HVAC**") equipment of the Building (exclusive of any supplemental HVAC equipment servicing only the Premises) and shall maintain in good repair the Common Areas, roof, foundations, footings, the exterior surfaces of the exterior walls of the Building (including exterior glass), and the structural, electrical, mechanical, life safety/sprinkler and plumbing systems of the Building (including elevators, if any, serving the Building), except to the event provided in Section 7.1 above. Landlord need not make any other improvements or repairs except as specifically required under this Lease, and nothing contained in this Section 7.2 shall limit Landlord's right to reimbursement from Tenant for maintenance, repair costs and replacement costs as provided elsewhere in this Lease. Notwithstanding any provision of the California Civil Code or any similar or successor laws to the contrary, Tenant understands that it shall not make repairs at Landlord's expense or by rental offset. Except as provided in this Lease (including without limitation Section 6.1 above and Section 11.1 and Article 12 below, there shall be no abatement of rent and no liability of Landlord by reason of any injury to or interference with Tenant's business arising from the making of any repairs, alterations or improvements to any portion of the Building, including repairs to the Premises, nor shall any related activity by Landlord constitute an actual or constructive eviction; provided, however, that in making repairs, alterations or improvements, Landlord shall interfere as little as reasonably practicable with the conduct of Tenant's business in the Premises. Tenant hereby waives any and all rights under and benefits of subsection 1 of Section 1932, and Sections 1941 and 1942 of the California Civil Code, or any similar or successor laws now or hereafter in effect.

7.3 ALTERATIONS. Except for cosmetic alteration projects that do not exceed $20,000.00 during any 12 month period and that satisfy the criteria in the next following sentence (which projects shall require that Tenant provide Landlord with notice but which projects will not require Landlord's consent), Tenant shall make no alterations, additions, decorations, or improvements (collectively referred to as "**Alterations**") to the Premises without the prior written consent of Landlord. Landlord's consent shall not be unreasonably withheld as long as the proposed Alterations do not affect the structural, electrical or mechanical components or systems of the Building, are not visible from the exterior of the Premises, do not change the basic floor plan of the Premises, and utilize only Landlord's building standard materials ("**Standard Improvements**"). Landlord may impose, as a condition to its consent, any requirements that Landlord in its discretion may deem reasonable or desirable. Without limiting the generality of the foregoing, Tenant shall use Landlord's designated mechanical and electrical contractors for all Alterations work affecting the mechanical or electrical systems of the Building. Should Tenant perform any Alterations work that would necessitate any ancillary Building modification or other expenditure by Landlord, then Tenant shall promptly fund the cost thereof to Landlord. Tenant shall obtain all required permits for the Alterations and shall perform the work in compliance with all applicable laws, regulations and ordinances with contractors reasonably acceptable to Landlord, and except for cosmetic Alterations not requiring a permit, Landlord shall be entitled to a supervision fee in the amount of 3% of the cost of the Alterations. Any request for Landlord's consent shall be made in writing and shall contain architectural plans describing the work in detail reasonably satisfactory to Landlord. Landlord may elect to cause its architect to review Tenant's architectural plans, and the reasonable cost of that review shall be reimbursed by Tenant. Should the Alterations proposed by Tenant and consented to by Landlord change the floor plan of the Premises, then Tenant shall, at its expense, furnish Landlord with as-built drawings and CAD disks compatible with Landlord's systems. Alterations shall be constructed in a good and workmanlike manner using materials of a quality reasonably approved by Landlord Unless Landlord otherwise agrees in writing, alI Alterations affixed to the Premises, including without limitation all Tenant Improvements constructed pursuant to the Work Letter (except as otherwise provided in the Work Letter), but excluding moveable trade fixtures and furniture, shall become the property of Landlord and shall be surrendered with the Premises at the end of the Term, except that Landlord may, by notice to Tenant given at the time of Landlords' consent to such Alterations (or, with respect to those Alterations not requiring Landlord's consent, within 10 days of Landlord's receipt of notice concerning such Alterations), require Tenant to remove by the Expiration Date, or sooner termination date of this Lease, all or any Alterations (including without limitation all telephone and data cabling) installed either by Tenant or by Landlord at Tenant's request but specifically excluding the Tenant Improvements constructed pursuant to the Work Letter which Tenant shall not be required to remove (collectively, the "**Required Removables**"), and to replace any non-Standard Improvements with the applicable Standard Improvements. Tenant, at the time it requests approval for a proposed Alteration, may request in writing that Landlord advise Tenant whether the Alteration or any portion thereof, is a Required Removable. At the time of Landlord's consent and within 10 days after receipt of Tenant's request, Landlord shall advise Tenant in writing as to which portions of the subject Alterations are Required Removables. In connection with its removal of Required Removables, Tenant shall repair any damage to the Premises arising from that removal and shall restore the affected area to its pre-existing condition, reasonable wear and tear excepted.

7.4 MECHANIC'S LIENS. Tenant shall keep the Premises free from any liens arising out of any work performed, materials furnished, or obligations incurred by or for Tenant. Upon request by Landlord, Tenant shall promptly cause any such lien to be released by posting a bond in accordance with California Civil Code Section 3143 or any successor statute. In the event that Tenant shall not, within 15 days following the imposition of any lien, cause the lien to be released of record by payment or posting of a proper bond, Landlord shall have, in addition to all other available remedies, the right to cause the lien to be released by any means it deems proper, including payment of or defense against the claim giving rise to the lien. All expenses so incurred by Landlord, including Landlord's attorneys' fees, shall be

reimbursed by Tenant promptly following Landlord's demand, together with interest from the date of payment by Landlord at the maximum rate permitted by law until paid. Tenant shall give Landlord no less than 20 days' prior notice in writing before commencing construction of any kind on the Premises.

7.5 ENTRY AND INSPECTION. Landlord shall at all reasonable times have the right to enter the Premises to inspect them, to supply services in accordance with this Lease, to make repairs and renovations as reasonably deemed necessary by Landlord, and to submit the Premises to prospective or actual purchasers or encumbrance holders (or, during the final twelve months of the Term or when an uncured Default exists, to prospective tenants), all without being deemed to have caused an eviction of Tenant and without abatement of rent except as provided elsewhere in this Lease. If reasonably necessary, Landlord may temporarily close all or a portion of the Premises to perform repairs, alterations and additions. Except in emergencies or to provide Building services, Landlord shall provide Tenant with reasonable prior written notice of entry and shall use reasonable efforts to minimize any interference with Tenant's use of the Premises. If, as a result of work being performed by Landlord, Landlord temporarily closes all or any portion of the Premises for a period in excess of 5 consecutive business day(s), Tenant, as its sole remedy, shall be entitled to receive a per diem abatement of Basic Rent in the proportion that the rentable area of the portion of the Premises that Tenant is prevented from using, and does not use, bears to the total rentable area of the Premises during the period beginning on the 6th consecutive business day of closure and ending on the date on which the Premises are returned to Tenant in a tenantable condition. Tenant, however, shall not be entitled to an abatement if the repairs, alterations and/or additions to be performed are required as a result of the acts or omissions of Tenant, its agents, employees or contractors, including, without limitation, a Default by Tenant in its maintenance and repair obligations under the Lease.

ARTICLE 8. SPACE PLANNING AND SUBSTITUTION

[Intentionally Omitted]

ARTICLE 9. ASSIGNMENT AND SUBLETTING

9.1 RIGHTS OF PARTIES.

(a) Except as otherwise specifically provided in this Article 9, Tenant may not, either voluntarily or by operation of law, assign, sublet, encumber, or otherwise transfer all or any part of Tenant's interest in this Lease, or permit the Premises to be occupied by anyone other than Tenant (each, a "**Transfer**"), without Landlord's prior written consent, which consent shall not unreasonably be withheld in accordance with the provisions of Section 9.1(b). For purposes of this Lease, references to any subletting, sublease or variation thereof shall be deemed to apply not only to a sublease effected directly by Tenant, but also to a sub-subletting or an assignment of subtenancy by a subtenant at any level. Except as otherwise specifically provided in this Article 9, no Transfer (whether voluntary, involuntary or by operation of law) shall be valid or effective without Landlord's prior written consent and, at Landlord's election, such a Transfer shall constitute a material default of this Lease.

(b) Except as otherwise specifically provided in this Article 9, if Tenant or any subtenant hereunder desires to transfer an interest in this Lease, Tenant shall first notify Landlord in writing and shall request Landlord's consent thereto. Tenant shall also submit to Landlord in writing: (i) the name and address of the proposed transferee; (ii) the nature of any proposed subtenant's or assignee's business to be carried on in the Premises; (iii) the terms and provisions of any proposed sublease or assignment (including without limitation the rent and other economic provisions, term, improvement obligations and commencement date); (iv) evidence that the proposed assignee or subtenant will comply with the requirements of **Exhibit D** to this Lease; and (v) any other information requested by Landlord and reasonably related to the Transfer. Landlord shall not unreasonably withhold its consent, provided: (1) the use of the Premises will be consistent with the provisions of this Lease and with Landlord's commitment to other tenants of the Building and Project; (2) any proposed subtenant or assignee demonstrates that it is financially responsible by submission to Landlord of all reasonable information as Landlord may request concerning the proposed subtenant or assignee, including, but not limited to, a balance sheet of the proposed subtenant or assignee as of a date within 90 days of the request for Landlord's consent and statements of income or profit and loss of the proposed subtenant or assignee for the two-year period preceding the request for Landlord's consent; (3) the proposed assignee or subtenant is neither an existing tenant or occupant of the Building or Project nor a prospective tenant with whom Landlord or Landlord's affiliate has been actively negotiating to become a tenant at the Building or Project, except that Landlord will not enforce this restriction if it does not have sufficient available space to accommodate the proposed transferee; and (4) the proposed transferee is not an SDN (as defined below) and will not impose additional burdens or security risks on Landlord. If Landlord consents to the proposed Transfer, then the Transfer may be effected within 90 days after the date of the consent upon the terms described in the information furnished to Landlord; provided that any material change in the terms shall be subject to Landlord's consent as set forth in this Section 9.1(b). Landlord shall approve or disapprove any requested Transfer within 20 days following receipt of Tenant's written notice and the information set forth above. Except in connection with a Permitted Transfer (as defined below), if Landlord approves the Transfer Tenant shall pay a transfer fee of $1,000.00 to Landlord concurrently with Tenant's execution of a Transfer consent prepared by Landlord.

If Landlord fails to respond to any request for consent within the 20 day period set forth above, Tenant shall have the right to provide Landlord with a second request for consent. Tenant's second request for consent must specifically state that Landlord's failure to respond within a period of 10 days

shall be deemed to be an approval by Landlord. If Landlord's failure to respond continues for 10 days after its receipt of the second request for consent, the Transfer for which Tenant has requested consent shall be deemed to have been approved by Landlord.

(c) Notwithstanding the provisions of Subsection (b) above, and except in connection with a "**Permitted Transfer**" (as defined below), in lieu of consenting to a proposed assignment or subletting, Landlord may elect to terminate this Lease in its entirety in the event of an assignment, or terminate this Lease as to the portion of the Premises proposed to be subleased with a proportionate abatement in the rent payable under this Lease, such termination to be effective on the date that the proposed sublease or assignment would have commenced. Landlord may thereafter, at its option, assign or re-let any space so recaptured to any third party, including without limitation the proposed transferee identified by Tenant. Notwithstanding the foregoing, should Landlord so elect to terminate this Lease (or terminate as to a portion of the Premises), Tenant may, by notice to Landlord within 5 business days thereafter, elect to rescind its transfer request, in which event Landlord's termination election shall be null and void, this Lease shall continue in full force and effect, and Tenant will not consummate its proposed transfer.

(d) Should any Transfer occur, Tenant shall, except in connection with a Permitted Transfer, promptly pay or cause to be paid to Landlord, as additional rent, 50% of any amounts paid by the assignee or subtenant, however described and whether funded during or after the Lease Term, to the extent such amounts are in excess of the sum of (i) the scheduled Basic Rent payable by Tenant hereunder (or, in the event of a subletting of only a portion of the Premises, the Basic Rent allocable to such portion as reasonably determined by Landlord) and (ii) the direct out-of-pocket costs, as evidenced by third party invoices provided to Landlord, incurred by Tenant to effect the Transfer, which costs shall be amortized over the remaining Term of this Lease or, if shorter, over the term of the sublease.

(e) Notwithstanding anything to the contrary in this Article 9, Tenant may assign this Lease to a successor to Tenant by merger, consolidation, reorganization or dissolution or the purchase of substantially all of Tenant's assets, stock or ownership interests or assign this Lease or sublet all or a portion of the Premises to an Affiliate (defined below), without the consent of Landlord but subject to the provisions of Section 9.2, provided that all of the following conditions are satisfied (a "**Permitted Transfer**"): (i) Tenant is not then in Default hereunder; (ii) Tenant gives Landlord written notice at least 10 business days before such Permitted Transfer; and (iii) the successor entity resulting from any merger or consolidation of Tenant or the sale of all or substantially all of the assets, stock or ownership interests of Tenant, has a net worth (computed in accordance with generally accepted accounting principles, except that intangible assets such as goodwill, patents, copyrights, and trademarks shall be excluded in the calculation ("**Net Worth**")) at the time of the Permitted Transfer that is at least equal to the Net Worth of Tenant immediately before the Permitted Transfer. Tenant's notice to Landlord shall include reasonable information and documentation evidencing the Permitted Transfer and showing that each of the above conditions has been satisfied. If requested by Landlord, Tenant's successor shall sign and deliver to Landlord a commercially reasonable form of assumption agreement. "**Affiliate**" shall mean an entity controlled by, controlling or under common control with Tenant.

9.2 EFFECT OF TRANSFER. No subletting or assignment, even with the consent of Landlord, shall relieve Tenant, or any successor-in-interest to Tenant hereunder, of its obligation to pay rent and to perform all its other obligations under this Lease. Each assignee, other than Landlord, shall be deemed to assume all obligations of Tenant under this Lease and shall be liable jointly and severally with Tenant for the payment of all rent, and for the due performance of all of Tenant's obligations, under this Lease. Such joint and several liability shall not be discharged or impaired by any subsequent modification or extension of this Lease. Consent by Landlord to one or more transfers shall not operate as a waiver or estoppel to the future enforcement by Landlord of its rights under this Lease.

9.3 SUBLEASE REQUIREMENTS. Any sublease, license, concession or other occupancy agreement entered into by Tenant shall be subordinate and subject to the provisions of this Lease, and if this Lease is terminated during the term of any such agreement, Landlord shall have the right to: (i) treat such agreement as cancelled and repossess the subject space by any lawful means, or (ii) require that such transferee attorn to and recognize Landlord as its landlord (or licensor, as applicable) under such agreement. Landlord shall not, by reason of such attornment or the collection of sublease rentals, be deemed liable to the subtenant for the performance of any of Tenant's obligations under the sublease. If Tenant is in Default (hereinafter defined), Landlord is irrevocably authorized to direct any transferee under any such agreement to make all payments under such agreement directly to Landlord (which Landlord shall apply towards Tenant's obligations under this Lease) until such Default is cured. No collection or acceptance of rent by Landlord from any transferee shall be deemed a waiver of any provision of Article 9 of this Lease, an approval of any transferee, or a release of Tenant from any obligation under this Lease, whenever accruing. In no event shall Landlord's enforcement of any provision of this Lease against any transferee be deemed a waiver of Landlord's right to enforce any term of this Lease against Tenant or any other person.

ARTICLE 10. INSURANCE AND INDEMNITY

10.1 TENANT'S INSURANCE. Tenant, at its sole cost and expense, shall provide and maintain in effect the insurance described in **Exhibit D**. Evidence of that insurance must be delivered to Landlord prior to the Commencement Date.

10.2 LANDLORD'S INSURANCE. Landlord shall provide the following types of insurance, with or without deductible and in amounts and coverages as may be determined by Landlord in its discretion:

property insurance, subject to standard exclusions (such as, but not limited to, earthquake and flood exclusions), covering the Building or Project. In addition, Landlord may, at its election, obtain insurance coverages for such other risks as Landlord or its Mortgagees may from time to time deem appropriate, including earthquake and commercial general liability coverage. Landlord shall not be required to carry insurance of any kind on any tenant improvements or Alterations in the Premises installed by Tenant or its contractors or otherwise removable by Tenant (collectively, "**Tenant Installations**"), or on any trade fixtures, furnishings, equipment, interior plate glass, signs or items of personal property in the Premises, and Landlord shall not be obligated to repair or replace any of the foregoing items should damage occur. All proceeds of insurance maintained by Landlord upon the Building and Project shall be the property of Landlord, whether or not Landlord is obligated to or elects to make any repairs.

10.3 TENANT'S INDEMNITY. To the fullest extent permitted by law, but subject to Section 10.5 below, Tenant shall defend, indemnify and hold harmless Landlord, its agents, lenders, and any and all affiliates of Landlord, from and against any and all claims, liabilities, costs or expenses arising during the Term from Tenant's use or occupancy of the Premises, the Building or the Common Areas, or from the conduct of its business, or from any activity, work, or thing done by Tenant or its agents, employees, subtenants, vendors, contractors, invitees or licensees (collectively, "**Tenant Parties**") in or about the Premises, the Building or the Common Areas, or from any Default in the performance of any obligation on Tenant's part to be performed under this Lease, or from any act or negligence of Tenant or its agents, employees, subtenants, vendors, contractors, invitees or licensees. Landlord may, at its option, require Tenant to assume Landlord's defense in any action covered by this Section 10.3 through counsel reasonably satisfactory to Landlord. Notwithstanding the foregoing, Tenant's indemnification obligation shall not apply to any liability or expense to the extent the same was caused by the negligence or willful misconduct of Landlord, its agents, contractors or employees, and, in that event, Landlord shall indemnify, defend and hold Tenant harmless from any resulting claims, liabilities, costs or expenses.

10.4 LANDLORD'S NONLIABILITY. Except to the extent caused by the negligence or intentional misconduct of Landlord (or any of Landlord's agents or affiliates) but subject to Section 10.5 below, Landlord shall not be liable to Tenant, its employees, agents and invitees, and Tenant hereby waives all claims against Landlord, its employees and agents for loss of or damage to any property, or any injury to any person, resulting from any condition including, but not limited to, acts or omissions (criminal or otherwise) of third parties and/or other tenants of the Project, or their agents, employees or invitees, fire, explosion, falling plaster, steam, gas, electricity, water or rain which may leak or flow from or into any part of the Premises or from the breakage, leakage, obstruction or other defects of the pipes, sprinklers, wires, appliances, plumbing, air conditioning, electrical works or other fixtures in the Building, whether the damage or injury results from conditions arising in the Premises or in other portions of the Building. It is understood that any such condition may require the temporary evacuation or closure of all or a portion of the Building. Should Tenant elect to receive any service from a concessionaire, licensee or third party tenant of Landlord, Tenant shall not seek recourse against Landlord for any breach or liability of that service provider. Notwithstanding anything to the contrary contained in this Lease, in no event shall Landlord be liable for Tenant's loss or interruption of business or income (including without limitation, Tenant's consequential damages, lost profits or opportunity costs), or for interference with light or other similar intangible interests.

10.5 WAIVER OF SUBROGATION. Landlord and Tenant each hereby waives all rights of recovery against the other on account of loss and damage occasioned to the property of such waiving party to the extent that the waiving party is entitled to proceeds for such loss and damage under any property insurance policies carried or otherwise required to be carried by this Lease; provided however, that the foregoing waiver shall not apply to the extent of Tenant's obligation to pay deductibles under any such policies and this Lease. By this waiver it is the intent of the parties that neither Landlord nor Tenant shall be liable to any insurance company (by way of subrogation or otherwise) insuring the other party for any loss or damage insured against under any property insurance policies, even though such loss or damage might be occasioned by the negligence of such party, its agents, employees, contractors or invitees. The foregoing waiver by Tenant shall also inure to the benefit of Landlord's management agent for the Building.

ARTICLE 11. DAMAGE OR DESTRUCTION

11.1 RESTORATION.

(a) If the Building of which the Premises are a part is damaged as the result of an event of casualty, then subject to the provisions below, Landlord shall repair that damage as soon as reasonably possible unless Landlord reasonably determines that: (i) the Premises have been materially damaged and there is less than 1 year of the Term remaining on the date of the casualty; (ii) any Mortgagee (defined in Section 13.1) requires that the insurance proceeds be applied to the payment of the mortgage debt; or (iii) proceeds necessary to pay the full cost of the repair are not available from Landlord's insurance, including without limitation earthquake insurance. Should Landlord elect not to repair the damage for one of the preceding reasons, Landlord shall so notify Tenant in the "Casualty Notice" (as defined below), and this Lease shall terminate as of the date of delivery of that notice.

(b) As soon as reasonably practicable following the casualty event but not later than 60 days thereafter, Landlord shall notify) Tenant in writing ("**Casualty Notice**") of Landlord's election, if applicable, to terminate this Lease. If this Lease is not so terminated, the Casualty Notice shall set forth the anticipated period for repairing the casualty damage. If the anticipated repair period exceeds 270 days and if the damage is so extensive as to reasonably prevent Tenant's substantial use and enjoyment of the

Premises, then either party may elect to terminate this Lease by written notice to the other within 10 days following delivery of the Casualty Notice.

(c) In the event that neither Landlord nor Tenant terminates this Lease pursuant to Section 11.1(b), Landlord shall repair all material damage to the Premises or the Building as soon as reasonably possible and this Lease shall continue in effect for the remainder of the Term. Upon notice from Landlord, Tenant shall assign or endorse over to Landlord (or to any party designated by Landlord) all property insurance proceeds payable to Tenant under Tenant's insurance with respect to any Tenant Installations; provided if the estimated cost to repair such Tenant Installations exceeds the amount of insurance proceeds received by Landlord from Tenant's insurance carrier, the excess cost of such repairs shall be paid by Tenant to Landlord prior to Landlord's commencement of repairs. Within 15 days of demand, Tenant shall also pay Landlord for any additional excess costs that are determined during the performance of the repairs to such Tenant Installations.

(d) From and after the casualty event, the rental to be paid under this Lease shall be abated in the same proportion that the Floor Area of the Premises that is rendered unusable by the damage from time to time bears to the total Floor Area of the Premises.

(e) Notwithstanding the provisions of subsections (a), (b) and (c) of this Section 11.1, but subject to Section 10.5, the cost of any repairs shall be borne by Tenant, and Tenant shall not be entitled to rental abatement or termination rights, if the damage is due to the fault or neglect of Tenant or its employees, subtenants, contractors, invitees or representatives. In addition, the provisions of this Section 11.1 shall not be deemed to require Landlord to repair any Tenant Installations, fixtures and other items that Tenant is obligated to insure pursuant to **Exhibit D** or under any other provision of this Lease.

11.2 LEASE GOVERNS. Tenant agrees that the provisions of this Lease, including without limitation Section 11.1, shall govern any damage or destruction and shall accordingly supersede any contrary statute or rule of law.

ARTICLE 12. EMINENT DOMAIN

Either party may terminate this Lease if any material part of the Premises is taken or condemned for any public or quasi-public use under Law, by eminent domain or private purchase in lieu thereof (a "**Taking**"). Landlord shall also have the right to terminate this Lease if there is a Taking of any portion of the Building or Project which would have a material adverse effect on Landlord's ability to profitably operate the remainder of the Building. The termination shall be effective as of the effective date of any order granting possession to, or vesting legal title in, the condemning authority. If this Lease is not terminated, Basic Rent and Tenant's Share of Operating Expenses shall be appropriately adjusted to account for any reduction in the square footage of the Building or Premises. All compensation awarded for a Taking shall be the property of Landlord and the right to receive compensation or proceeds in connection with a Taking are expressly waived by Tenant; provided, however, Tenant may file a separate claim for Tenant's personal property and Tenant's reasonable relocation expenses, provided the filing of the claim does not diminish the amount of Landlord's award. If only a part of the Premises is subject to a Taking and this Lease is not terminated, Landlord, with reasonable diligence, will restore the remaining portion of the Premises as nearly as practicable to the condition immediately prior to the Taking. Tenant agrees that the provisions of this Lease shall govern any Taking and shall accordingly supersede any contrary statute or rule of law.

ARTICLE 13. SUBORDINATION; ESTOPPEL CERTIFICATE

13.1 SUBORDINATION. Landlord hereby represents and warrants that the Building is not currently encumbered by any mortgage or deed of trust (i.e. there is no current Mortgagee on the Building). Tenant accepts this Lease subject and subordinate to any mortgage(s), deed(s) of trust, ground lease(s) or other lien(s) now or subsequently arising upon the Premises, the Building or the Project, and to renewals, modifications, refinancings and extensions thereof (collectively referred to as a "**Mortgage**"). The party having the benefit of a Mortgage shall be referred to as a "**Mortgagee**". This clause shall be self-operative, but upon request from a Mortgagee, Tenant shall execute a commercially reasonable subordination and attornment agreement in favor of the Mortgagee, provided such agreement provides a non-disturbance covenant benefiting Tenant. Alternatively, a Mortgagee shall have the right at any time to subordinate its Mortgage to this Lease. Upon request, Tenant, without charge, shall attorn to any successor to Landlord's interest in this Lease in the event of a foreclosure of any mortgage. Tenant agrees that any purchaser at a foreclosure sale or lender taking title under a deed in lieu of foreclosure shall not be responsible for any act or omission of a prior landlord, shall not be subject to any offsets or defenses Tenant may have against a prior landlord, and shall not be liable for the return of the Security Deposit not actually recovered by such purchaser nor bound by any rent paid in advance of the calendar month in which the transfer of title occurred; provided that the foregoing shall not release the applicable prior landlord from any liability for those obligations. Tenant acknowledges that Landlord's Mortgagees and their successors-in-interest are intended third party beneficiaries of this Section 13.1.

13.2 ESTOPPEL CERTIFICATE. Tenant shall, within 10 days after receipt of a written request from Landlord, execute and deliver (or provide reasonable comments to) a commercially reasonable estoppel certificate in favor of those parties as are reasonably requested by Landlord (including a Mortgagee or a prospective purchaser of the Building or the Project).

ARTICLE 14. DEFAULTS AND REMEDIES

14.1 TENANT'S DEFAULTS. In addition to any other event of default set forth in this Lease, the occurrence of any one or more Of the following events shall constitute a "**Default**" by Tenant:

(a) The failure by Tenant to make any payment of Rent required to be made by Tenant, as and when due, where the failure continues for a period of 5 business days after written notice from Landlord to Tenant. The term "**Rent**" as used in this Lease shall be deemed to mean the Basic Rent and all other sums required to be paid by Tenant to Landlord pursuant to the terms of this Lease

(b) The assignment, sublease, encumbrance or other Transfer of the Lease by Tenant, either voluntarily or by operation of law, whether by judgment, execution, transfer by intestacy or testacy, or other means, without the prior written consent of Landlord unless otherwise authorized in Article 9 of this Lease.

(c) The discovery by Landlord that any financial statement provided by Tenant, or by any affiliate, successor or guarantor of Tenant, was materially false.

(d) Except where a specific time period is otherwise set forth for Tenant's performance in this Lease (in which event the failure to perform by Tenant within such time period shall be a Default), the failure or inability by Tenant to observe or perform any of the covenants or provisions of this Lease to be observed or performed by Tenant, other than as specified in any other subsection of this Section 14.1, where the failure continues for a period of 30 days after written notice from Landlord to Tenant. However, if the nature of the failure is such that more than 30 days are reasonably required for its cure, then Tenant shall not be deemed to be in Default if Tenant commences the cure within 30 days, and thereafter diligently pursues the cure to completion.

The notice periods provided herein are in lieu of, and not in addition to, any notice periods provided by law, and Landlord shall not be required to give any additional notice under California Code of Civil Procedure Section 1161, or any successor statute, in order to be entitled to commence an unlawful detainer proceeding.

14.2 LANDLORD'S REMEDIES.

(a) Upon the occurrence of any Default by Tenant, then in addition to any other remedies available to Landlord, Landlord may exercise the following remedies:

(i) Landlord may terminate Tenant's right to possession of the Premises by any lawful means, in which case this Lease shall terminate and Tenant shall immediately surrender possession of the Premises to Landlord. Such termination shall not affect any accrued obligations of Tenant under this Lease. Upon termination, Landlord shall have the right to reenter the Premises and remove all persons and property. Landlord shall also be entitled to recover from Tenant:

(1) The worth at the time of award of the unpaid Rent which had been earned at the time of termination;

(2) The worth at the time of award of the amount by which the unpaid Rent which would have been earned after termination until the time of award exceeds the amount of such loss that Tenant proves could have been reasonably avoided;

(3) The worth at the time of award of the amount by which the unpaid Rent for the balance of the Term after the time of award exceeds the amount of such loss that Tenant proves could be reasonably avoided;

(4) Any other amount necessary to compensate Landlord for all the detriment proximately caused by Tenant's failure to perform its obligations under this Lease or which in the ordinary course of things would be likely to result from Tenant's default, including, but not limited to, the cost of recovering possession of the Premises, commissions and other expenses of reletting, including necessary repair, renovation, improvement and alteration of the Premises for a new tenant, reasonable attorneys' fees, and any other reasonable costs; and

(5) At Landlord's election, all other amounts in addition to or in lieu of the foregoing as may be permitted by law. Any sum, other than Basic Rent, shall be computed on the basis of the average monthly amount accruing during the 24 month period immediately prior to Default, except that if it becomes necessary to compute such rental before the 24 month period has occurred, then the computation shall be on the basis of the average monthly amount during the shorter period. As used in subparagraphs (1) and (2) above, the "worth at the time of award" shall be computed by allowing interest at the rate of 10% per annum. As used in subparagraph (3) above, the "worth at the time of award" shall be computed by discounting the amount at the discount rate of the Federal Reserve Bank of San Francisco at the time of award plus 1%.

(ii) Landlord may elect not to terminate Tenant's right to possession of the Premises, in which event Landlord may continue to enforce all of its rights and remedies under this Lease, including the right to collect all rent as it becomes due. Efforts by the Landlord to maintain, preserve or relet the Premises, or the appointment of a receiver to protect the Landlord's interests under this Lease, shall not

constitute a termination of the Tenant's right to possession of the Premises. In the event that Landlord elects to avail itself of the remedy provided by this subsection (ii), Landlord shall not unreasonably withhold its consent to an assignment or subletting of the Premises subject to the reasonable standards for Landlord's consent as are contained in this Lease.

(b) The various rights and remedies reserved to Landlord in this Lease or otherwise shall be cumulative and, except as otherwise provided by California law, Landlord may pursue any or all of its rights and remedies at the same time. No delay or omission of Landlord to exercise any right or remedy shall be construed as a waiver of the right or remedy or of any breach or Default by Tenant. The acceptance by Landlord of rent shall not be a (i) waiver of any preceding breach or Default by Tenant of any provision of this Lease, other than the failure of Tenant to pay the particular rent accepted, regardless of Landlord's knowledge of the preceding breach or Default at the time of acceptance of rent, or (ii) a waiver of Landlord's right to exercise any remedy available to Landlord by virtue of the breach or Default. The acceptance of any payment from a debtor in possession, a trustee, a receiver or any other person acting on behalf of Tenant or Tenant's estate shall not waive or cure a Default under Section 14.1. No payment by Tenant or receipt by Landlord of a lesser amount than the rent required by this Lease shall be deemed to be other than a partial payment on account of the earliest due stipulated rent, nor shall any endorsement or statement on any check or letter be deemed an accord and satisfaction and Landlord shall accept the check or payment without prejudice to Landlord's right to recover the balance of the rent or pursue any other remedy available to it. Tenant hereby waives any right of redemption or relief from forfeiture under California Code of Civil Procedure Section 1174 or 1179, or under any successor statute, in the event this Lease is terminated by reason of any Default by Tenant. No act or thing done by Landlord or Landlord's agents during the Term shall be deemed an acceptance of a surrender of the Premises, and no agreement to accept a surrender shall be valid unless in writing and signed by Landlord. No employee of Landlord or of Landlord's agents shall have any power to accept the keys to the Premises prior to the termination of this Lease, and the delivery of the keys to any employee shall not operate as a termination of the Lease or a surrender of the Premises.

14.3 LATE PAYMENTS. Any Rent due under this Lease that is not paid to Landlord within 5 business days of the date when due shall bear interest at the maximum rate permitted by law from the date due until fully paid. The payment of interest shall not cure any Default by Tenant under this Lease. In addition, Tenant acknowledges that the late payment by Tenant to Landlord of rent will cause Landlord to incur costs not contemplated by this Lease, the exact amount of which will be extremely difficult and impracticable to ascertain. Those costs may include, but are not limited to, administrative, processing and accounting charges, and late charges which may be imposed on Landlord by the terms of any ground lease, mortgage or trust deed covering the Premises. Accordingly, if any rent due from Tenant shall not be received by Landlord or Landlord's designee within 5 business days after the date due, then Tenant shall pay to Landlord, in addition to the interest provided above, a late charge for each delinquent payment equal to the greater of (i) 5% of that delinquent payment or (ii) $100.00. Acceptance of a late charge by Landlord shall not constitute a waiver of Tenant's Default with respect to the overdue amount, nor shall it prevent Landlord from exercising any of its other rights and remedies.

14.4 RIGHT OF LANDLORD TO PERFORM. If Tenant is in Default of any of its obligations under the Lease, Landlord shall have the right to perform such obligations. Tenant shall reimburse Landlord for the cost of such performance upon demand together with an administrative charge equal to 10% of the cost of the work performed by Landlord.

14.5 DEFAULT BY LANDLORD. Landlord shall not be deemed to be in default in the performance of any obligation under this Lease unless and until it has failed to perform the obligation within 30 days after written notice by Tenant to Landlord specifying in reasonable detail the nature and extent of the failure; provided, however, that if the nature of Landlord's obligation is such that more than 30 days are required for its performance, then Landlord shall not be deemed to be in default if it commences performance within the 30 day period and thereafter diligently pursues the cure to completion.

14.6 EXPENSES AND LEGAL FEES. Should either Landlord or Tenant bring any action in connection with this Lease, the prevailing party shall be entitled to recover as a part of the action its reasonable attorneys' fees, and all other reasonable costs. The prevailing party for the purpose of this paragraph shall be determined by the trier of the facts.

14.7 WAIVER OF JURY TRIAL/JUDICIAL REFERENCE.

(a) **LANDLORD AND TENANT EACH ACKNOWLEDGES THAT IT IS AWARE OF AND HAS HAD THE ADVICE OF COUNSEL OF ITS CHOICE WITH RESPECT TO ITS RIGHT TO TRIAL BY JURY, AND EACH PARTY DOES HEREBY EXPRESSLY AND KNOWINGLY WAIVE AND RELEASE ALL SUCH RIGHTS TO TRIAL BY JURY IN ANY ACTION, PROCEEDING OR COUNTERCLAIM BROUGHT BY EITHER PARTY HERETO AGAINST THE OTHER (AND/OR AGAINST ITS OFFICERS, DIRECTORS, EMPLOYEES, AGENTS, OR SUBSIDIARY OR AFFILIATED ENTITIES) ON ANY MATTERS WHATSOEVER ARISING OUT OF OR IN ANY WAY CONNECTED WITH THIS LEASE, TENANT'S USE OR OCCUPANCY OF THE PREMISES, AND/OR ANY CLAIM OF INJURY OR DAMAGE.**

(b) In the event that the jury waiver provisions of Section 14.7 (a) are not enforceable under California law, then, unless otherwise agreed to by the parties, the provisions of this Section 14.7 (b) shall apply. Landlord and Tenant agree that any disputes arising in connection with this Lease (including but

not limited to a determination of any and all of the issues in such dispute, whether of fact or of law) shall be resolved (and a decision shall be rendered) by way of a general reference as provided for in Part 2, Title 8, Chapter 6 (§§ 638 et. seq.) of the California Code of Civil Procedure, or any successor California statute governing resolution of disputes by a court appointed referee. Nothing within this Section 14.7 shall apply to an unlawful detainer action.

14.8 SATISFACTION OF JUDGMENT. The obligations of Landlord do not constitute the personal obligations of the individual partners, trustees, directors, officers, members or shareholders of Landlord or its constituent partners or members. Should Tenant recover a money judgment against Landlord, such judgment shall be satisfied only from the interest of Landlord in the Project and out of the rent or other income from such property receivable by Landlord, and no action for any deficiency may be sought or obtained by Tenant.

ARTICLE 15. END OF TERM

15.1 HOLDING OVER. If Tenant holds over for any period after the Expiration Date (or earlier termination of the Term) without the prior written consent of Landlord, such tenancy shall constitute a tenancy at sufferance only and a Default by Tenant; such holding over with the prior written consent of Landlord shall constitute a month-to-month tenancy commencing on the 1st day following the termination of this Lease and terminating 30 days following delivery of written notice of termination by either Landlord or Tenant to the other. In either of such events, possession shall be subject to all of the terms of this Lease, except that the monthly rental shall be 150% of the total monthly rental for the month immediately preceding the date of termination, subject to Landlord's right to modify same upon 30 days notice to Tenant. The acceptance by Landlord of monthly hold-over rental in a lesser amount shall not constitute a waiver of Landlord's right to recover the full amount due unless otherwise agreed in writing by Landlord. If Tenant fails to surrender the Premises upon the expiration of this Lease despite demand to do so by Landlord, Tenant shall indemnify and hold Landlord harmless from all loss or liability, including without limitation, any claims made by any succeeding tenant relating to such failure to surrender. The foregoing provisions of this Section 15.1 are in addition to and do not affect Landlord's right of re-entry or any other rights of Landlord under this Lease or at law.

15.2 SURRENDER OF PREMISES; REMOVAL OF PROPERTY. Upon the Expiration Date or upon any earlier termination of this Lease, Tenant shall quit and surrender possession of the Premises to Landlord in as good order, condition and repair as when received or as hereafter may be improved by Landlord or Tenant, reasonable wear and tear and repairs which are Landlord's obligation excepted, and shall remove or fund to Landlord the cost of removing all wallpapering, voice and/or data transmission cabling installed by or for Tenant and Required Removables, together with all personal property and debris, and shall perform all work required under Section 7.3 of this Lease. If Tenant shall fail to comply with the provisions of this Section 15.2, Landlord may effect the removal and/or make any repairs, and the cost to Landlord shall be additional rent payable by Tenant upon demand.

ARTICLE 16. PAYMENTS AND NOTICES

All sums payable by Tenant to Landlord shall be paid, without deduction or offset (except as otherwise expressly provided in this Lease), in lawful money of the United States to Landlord at its address set forth in Item 12 of the Basic Lease Provisions, or at any other place as Landlord may designate in writing. Unless this Lease expressly provides otherwise, as for example in the payment of rent pursuant to Section 4.1, all payments shall be due and payable within 5 days after demand. All payments requiring proration shall be prorated on the basis of the number of days in the pertinent calendar month or year, as applicable. Any notice, election, demand, consent, approval or other communication to be given or other document to be delivered by either party to the other may be delivered to the other party, at the address set forth in Item 12 of the Basic Lease Provisions, by personal service, or by any courier or "overnight" express mailing service. Either party may, by written notice to the other, served in the manner provided in this Article, designate a different address. The refusal to accept delivery of a notice, or the inability to deliver the notice (whether due to a change of address for which notice was not duly given or other good reason), shall be deemed delivery and receipt of the notice as of the date of attempted delivery. If more than one person or entity is named as Tenant under this Lease, service of any notice upon any one of them shall be deemed as service upon all of them.

ARTICLE 17. RULES AND REGULATIONS

Tenant agrees to comply with the Rules and Regulations attached as **Exhibit E**, and any reasonable and nondiscriminatory amendments, modifications and/or additions as may be adopted and published by written notice to tenants by Landlord for the safety, care, security, good order, or cleanliness of the Premises, Building, Project and/or Common Areas. Landlord shall not be liable to Tenant for any violation of the Rules and Regulations or the breach of any covenant or condition in any lease or any other act or conduct by any other tenant, and the same shall not constitute a constructive eviction hereunder. One or more waivers by Landlord of any breach of the Rules and Regulations by Tenant or by any other tenant(s) shall not be a waiver of any subsequent breach of that rule or any other. Tenant's failure to keep and observe the Rules and Regulations shall constitute a default under this Lease. In the case of any conflict between the Rules and Regulations and this Lease, this Lease shall be controlling.

ARTICLE 18. BROKER'S COMMISSION

The parties recognize as the broker(s) who negotiated this Lease the firm(s) whose name(s) is (are) stated in Item 10 of the Basic Lease Provisions, and agree that Landlord shall be responsible for the payment of brokerage commissions to those broker(s) unless otherwise provided in this Lease. It is understood that Landlord's Broker represents only Landlord in this transaction and Tenant's Broker (if any) represents only Tenant. Each party warrants that it has had no dealings with any other real estate broker or agent in connection with the negotiation of this Lease, and agrees to indemnify and hold the other party harmless from any cost, expense or liability (including reasonable attorneys' fees) for any compensation, commissions or charges claimed by any other real estate broker or agent employed or claiming to represent or to have been employed by the indemnifying party in connection with the negotiation of this Lease. The foregoing agreement shall survive the termination of this Lease.

ARTICLE 19. TRANSFER OF LANDLORD'S INTEREST

In the event of any transfer of Landlord's interest in the Premises, the transferor shall be automatically relieved of all obligations on the part of Landlord accruing under this Lease from and after the date of the transfer, provided that Tenant is duly notified of the transfer, and further provided that any successor pursuant to a voluntary, third party transfer (but not as part of an involuntary transfer resulting from a foreclosure or deed in lieu thereof) shall have assumed Landlord's obligations under this Lease either by contractual obligation, assumption agreement or by operation of law.. Any funds held by the transferor in which Tenant has an interest, including without limitation, the Security Deposit, shall be turned over, subject to that interest, to the transferee. No Mortgagee to which this Lease is or may be subordinate shall be responsible in connection with the Security Deposit unless the Mortgagee actually receives the Security Deposit. It is intended that the covenants and obligations contained in this Lease on the part of Landlord shall, subject to the foregoing, be binding on Landlord, its successors and assigns, only during and in respect to their respective successive periods of ownership.

ARTICLE 20. INTERPRETATION

20.1 NUMBER. Whenever the context of this Lease requires, the words "Landlord" and "Tenant" shall include the plural as well as the singular.

20.2 HEADINGS. The captions and headings of the articles and sections of this Lease are for convenience only, are not a part of this Lease and shall have no effect upon its construction or interpretation.

20.3 JOINT AND SEVERAL LIABILITY. If more than one person or entity is named as Tenant, the obligations imposed upon each shall be joint and several and the act of or notice from, or notice or refund to, or the signature of, any one or more of them shall be binding on all of them with respect to the tenancy of this Lease, including, but not limited to, any renewal, extension, termination or modification of this Lease.

20.4 SUCCESSORS. Subject to Sections 13.1 and 22.3 and to Articles 9 and 19 of this Lease, all rights and liabilities given to or imposed upon Landlord and Tenant shall extend to and bind their respective heirs, executors, administrators, successors and assigns. Nothing contained in this Section 20.4 is intended, or shall be construed, to grant to any person other than Landlord and Tenant and their successors and assigns any rights or remedies under this Lease.

20.5 TIME OF ESSENCE. Time is of the essence with respect to the performance of every provision of this Lease in which time of performance is a factor.

20.6 CONTROLLING LAW/VENUE. This Lease shall be governed by and interpreted in accordance with the laws of the State of California. Should any litigation be commenced between the parties in connection with this Lease, such action shall be prosecuted in the applicable State Court of California in the county in which the Building is located.

20.7 SEVERABILITY. If any term or provision of this Lease, the deletion of which would not adversely affect the receipt of any material benefit by either party or the deletion of which is consented to by the party adversely affected, shall be held invalid or unenforceable to any extent, the remainder of this Lease shall not be affected and each term and provision of this Lease shall be valid and enforceable to the fullest extent permitted by law.

20.8 WAIVER. One or more waivers by Landlord or Tenant of any breach of any term, covenant or condition contained in this Lease shall not be a waiver of any subsequent breach of the same or any other term, covenant or condition. Consent to any act by one of the parties shall not be deemed to render unnecessary the obtaining of that party's consent to any subsequent act. No breach of this Lease shall be deemed to have been waived unless the waiver is in a writing signed by the waiving party.

20.9 INABILITY TO PERFORM. In the event that either party shall be delayed or hindered in or prevented from the performance of any work or in performing any act required under this Lease by reason of any cause beyond the reasonable control of that party, then the performance of the work or the doing of the act shall be excused for the period of the delay and the time for performance shall be extended for a period equivalent to the period of the delay. The provisions of this Section 20.9 shall not operate to excuse Tenant from the prompt payment of Rent.

20.10 ENTIRE AGREEMENT. This Lease and its exhibits and other attachments cover in full each and every agreement of every kind between the parties concerning the Premises, the Building, and the Project, and all preliminary negotiations, oral agreements, understandings and/or practices, except those contained in this Lease, are superseded and of no further effect. Tenant waives its rights to rely on any representations or promises made by Landlord or others which are not contained in this Lease. No verbal agreement or implied covenant shall be held to modify the provisions of this Lease, any statute, law, or custom to the contrary notwithstanding.

20.11 QUIET ENJOYMENT. Upon the observance and performance of all the covenants, terms and conditions on Tenant's part to be observed and performed, and subject to the other provisions of this Lease, Tenant shall have the right of quiet enjoyment and use of the Premises for the Term without hindrance or interruption by Landlord or any other person claiming by or through Landlord.

20.12 SURVIVAL. All covenants of Landlord or Tenant which reasonably would be intended to survive the expiration or sooner termination of this Lease, including without limitation any warranty or indemnity hereunder, shall so survive and continue to be binding upon and inure to the benefit of the respective parties and their successors and assigns.

ARTICLE 21. EXECUTION AND RECORDING

21.1 COUNTERPARTS. This Lease may be executed in one or more counterparts, each of which shall constitute an original and all of which shall be one and the same agreement.

21.2 CORPORATE AND PARTNERSHIP AUTHORITY. Tenant represents and warrants that it is duly authorized to execute and deliver this Lease and that this Lease is binding upon the corporation, limited liability company or partnership in accordance with its terms. Tenant shall, at Landlord's request, deliver a certified copy of its organizational documents or an appropriate certificate authorizing or evidencing the execution of this Lease.

21.3 EXECUTION OF LEASE; NO OPTION OR OFFER. The submission of this Lease to Tenant shall be for examination purposes only, and shall not constitute an offer to or option for Tenant to lease the Premises. Execution of this Lease by Tenant and its return to Landlord shall not be binding upon Landlord, notwithstanding any time interval, until Landlord has in fact executed and delivered this Lease to Tenant, it being intended that this Lease shall only become effective upon execution by Landlord and delivery of a fully executed counterpart to Tenant.

21.4 RECORDING. Tenant shall not record this Lease without the prior written consent of Landlord. Tenant, upon the request of Landlord, shall execute and acknowledge a "short form" memorandum of this Lease for recording purposes.

21.5 AMENDMENTS. No amendment or mutual termination of this Lease shall be effective unless in writing signed by authorized signatories of Tenant and Landlord, or by their respective successors in interest. No actions, policies oral or informal arrangements, business dealings or other course of conduct by or between the parties shall be deemed to modify this Lease in any respect.

ARTICLE 22. MISCELLANEOUS

22.1 NONDISCLOSURE OF LEASE TERMS. Tenant acknowledges that the content of this Lease and any related documents are confidential information. Except to the extent disclosure is required by law, Tenant shall keep such confidential information strictly confidential and shall not disclose such confidential information to any person or entity other than Tenant's financial, legal and space-planning consultants, provided, however, that Tenant may disclose the terms to prospective subtenants or assignees under this Lease or pursuant to legal requirement.

22.2 TENANT'S FINANCIAL STATEMENTS. The application, financial statements and tax returns, if any, submitted and certified to by Tenant as an accurate representation of its financial condition have been prepared, certified and submitted to Landlord as an inducement and consideration to Landlord to enter into this Lease. Tenant shall during the Term furnish Landlord with current annual financial statements accurately reflecting Tenant's financial condition upon written request from Landlord within 10 days following Landlord's request, which shall not be more often than once every twelve (12) months; provided, however, that so long as Tenant is a publicly traded corporation on a nationally recognized stock exchange, the foregoing obligation to deliver the statements shall be waived.

22.3 MORTGAGEE PROTECTION. No act or failure to act on the part of Landlord which would otherwise entitle Tenant to be relieved of its obligations hereunder or to terminate this Lease shall result in such a release or termination unless (a) Tenant has given notice by registered or certified mail to any Mortgagee of a Mortgage covering the Building whose address has been furnished to Tenant and (b) such Mortgagee is afforded a reasonable opportunity to cure the default by Landlord (which shall in no event be less than 30 days). Tenant shall comply with any written directions by any Mortgagee to pay Rent due hereunder directly to such Mortgagee without determining whether a default exists under such Mortgagee's Mortgage.

22.4 SDN LIST. Tenant hereby represents and warrants that neither Tenant nor any officer, director, employee, partner, member or other principal of Tenant (collectively, "**Tenant Parties**") is listed

as a Specially Designated National and Blocked Person ("**SDN**") on the list of such persons and entities issued by the U.S. Treasury Office of Foreign Assets Control (OFAC). In the event Tenant or any Tenant Party is or becomes listed as an SDN, Tenant shall be deemed in breach of this Lease and Landlord shall have the right to terminate this Lease immediately upon written notice to Tenant.

LANDLORD:

THE IRVINE COMPANY LLC,
a Delaware limited liability company

By: /s/ Steven M. Case
Steven M. Case
Executive Vice President
Office Properties

By: /s/ Michael T. Bennett
Michael T. Bennett
Senior Vice President, Operations
Office Properties

TENANT:

BIONANO GENOMICS, INC.,
a Delaware corporation

By /s/ R. Erik Holmlin

Printed Name R. Erik Holmlin

Title President & CEO

By /s/ Garth Monroe

Printed Name Garth Monroe

Title Vice President & CFO

EXHIBIT A

DESCRIPTION OF PREMISES

9640 Towne Centre Drive, Suite 100

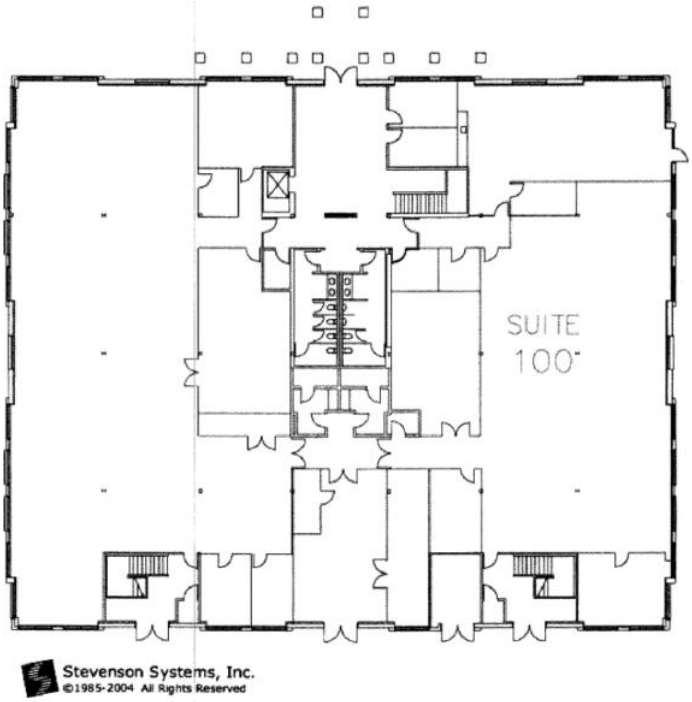


EXHIBIT A

EXHIBIT B

Operating Expenses
(Net)

(a) From and after the Commencement Date, Tenant shall pay to Landlord, as additional rent, Tenant's Share of all Operating Expenses, as defined in Section (f) below, incurred by Landlord in the operation of the Building and the Project. The term "**Tenant's Share**" means that portion of any Operating Expenses determined by multiplying the cost of such item by a fraction, the numerator of which is the Floor Area of the Premises and the denominator of which is the total rentable square footage, of (i) the Building (i.e. the floor area of the Building), for expenses determined by Landlord to benefit or relate substantially to the Building rather than the entire Project, and (ii) all or some of the buildings in the Project, for expenses determined by Landlord to benefit or relate substantially to all or some of the buildings in the Project rather than any specific building. Landlord reserves the right to allocate to the entire Project any Operating Expenses which may benefit or substantially relate to a particular building within the Project in order to maintain greater consistency of Operating Expenses among buildings within the Project. In the event that Landlord reasonably determines that the Premises or the Building incur a non-proportional benefit from any expense, or is the non-proportional cause of any such expense, Landlord may allocate a greater percentage of such Operating Expense to the Premises or the Building. In the event that any management and/or overhead fee payable or imposed by Landlord for the management of Tenant's Premises is calculated as a percentage of the rent payable by Tenant and other tenants of Landlord, then the kill amount of such management and/or overhead fee which is attributable to the rent paid by Tenant shall be additional rent payable by Tenant, in full, provided, however, that Landlord may elect to include such full amount as part of Tenant's Share of Operating Expenses.

(b) Commencing prior to the start of the first full "**Expense Recovery Period**" of the Lease (as defined in Item 7 of the Basic Lease Provisions), and prior to the start of each full or partial Expense Recovery Period thereafter, Landlord shall give Tenant a written estimate of the amount of Tenant's Share of Operating Expense for the applicable Expense Recovery Period. Tenant shall pay the estimated amounts to Landlord in equal monthly installments, in advance, concurrently with payments of Basic Rent. If Landlord has n t furnished its written estimate for any Expense Recovery Period by the time set forth above, Tenant shall continue to pay monthly the estimated Tenant's Share of Operating Expenses in effect during the prior Expense Recovery Period; provided that when the new estimate is delivered to Tenant, Tenant shall, at the next monthly payment date, pay any accrued estimated Tenant's Share of Operating Expenses based upon the new estimate. Landlord may from time to time change the Expense Recovery Period to reflect a calendar year or a new fiscal year of Landlord, as applicable, in which event Tenant's Share of Operating Expenses shall be equitably prorated for any partial year.

(c) Within 180 days after the end of each Expense Recovery Period, Landlord shall furnish to Tenant a statement (a "**Reconciliation Statement**") showing in reasonable detail the actual or prorated Tenant's Share of Operating Expenses incurred by Landlord during such Expense Recovery Period, and the parties shall within 30 day thereafter make any payment or allowance necessary to adjust Tenant's estimated payments of Tenants Share of Operating Expenses, if any, to the actual Tenant's Share of Operating Expenses as show') by the Reconciliation Statement. Any delay or failure by Landlord in delivering any Reconciliation Statement shall not constitute a waiver of Landlord's right to require Tenant to pay Tenant's Share of Operating Expenses pursuant hereto (provided, however, that Tenant shall not be obligated to pay any additional amounts of Project Costs required by such Reconciliation Statement to the extent Landlord fails to notify Tenant within 3 calendar years of the Expiration Date of this Lease). Any amount due Tenant shall be credited against installments next coming due under this **Exhibit B**, and any deficiency shall be paid by Tenant together with the next installment. Should Tenant fail to object in writing to Landlord's determination of Tenant's Share of Operating Expenses within 90 days following delivery of Landlord's Reconciliation Statement (as set forth in subsection (1) below), Landlord's determination of Tenant's Share of Operating Expenses for the applicable Expense Recovery Period shall be conclusive and binding on Tenant for all purposes and any future claims by Tenant to the contrary shall be barred.

(d) Even though this Lease has terminated and the Tenant has vacated the Premises, when the final determination is made of Tenant's Share of Operating Expenses for the Expense Recovery Period in which this Lease terminates, Tenant shall within 30 days of written notice pay the entire increase over the estimated Tenant's Share of Operating Expenses already paid. Conversely, any overpayment by Tenant shall be rebated by Landlord to Tenant not later than 30 days after such final determination.

(e) If, at any time during any Expense Recovery Period, any one or more of the Operating Expenses are increased to a rate(s) or amount(s) in excess of the rate(s) or amount(s) used in calculating the estimated Tenant's Share of Operating Expenses for the year, then the estimate of Tenant's Share of Operating Expenses may be increased by written notice from Landlord for the month in which such rate(s) or amount(s) becomes effective and for all succeeding months by an amount equal to the estimated amount of Tenant's Share of the increase. Landlord shall give Tenant written notice of the amount or estimated amount of the increase, the month in which the increase will become effective, Tenant's Share thereof and the months for which the payments are due. Tenant shall pay the increase to Landlord as part of the Tenant s monthly payments of estimated expenses as provided in paragraph (b) above, commencing with the month in which effective.

(f) The term "Operating Expenses" shall mean and include all Project Costs, as defined in Section (g) below, and Property Taxes, as defined in Section (i) below.

(g) The term "**Project Costs**" shall mean all expenses of operation, management, repair, replacement and maintenance Of the Building and the Project, including without limitation all appurtenant Common Areas (as defined in Section 6.2 of the Lease), and shall include the following charges by way of illustration but not limitation: water and sewer charges; insurance premiums, deductibles, or reasonable premium equivalents or deductible equivalents should Landlord elect to self insure any risk that Landlord is authorized to insure hereunder; license, permit, and inspection fees; light; power; window washing; trash pickup; janitoriaI services to any interior Common Areas; heating, ventilating and air conditioning; supplies; materiaIs; equipment; tools; reasonable fees for consulting services; access control/security costs, inclusive of the reasonable cost of improvements made to enhance access control systems and procedures; establishment of reasonable reserves for replacement of the roof of the Building; costs incurred in connection with compliance with any laws or changes in laws applicable to the Building or the Project; the cost of any capital improvements or replacements (other than tenant improvements for specific tenants) to the extent of the amortized amount thereof over the useful life of such capital improvements or replacements (or, if such capital improvements or replacements are anticipated to achieve a cost savings as to the Operating Expenses, any shorter estimated period of time over which the cost of the capital improvements or replacements would be recovered from the estimated cost savings) calculated at a market cost of funds, all as determined by Landlord, for each year of useful life or shorter recovery period of such capital expenditure whether such capital expenditure occurs during or prior to the Term; costs associated with the maintenance of an air conditioning, heating and ventilation service agreement, and maintenance of any communications or networked data transmission equipment, conduit, cabling, wiring and related telecommunications facilitating automation and control systems, remote telecommunication or d to transmission infrastructure within the Building and/or the Project, and any other maintenance, repair and replacement costs associated with such infrastructure; capital costs associated with a requirement related to demands on utilities by Project tenants, including without limitation the cost to obtain additional voice, data and modem connections; labor; reasonably allocated wages and salaries, fringe benefits, and payroll taxes for administrative and other personnel directly applicable to the Building and/or Project, including both Landlord's personnel and outside personnel; any expense incurred pursuant to Sections 6.1, 6.2, 7.2, 10.2, and Exhibits C and F of the Lease; and commercially reasonable and Market-competitive overhead and/or management fees for the professional operation of the Project. It is understood and agreed that Project Costs may include competitive charges for direct services (including, without limitation, management and/or operations services) provided by any subsidiary, division or affiliate of Landlord.

(h) Notwithstanding the foregoing, Operating Expenses shall exclude the following:

(1) Any ground lease rental;

(2) Costs incurred by Landlord with respect to goods and services (including utilities sold and supplied to tenants and occupants of the Building) to the extent that Landlord is reimbursed for such costs other than through the Operating Expense pass-through provisions of such tenants' lease;

(3) Costs incurred by Landlord for repairs, replacements and/or restoration to or of the Building to the extent that Landlord is reimbursed by insurance or condemnation proceeds or by tenants (other than through Operating expense pass-throughs), warrantors or other third persons;

(4) Costs, including permit, license and inspection costs, incurred with respect to the installation of tenant improvements made for other tenants in the Building or incurred in renovating or otherwise improving, decorating, painting or redecorating vacant space for tenants or other occupants of the Building;

(5) Costs arising from Landlord's charitable or political contributions;

(6) Attorneys' fees and other costs and expenses incurred in connection with negotiations or disputes with present or prospective tenants or other occupants of the Building, except those attorneys' fees and other costs and expenses incurred in connection with negotiations, disputes or claims relating to items of Operating Expenses, enforcement of rules and regulations of the Building and such other matters relating to the maintenance of standards required of Landlord under this Lease;

(7) Capital expenditures as determined in accordance with generally accepted accounting principles, consistently applied, and as generally practiced in the real estate industry ("**GAAP**"), except for the amortized cost of capital expenditures which are intended to, and which could reasonably be expected to, reduce other Project Costs or increases thereof, or upgrade Building and/or Project security, or which are squired to bring the Building and/or Project into compliance with applicable laws and building codes enacted after the Commencement Date of this Lease;

(8) Brokers commissions, finders' fees, attorneys' fees, entertainment and travel expenses and other costs incurred by Landlord in leasing or attempting to lease space in the Building;

(9) Expenses in connection with services or other benefits which are not offered to Tenant or for which Tenant is charged for directly but which are provided to another tenant or occupant of the Building;

(10) Costs incurred by Landlord due to the violation by Landlord of any law, code, regulation, or ordinance;

(11) Overhead and profit increments paid to subsidiaries or affiliates of Landlord for services provided to the Building to the extent the same exceeds the costs that would generally be charged for such services if rendered on a competitive basis (based upon a standard of similar office buildings in the general market area of the Premises) by unaffiliated third parties capable of providing such service;

(12) Interest on debt or amortization on any mortgage or mortgages encumbering the Building;

(13) Landlord's general corporate overhead, except as it relates to the specific management, operation, repair, replacement and maintenance of the Building or Project;

(14) Costs of installing the initial landscaping and the initial sculpture, paintings and objects of art for the Building and Project;

(15) Advertising expenditures;

(16) Rentals and other related expenses incurred in leasing permanent air-conditioning systems, elevators, or other Building equipment ordinarily considered to be of a capital nature, except temporary equipment or equipment which is used in providing janitorial, repair, maintenance, or engineering services and which is not permanently affixed to the Building;

(17) Environmental clean-up costs or hazardous waste clean-up costs incurred by Landlord with respect to (a) pre-existing conditions at the Building, or (b) any such costs accruing from and after the Commencement Date that were not caused by Tenant or Tenant Parties, or (c) any other costs that are not the responsibility of Tenant under Section 5.3 of this Lease;

(18) The cost of overtime or other expense to Landlord in curing its defaults or performing work expressly provided in this Lease to be borne at Landlord's expense;

(19) Any bad debt loss, rent loss, or reserves for bad debts or rent loss;

(20) Costs associated with the operation of the business of the partnership or entity which constitutes the Landlord (including partnership accounting and legal matters, costs of defending any lawsuits with any mortgagee (except as the actions of Tenant may be in issue), costs of selling, syndicating, financing, mortgaging or hypothecating any of Landlord's interest in the Project, and costs incurred in connection with any disputes between Landlord and its employees, between Landlord and Project management, or between Landlord and other tenants or occupants) as the same are distinguished from the costs of the operation, management, repair, replacement and maintenance of the Project;

(21) The wages and benefits of any employee who does not devote substantially all of his or her employed time to the Project unless such wages and benefits are prorated to reflect time spent on operating and managing the Project vis-à-vis time spent on matters unrelated to operating and managing the Project; provided that in no event shall Project Costs include wages and/or benefits attributable to personnel above the level of portfolio property manager or chief engineer;

(22) Reserves for repairs, maintenance and replacements;

(23) The costs of any "tap fees" or one time lump sum sewer, water or other utility connection fees for the Project;

(24) Insurance premiums and deductibles for earthquake and terrorism insurance, and any other insurance deductible except to the extent the same are commercially reasonable;

(25) Costs incurred by Landlord for improvements or replacements (including structural additions), repairs, equipment and tools which are of a "capital" nature and/or which are considered "capital" improvements or replacements under GAAP, except to the extent included in Project Costs pursuant to the definition in Section (g) above or by other express terms of this Lease;

(26) Legal fees and costs, settlements, judgments or awards paid or incurred because of disputes between Landlord and other tenants or prospective occupants or prospective tenants/occupants or providers of goods and services to the Project;

(27) Payments made with respect to uninsured casualty losses; and

(28) The cost to Landlord in curing its defaults or performing work expressly provided in this Lease to be borne at Landlord's expense.

(i) The term "**Property Taxes**" as used herein shall include any form of federal, state, county or local government or municipal taxes, fees, charges or other impositions of every kind (whether general,

special, ordinary or extraordinary related to the ownership, leasing or operation of the Premises, Building or Project, including without limitation, the following: (i) all real estate taxes or personal property taxes levied against the Premises, the Building or Project, as such property taxes may be reassessed from time to time; and (ii) other taxes, charges and assessments which are levied with respect to this Lease or to the Building and/or the Project, and any improvements, fixtures and equipment and other property of Landlord located in the Building and/or the Project, (iii) all assessments and fees for public improvements, services, and facilities and impacts thereon, including without limitation arising out of any Community Facilities Districts, "Mello Roos" districts, similar assessment districts, and any traffic impact mitigation assessments or fees; (iv) any t x, surcharge or assessment which shall be levied in addition to or in lieu of real estate or personal property taxes, and (v) taxes based on the receipt of rent (including gross receipts or sales taxes applicable to the receipt of rent), and (vi) costs and expenses incurred in contesting the amount or validity of any Property Tax by appropriate proceedings (but only to the extent of the reasonably anticipated savings to Tenant of such contest). Notwithstanding the foregoing, general net income or franchise taxes imposed against Landlord shall be excluded. Property Taxes shall not include any federal and state income taxes, and other taxes to the extent applicable to Landlord's general or net income (as opposed to rents, receipts or income attributable to operations at the Project), capital levy, franchise, capital stock, gift, estate or inheritance tax.

(j) Provided Tenant is not then in default hereunder, Tenant shall have the right to cause a certified public accountant, engaged on a non-contingency fee basis, to audit Operating Expenses by inspecting Landlord's general ledger of expenses not more than once during any Expense Recovery Period. However, to the extent that insurance premiums or any other component of Operating Expenses is determined by Landlord on the basis of an internal allocation of costs utilizing information Landlord in good faith deems proprietary, Such expense component shall not be subject to audit so long as it does not exceed the amount per square foot typically imposed by landlords of other first class office projects in San Diego, California. Tenant shall give notice to Landlord of Tenant's intent to audit within ninety (90) days after Tenant's receipt of Landlord's Reconciliation Statement which sets forth Landlord's actual Operating Expenses. Such audit shall be conducted at a mutually agreeable time during normal business hours at the office of Landlord or its management agent where such accounts are maintained. If Tenant's audit determines that actual Operating Expenses have been overstated by more than 5%, then subject to Landlord's right to review and/or contest the audit results, Landlord shall reimburse Tenant for the reasonable out-of-pocket costs of such audit. Tenant's rent shall be appropriately adjusted to reflect any overstatement in Operating Expenses. In the event of a dispute between Landlord and Tenant regarding such audit, either party may elect to submit the matter for binding arbitration with the American Arbitration Association under its Arbitration Rules for the Real Estate Industry, and judgment on the arbitration award may be entered in any court having jurisdiction thereof. All of the information obtained by Tenant and/or its auditor in connection with such audit, as well as any compromise, settlement, or adjustment reached between Landlord and Tenant as a result thereof, shall be held in strict confidence and, except as may be required pursuant to litigation, shall not be disclosed to any third party, directly or indirectly, by Tenant or its auditor or any of their officers, agents or employees. Landlord may require Tenant's auditor to execute a separate confidentiality agreement affirming the foregoing as a condition precedent to any audit. In the event of a violation of this confidentiality covenant in connection with any audit, then in addition to any other legal or equitable remedy available to Landlord, Tenant shall forfeit its right to any reconciliation or cost reimbursement payment from Landlord due to said audit (and any such payment theretofore made by Landlord shall be promptly returned by Tenant), and Tenant shall have no further audit rights under this Lease. Notwithstanding the foregoing, Tenant shall have no right of audit with respect to any Expense Recovery Period unless the total Operating Expenses per square foot for such Expense Recovery Period, as set forth in Landlord's annual expense reconciliation, exceed the total Operating Expenses per square foot during the initial Expense Recovery Period, as increased by the percentage change in the United States Department of Labor, Bureau of Labor Statistics, Consumer Price Index for all Urban Consumers, Los Angeles - Riverside - Orange County Area Average, all items (1982-84 = 100) (the "**Index**"), which change in the Index shall be measured by comparing the Index published for January of the initial Expense Recovery Period with the Index published for January of the applicable Expense Recovery Period.

EXHIBIT C

UTILITIES AND SERVICE

Landlord represents and warrants that the Premises are currently separately metered for all utilities. Tenant shall be responsible for and shall pay promptly, directly to the appropriate supplier, all charges for electricity metered to the Premises, telephone, telecommunications service, janitorial service, interior landscape maintenance and all other utilities, materials and services furnished directly to Tenant or the Premises or used exclusively by Tenant in, on or about the Premises during the Term, together with any taxes thereon. Landlord shall make a reasonable determination of Tenant's proportionate share of the cost of water, gas, sewer, refuse pickup and any other utilities and services that are not separately metered to the Premises and services, and Tenant shall pay such amount to Landlord, as an item of additional rent, within 10 days after delivery of Landlord's statement or invoice therefor. Alternatively, Landlord may elect to include such cost in the definition of Project Costs in which event Tenant shall pay Tenant's proportionate share of such costs in the manner set forth in Section 4.2. Tenant shall also pay to Landlord as an item of additional rent, within 10 days after delivery of Landlord's statement or invoice therefor, Landlord's "standard charges" (as hereinafter defined, which shall be in addition to the electricity charge paid to the utility provider) for "after hours" usage by Tenant of each HVAC unit servicing the Premises. If the HVAC unit(s) servicing the Premises also serve other leased premises in the Building, "**after hours**" shall mean usage of said unit(s) before 6:00 A.M. or after 9:00 P.M. on Mondays through Fridays, before 9:00 A.M. or after 5:00 P.M. on Saturdays, and before 9:00 A.M. or after 1:00 P.M. on Sundays and nationally-recognized holidays, subject to reasonable adjustment of said hours by Landlord. If the HVAC unit(s) serve only the Premises, "after hours" shall mean more than 87 hours of usage during any week during the Term. "After hours" usage shall be determined based upon the operation of the applicable HVAC unit during each of the foregoing periods on a "non-cumulative" basis (that is, without regard to Tenant's usage or nonusage of other unit(s) serving the Premises, or of the applicable unit during other periods of the Term). As used herein, "**standard charges**" shall mean the following charges for each hour of "after hours" use (in addition to the applicable electricity charges paid to the utility provider) of the following described HVAC units: (i) $35.00 per hour for 1-5 ton HVAC units, (ii) $37.50 per hour for 6-30 ton HVAC units and (iii) $40.00 per hour for HVAC units of greater than 30 tons.

EXHIBIT D

TENANT'S INSURANCE

The following requirements for Tenant's insurance shall be in effect during the Term, and Tenant shall also cause any subtenant to comply with the requirements. Landlord reserves the right to adopt reasonable nondiscriminatory modifications and additions to these requirements.

1. Tenant shall maintain, at its sole cost and expense, during the entire Term: (i) commercial general liability insurance with respect to the Premises and the operations of Tenant in, on or about the Premises, including but not limited to coverage for personal injury, contractual liability, independent contractors, broad form property damage, fire legal liability, products liability (provided that (a) Tenant shall not be required to carry products liability insurance unless and until a product is manufactured within or sold from the Premises, and (b) any such coverage will be on a "claims made" basis) and liquor law liability (if alcoholic beverages are sold, served or consumed within the Premises), which policy(ies) shall be written on an "occurrence" basis (except for any required products liability policy shall be on a "claims made" basis) and for not less than $2,000,000 combined single limit per occurrence for bodily injury, death, and property damage liability; (ii) workers' compensation insurance coverage as required by law, together with employers' liability insurance coverage of at least $1,000,000 each accident and each disease; (iii) with respect to Alterations constructed by Tenant under this Lease, builder's risk insurance, in an amount equal to the replacement cost of the work; and (iv) insurance against fire, vandalism, malicious mischief and such other additional perils as may be included in a standard "special form" policy, insuring all Alterations, trade fixtures, furnishings, equipment and items of personal property in the Premises, in an amount equal to not less than 90% of their replacement cost (with replacement cost endorsement), which policy shaII also include business interruption coverage in an amount sufficient to cover 1 year of loss. In no event shall the limits of any policy be considered as limiting the liability of Tenant under this Lease.

2. All policies of insurance required to be carried by Tenant pursuant to this **Exhibit D** shall be written by insurance companies authorized to do business in the State of California and with a general policyholder rating of not less than "**A-**" and financial rating of not less than "**VIII**" in the most current Best's Insurance Report. The deductible or other retained limit under any policy carried by Tenant shall be commercially reasonable, and Tenant shall be responsible for payment of such deductible or retained limit with waiver of subrogation in favor of Landlord. Any insurance required of Tenant may be furnished by Tenant under any blanket policy carried by it or under a separate policy. A certificate of insurance, certifying that the policy has been issued, provides the coverage required by this Exhibit and contains the required provisions, together with endorsements acceptable to Landlord evidencing the waiver of subrogation and additional insured provisions required below, shall be delivered to Landlord prior to the date Tenant is given the right of possession of the Premises. Proper evidence of the renewal of any insurance coverage shall also be delivered to Landlord not less than thirty (30) days prior to the expiration of the coverage. In the event of a loss covered by any policy under which Landlord is an additional insured, Landlord shall be entitled to review a copy of such policy.

3. Tenant's commercial general liability insurance shall contain a provision that the policy shall be primary to and noncontributory with any policies carried by Landlord, together with a provision including Landlord and any other parties in interest designated by Landlord as additional insureds. Tenant's policies described in Subsections 1 (ii), (iii) and (iv) above shall each contain a waiver by the insurer of any right to subrogation against Landlord, its agents, employees, contractors and representatives. Tenant also Waives its right of recovery for any deductible or retained limit under same policies enumerated above. All of Tenant's policies shall contain a provision that the Tenant will not cancel or change the coverage provided by the policy without first giving Landlord prior written notice.

NOTICE TO TENANT: IN ACCORDANCE WITH THE TERMS OF THIS LEASE, TENANT MUST PROVIDE EVIDENCE OF THE REQUIRED INSURANCE TO LANDLORD'S MANAGEMENT AGENT PRIOR TO BEING AFFORDED ACCESS TO THE PREMISES.

EXHIBIT E

RULES AND REGULATIONS

The following Rules and Regulations shall be in effect at the Building. Landlord reserves the right to adopt reasonable nondiscriminatory modifications and additions at any time. In the case of any conflict between these regulations and the Lease, the Lease shall be controlling.

1. The sidewalks, halls, passages, elevators, stairways, and other common areas shall not be obstructed by Tenant or used by it for storage, for depositing items, or for any purpose other than for ingress to and egress from the Premises. Should Tenant have access to any balcony or patio area, Tenant shall not place any furniture other personal property in such area without the prior written approval of Landlord.

2. Neither Tenant nor any employee or contractor of Tenant shall go upon the roof of the Building without the prior written consent of Landlord.

3. Tenant shall, at its expense, be required to utilize the third party contractor designated by Landlord for the Building to provide any telephone wiring services from the minimum point of entry of the telephone cable in the Building to the Premises.

4. No antenna or satellite dish shall be installed by Tenant without the prior written agreement of Landlord.

5. The sashes, sash doors, windows, glass lights, solar film and/or screen, and any lights or skylights that reflect or admit light into the halls or other places of the Building shall not be covered or obstructed. If Landlord, by a notice in writing to Tenant, shall object to any curtain, blind, tinting, shade or screen attached to, or hung in, or used in connection with, any window or door of the Premises, the use of that curtain, blind, tinting, shade or screen shall be immediately discontinued and removed by Tenant. No awnings shall be permitted on any part of the Premises.

6. The installation and location of any unusually heavy equipment in the Premises, including without limitation file storage units, safes and electronic data processing equipment, shall require the prior written approval of Landlord. The moving of large or heavy objects shall occur only between those hours as may be designated by, and only upon previous notice to, Landlord. No freight, furniture or bulky matter of any description shall be received into or moved out of the lobby of the Building or carried in any elevator other than the freight elevator (if available) designated by Landlord unless approved in writing by Landlord.

7. Any pipes or tubing used by Tenant to transmit water to an appliance or device in the Premises must be made of copper or stainless steel, and in no event shall plastic tubing be used for that purpose.

8. Tenant shall not place any lock(s) on any door in the Premises or Building without Landlord’s prior written consent, which consent shall not be unreasonably withheld. Upon the termination of its tenancy, Tenant shall d liver to Landlord all the keys to offices, rooms and toilet rooms and all access cards which shall have seen furnished to Tenant or which Tenant shall have had made.

9. Tenant shall not install equipment requiring electrical or air conditioning service in excess of that to be provided by Landlord under the Lease without prior written approval from Landlord.

10. Tenant shall not use space heaters within the Premises.

11. Tenant shall not do or permit anything to be done in the Premises, or bring or keep anything in the Premises, which shall in any way increase the insurance on the Building, or on the property kept in the Building, or interfere with the rights of other tenants, or conflict with any government rule or regulation.

12. Tenant shall not use or keep any foul or noxious gas or substance in the Premises.

13. Tenant shall not permit the Premises to be occupied or used in a manner offensive or objectionable to Landlord or other occupants of the Building by reason of noise, odors and/or vibrations, or interfere in any way with other tenants or those having business with other tenants.

14. Tenant shall not permit any animals or birds be kept by Tenant in or about the Building.

15. Neither Tenant nor its employees, agents, contractors, invitees or licensees shall bring any firearm, whether loaded or unloaded, into the Project at any time.

16. Smoking anywhere within the Premises or Building is strictly prohibited, and Landlord may enforce such prohibition pursuant to Landlord’s leasehold remedies. Smoking is permitted outside the Building and within the project only in areas designated by Landlord.

17. Tenant shall not install an aquarium of any size in the Premises unless otherwise approved by Landlord.

18. Tenant shall not utilize any name selected by Landlord from time to time for the Building and/or the Project as any part of Tenant's corporate or trade name. Landlord shall have the right to change the name, number or designation of the Building or Project without liability to Tenant. Tenant shall not use any picture of the Building in its advertising, stationery or in any other manner.

19. Tenant shall, upon request by Landlord, supply Landlord with the names and telephone numbers of personnel designated by Tenant to be contacted on an after-hours basis should circumstances warrant.

20. Landlord may from time to time grant tenants individual and temporary variances from these Rules, provided that any variance does not have a material adverse effect on the use and enjoyment of the Premises by Tenant.

EXHIBIT F

PARKING

Tenant shall be entitled, at no cost to Tenant during the initial Term, to the number of vehicle parking spaces set forth in Item 11 of the Basic Lease Provisions, which spaces shall be unreserved and unassigned, on those portions of the Common Areas designated by Landlord for parking. Landlord shall designate 2 of the parking spaces for loading to be located directly in front of the shipping area in the rear of the Building. Tenant shall not use more parking spaces than such number. All parking spaces shall be used only for parking of vehicles no larger than full size passenger automobiles, sport utility vehicles or pickup trucks. Tenant shall not permit or allow any vehicles that belong to or are controlled by Tenant or Tenant's employees, suppliers, shippers, customers or invitees to be loaded, unloaded or parked in areas other than those designated by Landlord for such activities. If Tenant permits or allows any of the prohibited activities described above, then Landlord shall have the right, without notice, in addition to such other rights and remedies that Landlord may have, to remove or tow away the vehicle involved and charge the costs to Tenant. Parking within the Common Areas shall be limited to striped parking stalls, and no parking shall be permitted in any driveways, access ways or in any area which would prohibit or impede the free flow of traffic Within the Common Areas. There shall be no parking of any vehicles for longer than a forty-eight (48) hour period unless otherwise authorized by Landlord, and vehicles which have been abandoned or parked in violation of the terms hereof may be towed away at the owner's expense. Nothing contained in this Lease shall be deemed to create liability upon Landlord for any damage to motor vehicles of visitors or employees, for any loss of property from within those motor vehicles, or for any injury to Tenant, its visitors or employees, unless ultimately determined to be caused by the sole negligence or willful misconduct of Landlord. Landlord shall have the right to establish, and from time to time amend, and to enforce against all users all reasonable rules and regulations (including the designation of areas for employee parking) that Landlord may deem necessary and advisable for the proper and efficient operation and maintenance of parking within the Common Areas. Landlord shall have the right to construct, maintain and operate lighting facilities within the parking areas; to change the area, level, location and arrangement of the parking areas and improvements therein; to restrict parking by tenants, their officers, agents and employees to employee parking areas; to enforce parking charges (by operation of meters or otherwise); and to do and perform such other acts in and to the parking areas and improvements therein as, in the use of good business judgment, Landlord shall determine to be advisable. Any person using the parking area shall observe all directional signs and arrows and any posted speed limits. In no event shall Tenant interfere with the use and enjoyment of the parking area by other tenants of the Project or their employees or invitees. Parking areas shall be used only for parking vehicles. Washing, waxing, cleaning or servicing of vehicles, or the storage of vehicles for longer than 48-hours, is prohibited unless otherwise authorized by Landlord. Tenant shall be liable for any damage to the parking areas caused by Tenant or Tenant's employees, suppliers, shippers, customers or invitees, including without limitation damage from excess oil leakage. Tenant shall have no right to install any fixtures, equipment or personal property in the parking areas. Notwithstanding anything to the contrary in the Lease or this Exhibit F, Tenant shall at all times have the right to use the number of parking spaces allocated to Tenant under this Lease.

EXHIBIT G

ADDITIONAL PROVISIONS

1. RIGHT TO EXTEND. Provided that Tenant is not in Default under any provision of this Lease at the time of exercise of the extension right granted herein, and provided further that Tenant is occupying the entire Premises and has not assigned or sublet any of its interest in this Lease (except in connection with a Permitted Transfer of this Lease as described in Section 9.1(e) hereof), Tenant may extend the Term of this Lease for one period of 36 months. Tenant shall exercise its right to extend the Term by and only by delivering to Landlord, not less than 9 months nor more than 12 months prior to the expiration date of the Term, Tenant's written notice of its irrevocable commitment to extend (the "**Commitment Notice**"). Should Tenant fail timely to deliver the Commitment Notice, then this extension right shall thereupon lapse and be of no further force or effect.

The Basic Rent payable under the Lease during the extension of the Term shall be at the prevailing market rental rate (including periodic adjustments) for comparable and similarly improved office space in the Building and Project as of the commencement of the extension period, as determined by Landlord, based on a reasonable extrapolation of Landlord's then-current leasing rates. In no event shall the monthly Basic Rent payable for the extension period be less than the Basic Rent payable during the month immediately preceding the commencement of such extension period.

Promptly following receipt of the Commitment Notice, Landlord shall prepare an appropriate amendment to the Lease memorializing the extension of the Term in accordance with the foregoing, and Tenant shall duly execute and return same to Landlord within 15 days. If Tenant fails timely to do so, then Landlord, at its sole discretion, may either enforce its rights under this Section or, upon written notice to Tenant, elect to cause Tenant's right to extend to be extinguished, in which event this Lease shall terminate as of the originally scheduled date of expiration. Should Landlord elect the latter, then this Lease shall terminate upon the scheduled date of expiration and Tenant's rights under this paragraph shall be of no further force or effect.

Any attempt to assign or transfer any right or interest created by this paragraph to other than a Permitted Transfer shall be void from its inception. Tenant shall have no other right to extend the Term beyond the single 36 month extension created by this paragraph. Unless agreed to in a writing signed by Landlord and Tenant, any extension of the Term, whether created by an amendment to this Lease or by a holdover of the Premises by Tenant, or otherwise, shall be deemed a part of, and not in addition to, any duly exercised extension period permitted by this paragraph. Time is specifically made of the essence of this Section.

2. **RIGHT OF FIRST OFFER**. Provided Tenant is not then in Default hereunder, Landlord hereby grants Tenant the continuing right ("**First Right**") to lease, during the initial 60 month Term of this Lease, approximately 18,005 rentable square feet of office space known as Suite No. 200 in the Building and shown on **Exhibit A** hereto ("**First Right Space**") in accordance with and subject to the provisions of this Section; provided that this First Right shall cease to be effective during the final 12 months of the Term unless and until Tenant exercises its extension option set forth in Paragraph 1 of Exhibit G above. Except as otherwise provided below, prior to leasing the First Right Space, or any portion thereof, to any other party during the period that this First Right is in effect and after determining that the existing tenant as of the date of this Lease in the First Right Space will not extend or renew the term of its lease, Landlord shall give Tenant written notice of the basic economic terms including but not limited to the Basic Rent, term, operating expense base, security deposit, and tenant improvement allowance (collectively, the "**Economic Terms**"), upon which Landlord is willing to lease such particular First Right Space to Tenant or to a third party; provided that the Economic Terms shall exclude brokerage commissions and other Landlord payments that do not directly inure to the tenant's benefit. It is understood that should Landlord intend to lease other office space in addition to the First Right Space as part of a single transaction, then Landlord's notice shall so provide and all such space shall collectively be subject to the following provisions. Within 5 days after receipt of Landlord's notice, Tenant must give Landlord written notice pursuant to which Tenant shall elect to (i) lease all, but not less than all, of the space specified in Landlord's notice (the "**Designated Space**") upon such Economic Terms and the same non-Economic Terms as set forth in this Lease:, (ii) refuse to lease the Designated Space, specifying that such refusal is not based upon the Economic Terms, but upon Tenant's lack of need for the Designated Space, in which event Landlord may lease the Designated Space upon any terms it deems appropriate; or (iii) refuse to lease the Designated Space, specifying that such refusal is based upon said Economic Terms, in which event Tenant shall also specify revised Economic Terms upon which Tenant shall be willing to lease the Designated Space. In the event that Tenant does not so respond in writing to Landlord's notice within said period, Tenant shall be deemed to have elected clause (ii) above. In the event Tenant gives Landlord notice pursuant to clause (iii) above, Landlord may elect to either (x) lease the Designated Space to Tenant upon such revised Economic Terms and the same other non-Economic Terms as set forth in this Lease, or (y) lease the Designated Space to any third party upon Economic Terms which are not materially more favorable to such party than those Economic Terms proposed by Tenant. Should Landlord so elect to lease the Designated Space to Tenant, then Landlord shall promptly prepare and deliver to Tenant an amendment to this Lease consistent with the foregoing, and Tenant shall execute and return same (or provide reasonable comments thereto) to Landlord within 10 days. Tenant's failure to timely return the amendment shall entitle Landlord to specifically enforce Tenant's commitment to lease the Designated Space, to lease such space to a third party, and/or to pursue any other available legal remedy. In the event that Landlord leases the First Right Space, or any portion thereof, to a third party in

accordance with the provisions of this Section, and during the effective period of this First Right the First Right Space, or any portion thereof, shall again become available for releasing, then prior to Landlord entering into any such new lease with a third party for the First Right Space, Landlord shall repeat the procedures specified above in this Section. Notwithstanding the foregoing, it is understood that Tenant's First Right shall be subject to any extension or expansion rights previously granted by Landlord to any third party tenant in the Building, as well as to any such rights which may hereafter be granted by Landlord to any third party tenant now or hereafter occupying the First Right Space or any portion thereof, and Landlord shall in no event be obligated to initiate this First Right prior to leasing any portion of the First Right Space to the then-current occupant thereof. Tenant's rights under this Section shall be personal to the original Tenant named in this Lease and may not be assigned or transferred (except in connection with a Permitted Transfer of this Lease to an Affiliate as described in Section 9.1(e) hereof). Any other attempted assignment or transfer shall be void and of no force or effect.

3. **EXTERIOR SIGNAGE**. Tenant shall have the right to install either an exterior sign at the top of the northeast corner of the Building or one (1) eyebrow sign at a location mutually acceptable to Landlord and Tenant (the "**Exterior Signage**") which signage shall consist only of the name "BioNano Genomics, Inc.", or such other name as reasonably approved by Landlord that Tenant may request to the extent that the name of Tenant's business changes. The type and design of such signage shall be subject to the prior written approval of Landlord and the City of San Diego, and shall be consistent with Landlord's signage criteria for the Project. Fabrication, installation, insurance, and maintenance of such signage shall be at Tenant's sole cost and expense. Tenant understands and agrees that it shall use Landlord's designated contractor for installing the Exterior Signage. Should Tenant fail to have the Exterior Signage installed within 12 months of the Commencement Date, then Tenant's right to install same thereafter shall be deemed null and void. Except for the foregoing, no sign, advertisement or notice visible from the exterior of the Premises shall be inscribed, painted or affixed by Tenant on any part of the Premises without the prior consent of Landlord. Tenant's signage right shall belong solely to BioNano Genomics, Inc. and may not be transferred or assigned (except in connection with assignment Permitted Transfer of this Lease as described in Section 9.1(e) hereof) without Landlord's prior written consent which may be withheld by Landlord in Landlord's sole discretion. In the event Tenant (together with any of Tenant's assignees or subtenants pursuant to a Permitted Transfer), exclusive of any other subtenant(s), fails to occupy less that eighty percent (80%) the entire Premises, then Tenant shall, within thirty (30) days following) notice from Landlord, remove the Exterior Signage at Tenant's expense. Tenant shall also remove such signage promptly following the expiration or earlier termination of the Lease. Any such removal shall be at Tenant's sole expense, and Tenant shall bear the cost of any resulting repairs to the Building that are reasonably necessary due to the removal.

EXHIBIT I

IRREVOCABLE STANDBY LETTER OF CREDIT

Number: _____
Date: _____
Amount: _____
Expiration: _____

BENEFICIARY

The Irvine Company LLC
550 Newport Center Drive
Newport Beach, CA 92060
Attn: Senior Vice President, Finance
Office Properties

ACCOUNT PARTY

_____
_____

We hereby issue our Irrevocable Letter of Credit No. ____ in favor of ***The Irvine Company LLC*** ("Beneficiary"), its successors and assigns, for the account of _____. We undertake to honor your sight draft, upon presentation at our office in _____, California, for any sum or sums not to exceed a total of _____ ($_____) in favor of Beneficiary when accompanied by the original of this Letter of Credit.

Partial and multiple drawings are permitted under this Letter of Credit. In the event of a partial draw, the amount of the draft shall be endorsed on the reverse side hereof by the negotiating bank.

This Letter of Credit is transferable in its entire undrawn balance to a successor beneficiary upon presentation by Beneficiary of the original of this Letter of Credit, together with a written request for transfer executed by Beneficiary.

It is a condition of this Letter of Credit that it shall remain enforceable against us for a period of _____ from this date and further, that it shall be deemed automatically extended for successive one-year periods without amendment thereafter unless thirty (30) days prior to the expiration date set forth above, or within thirty (30) days prior to the end of any yearly Anniversary Date thereafter, you shall receive our notice in writing by certified mail, return receipt requested, or by overnight courier (e.g. FedEx), that we elect not to renew this Letter of Credit for any subsequent year.

The draft must be marked "Drawn under _____ Letter of Credit No. _____ dated _____."

There are no other conditions of this letter of credit. Except so far as otherwise stated, this credit is subject to the International Standby Practices 1998, International Chamber of Commerce Publication No. 590, and is otherwise governed, by the law of the State of California.

By: _____

By: _____

EXHIBIT J
SURVEY FORM
THE IRVINE COMPANY — INVESTMENT PROPERTIES GROUP

HAZARDOUS MATERIAL SURVEY FORM

The purpose of this form is to obtain information regarding the use of hazardous substances on Investment Properties Group ("**I G**") property. Prospective tenants and contractors should answer the questions in light of their propos d activities on the premises. Existing tenants and contractors should answer the questions as they relate to ongoing activities on the premises and should update any information previously submitted.

If additional space is needed to answer the questions, you may attach separate sheets of paper to this form. When completed, the form should be sent to the following address:

THE IRVINE COMPANY MANAGEMENT OFFICE
111 Innovation Drive
Irvine, CA 92617

Your cooperation in this matter is appreciated. If you have any questions, please call your property manager at (949) 720-4400 for assistance.

1. GENERAL INFORMATION

Name of Responding Company: _____

Check all that apply: Tenant ( ) Contractor ( )
Prospective ( ) Existing ( )

Mailing Address: _____
Contact person & Title: _____
Telephone Number: ( ) _____

Current TIC Tenant(s):

Address of Lease Premises: _____

Length of Lease or Contract Term: _____

Prospective TIC Tenant(s):

Address of Leased Premises: _____

Address of Current Operations:

Describe the proposed operations to take place on the property, including principal products manufactured or services to be conducted. Existing tenants and contractors should describe any proposed changes to ongoing operations.

_____
_____
_____

2. HAZARDOUS MATERIALS. For the purposes of this Survey Form, the term "hazardous material" means any raw material, product or agent considered hazardous under any state or federal law. The term does not include wastes which are intended to be discarded.

2.1 Will any hazardous materials be used or stored on site?

Chemical Products	Yes ( )	No ( )
Biological Hazards/ Infectious Wastes	Yes ( )	No ( )
Radioactive Materials	Yes ( )	No ( )
Petroleum Products	Yes ( )	No ( )

2.2 List any hazardous materials to be used or stored, the quantities that will be on-site at any given time, and the location and method of storage (e.g., bottles in storage closet on the premises).

Hazardous Materials	Location and Method of Storage	Quantity

2.3 Is any underground storage of hazardous materials proposed or currently conducted on the premises? Yes ( ) No ( )

If yes, describe the materials to be stored, and the size and construction of the tank. Attach copies of any permits obtained for the underground storage of such substances.

3. HAZARDOUS WASTE. For the purposes of this Survey Form, the term "hazardous waste" means any waste (including biological, infectious or radioactive waste) considered hazardous under any state or federal law, and which is intended to be discarded.

3.1 List any hazardous waste generated or to be generated on the premises, and indicate the quantity generated on a monthly basis.

Hazardous Materials	Location and Method of Storage	Quantity

3.2 Describe the method(s) of disposal (including recycling) for each waste. Indicate where and how often disposal will take place.

Hazardous Materials	Location and Method of Storage	Quantity

3.3 Is any treatment or processing of hazardous, infectious or radioactive wastes currently conducted or proposed to be conducted on the premise?

Yes ( ) No ( )

If yes, please describe any existing or proposed treatment methods.

3.4 Attach copies of any hazardous waste permits or licenses issued to your company with respect to its operations on the premises.

4. SPILLS

4.1 During the past year, have any spills or releases of hazardous materials occurred on the premises? Yes ( ) No ( )

If so, please describe the spill and attach the results of any testing conducted to determine the extent of such spills.

4.2 Were any agencies notified in connection with such spills? Yes ( ) No ( )

If so, attach copies of any spill reports or other correspondence with regulatory agencies.

4.3 Were any clean-up actions undertaken in connection with the spills? Yes ( ) No ( )

If so, briefly describe the actions taken. Attach copies of any clearance letters obtained from any regulatory agencies involved and the results of any final soil or groundwater sampling done upon completion of the clean-up work.

5. WASTEWATER TREATMENT/DISCHARGE

5.1 Do you discharge industrial wastewater to:

____storm drain? ____sewer?

____surface water? ____no industrial discharge

5.2 Is your industrial wastewater treated before discharge? Yes ( ) No ( )

If yes, describe the type of treatment conducted.

5.3 Attach copies of any wastewater discharge permits issued to your company with respect to its operations on the premises.

6. AIR DISCHARGES.

6.1 Do you have any air filtration systems or stacks that discharge into the air? Yes ( ) No ( )

6.2 Do you operate any equipment that requires air emissions permits? Yes ( ) No ( )

6.3 Attach copies of any air discharge permits pertaining to these operations.

7. HAZARDOUS MATERIAL DISCLOSURES.

7.1 Does your company handle an aggregate of at least 500 pounds, 55 gallons or 200 cubic feet of hazardous material at any given time? Yes ( ) No ( )

7.2 Has your company prepared a Hazardous Materials Disclosure — Chemical Inventory and Business Emergency Plan or similar disclosure document pursuant to state or county requirements? Yes ( ) No ( )

If so, attach a copy.

7.3 Are any of the chemicals used in your operations regulated under Proposition 65?

If so, describe the procedures followed to comply with these requirements.

7.4 Is your company subject to OSHA Hazard Communication Standard Requirements? Yes ( ) No ( )

If so, describe the procedures followed to comply with these requirements.

8. ANIMAL TESTING.

8.1 Does your company bring or intend to bring live animals onto the premises for research or development purposes? Yes ( ) No ( )

If so, describe the activity.

8.2 Does your company bring or intend to bring animal body parts or bodily fluids onto the premises for research or development purposes? Yes ( ) No ( )

If so, describe the activity.

9. ENFORCEMENT ACTIONS, COMPLAINTS.

9.1 Has your company ever been subject to any agency enforcement actions, administrative orders, lawsuits, or consent orders/decrees regarding environmental compliance or health and safety? Yes ( ) No ( )

If so, describe the actions and any continuing obligations imposed as a result of these actions.

9.2 Has your company ever received any request for information, notice of violation or demand letter, complaint, or inquiry regarding environmental compliance or health and safety? Yes ( ) No ( )

9.3 Has an environmental audit ever been conducted which concerned operations or activities on premises occupied by you?
Yes ( ) No ( )

9.4 If you answered "yes" to any questions in this section, describe the environmental action or complaint and any continuing compliance obligation imposed as a result of the same.

By: _____
Name: _____
Title: _____
Date: _____

EXHIBIT X

WORK LETTER

DOLLAR ALLOWANCE
[SECOND GENERATION SPACE]

The Tenant Improvement work (herein "**Tenant Improvements**") shall consist of any work required to complete the Premises pursuant to Working Drawings and Specifications approved by both Landlord and Tenant. All of the Tenant Improvement work shall be performed by a contractor engaged by Landlord and selected on the basis of competitive bids submitted by 3 general contractors, which shall consist of Pacific Building Group, Burger Construction and Reno Contracting, Inc.; provided that Landlord shall choose the lowest qualified bidder. The Tenant Improvements shall be undertaken in accordance with the procedures and requirements set forth below and shall comply with the American with Disabilities Act. Landlord shall use commercially reasonable efforts to obtain 12 month warranties on any new Tenant Improvements.

I. ARCHITECTURAL AND CONSTRUCTION PROCEDURES

A. Landlord shall engage an architect to prepare a detailed space plan for the Premises which includes interior partitions, ceilings, interior finishes, interior office doors, suite entrance, floor coverings, window coverings, lighting, electrical and telephone outlets, plumbing connections, heavy floor loads and other special requirements ("**Preliminary Plan**"). Not later than thirty (30) days after the full execution and delivery of this Lease ("**Plan Approval Date**"), Tenant shall approve the Preliminary Plan by signing copies of the appropriate instrument and delivering same to Landlord for Landlord's review and approval. Landlord shall provide an estimate, prepared by the contractor engaged by Landlord for the work herein pursuant to the competitive bidding process described above ("**Landlord's Contractor**"), of the cost for which Landlord will complete or cause to be completed the Tenant Improvements ("**Preliminary Cost Estimate**"). The parties acknowledge Preliminary Plan shall substantially conform to the "Test Fit" attached as **Exhibit X-1**.

B. On or before the Plan Approval Date, Tenant shall provide in writing to Landlord or Landlord's Architect all specifications and information requested by Landlord (provided that Landlord must request any specific information it desires at least three (3) business days prior to the Plan Approval Date) for the preparation of final construction documents and costing, including without limitation Tenant's final selection of wall and floor finishes, complete specifications and locations (including load and HVAC requirements) of Tenant's equipment, and details of all other non-building standard improvements to be installed in the Premises (collectively, "**Programming Information**"). Tenant's failure to provide the Programming Information by the Plan Approval Date shall constitute a Tenant Delay for purposes of this Lease. Tenant understands that final construction documents for the Tenant Improvements shall be predicated on the Programming Information, and accordingly that such information must be accurate and complete.

C. Upon Tenant's approval of the Preliminary Plan and Preliminary Cost Estimate and delivery of the complete Programming Information, Landlord's Architect and engineers shall prepare and deliver to the parties working drawings and specifications ("**Working Drawings and Specifications**"), and Landlord's Contractor shall prepare a final construction cost estimate ("**Final Cost Estimate**") for the Tenant Improvements in conformity with the Working Drawings and Specifications. Tenant shall have 3 business days from the receipt thereof to approve or disapprove the Working Drawings and Specifications and the Final Cost Estimate, and any disapproval or requested modification shall be limited to items not contained in the approved Preliminary Plan or Preliminary Cost Estimate and/or items that are inconsistent with the Preliminary Plan or Preliminary Cost Estimate; provided that in no event shall Tenant have the right to request changes or additions to the Working Drawings and Specifications for the purpose of utilizing any unused portion of the Landlord Contribution. In no event shall Tenant disapprove the Final Cost Estimate if it does not exceed the approved Preliminary Cost Estimate. Should Tenant disapprove the Working Drawings and Specifications and the Final Cost Estimate, such disapproval shall be accompanied by a detailed list of revisions. Any revision requested by Tenant and accepted by Landlord (provided that any revision requested by Tenant that is consistent with the Preliminary Plan and Preliminary Cost Estimate shall be accepted by Landlord) shall be incorporated by Landlord's Architect into a revised set of Working Drawings and Specifications and Final Cost Estimate, and Tenant shall approve same in writing within 3 business days of receipt without further revision. Tenant's failure to comply in a timely manner with any of the requirements of this paragraph shall constitute a Tenant Delay.

D. It is understood that the Preliminary Plan and the Working Drawings and Specifications, together with any Changes thereto, shall be subject to the prior approval of Landlord.

Landlord shall identify any disapproved items within 3 business days (or 2 business days in the case of Changes) after receipt of the applicable document. In lieu of disapproving an item, Landlord may approve same on the condition that Tenant pay to Landlord, prior to the start of construction and in addition to all sums otherwise due hereunder, an amount equal to the cost, as reasonably estimated by Landlord, of removing and replacing the item upon the expiration or termination of the Lease. Should Landlord approve work that would necessitate any ancillary Building modification or other expenditure by Landlord, then except to the extent of any remaining balance of the "Landlord Contribution" as described below, Tenant shall, in addition to its other obligations herein, promptly fund the cost thereof to Landlord.

E. Landlord shall submit the Preliminary Plan to competitive bid as provided above. Each bidding contractor shall use the electrical, mechanical, plumbing and fire/life safety engineers and subcontractors designated by Landlord. All other subcontractors shall be subject to Landlord's reasonable approval, and Landlord may require that one or more designated subtrades be union contractors. The lowest responsible bidder shall be selected as Landlord's general contractor and the bid amount shall be deemed the "Final Cost Estimate" for purposes hereof.

F. In the event that Tenant requests in writing a revision in the approved Working Drawings and Specifications ("**Change**"), then provided such Change is acceptable to Landlord, Landlord shall advise Tenant by written change order as soon within three (3) business days thereafter any increase in the Completion Cost and/or any Tenant Delay such Change would cause. Tenant shall approve or disapprove such change order in writing within 2 business days following its receipt from Landlord. Tenant's approval of a Change shall be accompanied by Tenant's payment of any resulting increase in the Completion Cost except to the extent of any unutilized portion of the Landlord Contribution. It is understood that Landlord shall have no obligation to interrupt or modify the Tenant Improvement work pending Tenant's approval of a change order.

G. Notwithstanding any provision in the Lease to the contrary, if Tenant (a) fails to comply with any of the time periods specified in this Work Letter, (b) fails otherwise to approve or reasonably disapprove any submittal within 3 business days, (c) fails to approve in writing the Preliminary Plan by the Plan Approval Date, (d) fails to provide all of the Programming Information timely requested by Landlord by the Plan Approval Date, (e) fails to approve or respond to, in writing the Working Drawings and Specifications within the time provided herein, (f) requests any Changes, (g) fails to make timely payment of any sum due hereunder, (h) furnishes inaccurate or erroneous specifications or other information, or (i) otherwise delays in any manner the completion of the Tenant Improvements (including without limitation by specifying materials that are not readily available) or the issuance of an occupancy certificate (any of the foregoing being referred to in this Lease as "**Tenant Delay**"), then Tenant shall bear any resulting additional construction cost or other expenses to the extent the same cause the Completion Cost to exceed the Landlord Contribution, and the Commencement Date shall be deemed to have occurred for all purposes, including Tenant's obligation to pay Rent, as of the date Landlord reasonably determines that it would have been able to deliver the Premises to Tenant but for the collective Tenant Delays (provided, however, that in no event shall the Commencement Date be deemed to have occurred prior to the Estimated Commencement Date). Should Landlord determine that the Commencement Date should be advanced in accordance with the foregoing, it shall so notify Tenant in writing. Landlord's determination shall be conclusive unless Tenant notifies Landlord in writing, within 5 business days thereafter, of Tenant's election to contest same by binding arbitration with the American Arbitration Association under its Arbitration Rules for the Real Estate Industry, and judgment on the arbitration award may be entered in any court having jurisdiction thereof. Pending the outcome of such arbitration proceedings, Tenant shall make timely payment of all rent due under this Lease based upon the Commencement Date set forth in the aforesaid notice from Landlord. Notwithstanding anything to the contrary, no act, omission or circumstance under clause (d) above shall constitute a Tenant Delay unless and until Tenant fails to cure such act, omission or circumstance within one (1) business day from the date that Landlord notifies Tenant in writing that such act, omission, or circumstance is delaying Landlord's construction of the Tenant Improvements and will constitute a Tenant Delay unless cured by Tenant within such one (1) business day time period.

H. Landlord shall permit Tenant and its agents to enter the Premises four (4) weeks prior to the Commencement Date of the Lease in order that Tenant may perform any work to be performed by Tenant hereunder through its own contractors (including without limitation installation of cabling and FF&E), subject to Landlord's prior written approval, and in a manner and upon terms and conditions and at times reasonably satisfactory to Landlord's representative; provided, however, that the period during which Tenant is permitted to enter the Premises pursuant to the terms of this Subsection H shall in no event be less than the four (4) week period preceding the Commencement Date. The foregoing license to enter the Premises prior to the Commencement Date is, however, conditioned upon Tenant's contractors and their subcontractors and employees working in harmony and not interfering with the work being performed by Landlord. If at any time that entry shall

cause disharmony or interfere with the work being performed by Landlord, this license may be withdrawn by Landlord upon 24 hours written notice to Tenant. That license is further conditioned upon the compliance by Tenant's contractors with all requirements imposed by Landlord on third party contractors and subcontractors, including without limitation the maintenance by Tenant and its contractors and subcontractors of workers' compensation and public liability and property damage insurance in amounts and with companies and on forms satisfactory to Landlord, with certificates of such insurance being furnished to Landlord prior to proceeding with any such entry. The entry shall be deemed to be under all of the provisions of the Lease except as to the covenants to pay Rent unless Tenant commences business activities within the Premises. Landlord shall not be liable in any way for any injury, loss or damage which may occur to any such work being performed by Tenant, the same being solely at Tenant's risk. In no event shall the failure of Tenant's contractors to complete any work in the Premises extend the Commencement Date.

I. Tenant hereby designates Chris Brietbarth, Telephone No. (858) 888-7635, as its representative, agent and attorney-in-fact for the purpose of receiving notices, approving submittals and issuing requests for Changes, and Landlord shall be entitled to rely upon authorizations and directives of such person(s) as if given directly by Tenant. Tenant may amend the designation of its construction representative(s) at any time upon delivery of written notice to Landlord.

II. COST OF TENANT IMPROVEMENTS

A. Landlord shall complete, or cause to be completed, the Tenant Improvements, at the construction cost shown in the Final Cost Estimate (subject to the provisions of this Work Letter), in accordance with final Working Drawings and Specifications approved by both Landlord and Tenant. Landlord shall pay towards the final construction costs ("**Completion Cost**") as incurred a maximum of $664,296.00 ("**Landlord Contribution**"), based on $44.39 per usable square foot of the Premises, and Tenant shall be fully responsible for the remainder ("**Tenant Contribution**"). Notwithstanding the foregoing, Tenant may elect to utilize up to $44,895.00 (i.e., $3.00 per usable square foot of the Premises) towards the costs of relocation, data and communications cabling, IT work, signage and Tenant's project manager reimbursement. If the actual cost of completion of the Tenant Improvements is less than the maximum amount provided for the Landlord Contribution or remains after December 31, 2012, such savings shall inure to the benefit of Landlord and Tenant shall not be entitled to any credit or payment or to apply the savings toward additional work.

B. The Completion Cost shall include all direct costs of Landlord in completing the Tenant Improvements, including but not limited to the following: (i) payments made to architects, engineers, contractors, subcontractors and other third party consultants in the performance of the work (including without limitation preparation of the Preliminary Plan and Working Drawings and Specifications), (ii) permit fees and other sums paid to governmental agencies, (iii) costs of all materials incorporated into the work or used in connection with the work (excluding any furniture, fixtures and equipment relating to the Premises), and (iv) keying and signage costs. The Completion Cost shall also include an administrative/supervision fee to be paid to Landlord in the amount of 2.5% of all such direct costs.

C. Prior to start of construction of the Tenant Improvements, Tenant shall pay to Landlord 50% of the amount of the Tenant Contribution set forth in the approved Final Cost Estimate; and 50% upon substantial completion of the Tenant Improvements (provided, however, that to the extent the actual Completion Cost ultimately amounts to less than the approved Final Cost Estimate, then the final installment(s) of the Tenant Contribution shall be reduced accordingly). In addition, if the actual Completion Cost of the Tenant Improvements is greater than the Final Cost Estimate because of Changes requested by Tenant and not reflected on the approved Working Drawings and Specifications, or because of Tenant Delays, then except to the extent of any unused portion of the Landlord Contribution, Tenant shall pay to Landlord, within 10 days following submission of an invoice therefor, all such additional costs, including any additional architectural fee. If Tenant defaults in the payment of any sums due under this Work Letter, Landlord shall (in addition to II other remedies) have the same rights as in the case of Tenant's failure to pay rent under the Lease.

III. DISPUTE RESOLUTION

A. All claims or disputes between Landlord and Tenant arising out of, or relating to, this Work Letter shall be resolved by the parties in good faith.

B. If any claims or disputes between Landlord and Tenant arising out of, or relating to, this Work Letter cannot be resolved in good faith, the claim or dispute shall be decided by the JAMS/ENDISPUTE ("**JAMS**"), or its successor, with such arbitration to be held in San Diego County, California, unless the parties mutually agree otherwise. Within 10 business days following submission to JAMS, JAMS shall designate three arbitrators and

each party may, within 5 business days thereafter, veto one of the three persons so designated. If two different designated arbitrators have been vetoed, the third arbitrator shall hear and decide the matter. If less than 2 arbitrators are timely vetoed, JAMS shall select a single arbitrator from the non-vetoed arbitrators originally designated by JAMS, who shall hear and decide the matter. Any arbitration pursuant to this section shall be decided within 30 days of submission to JAMS. The decision of the arbitrator shall be final and binding on the parties. All costs associated with the arbitration shall be awarded to the prevailing party as determined by the arbitrator.

C. Notice of the demand for arbitration by either party to the Work Letter shall be filed in writing with the other party to the Work Letter and with JAMS and shall be made within a reasonable time after the dispute has arisen. The award rendered by the arbitrator shall be final, and judgment may be entered upon it in accordance with applicable law in any court having jurisdiction thereof. Except by written consent of the person or entity sought to be joined, no arbitration arising out of or relating to this Work Letter shall include, by consolidation, joinder or in any other manner, any person or entity not a party to the Work Letter unless (1) such person or entity is substantially involved in a common question of fact or law, (2) the presence of such person or entity is required if complete relief is to be accorded in the arbitration, or (3) the interest or responsibility of such person or entity in the matter is not insubstantial.

D. The agreement herein among the parties to arbitrate shall be specifically enforceable under prevailing law. The agreement to arbitrate hereunder shall apply only to disputes arising out of, or relating to, this Work Letter, and shall not apply to other matters of dispute under the Lease except as may be expressly provided in the Lease.

IRVINE COMPANY Since 1864 | OFFICE PROPERTIES

9640 Towne Centre Drive, Suite 100

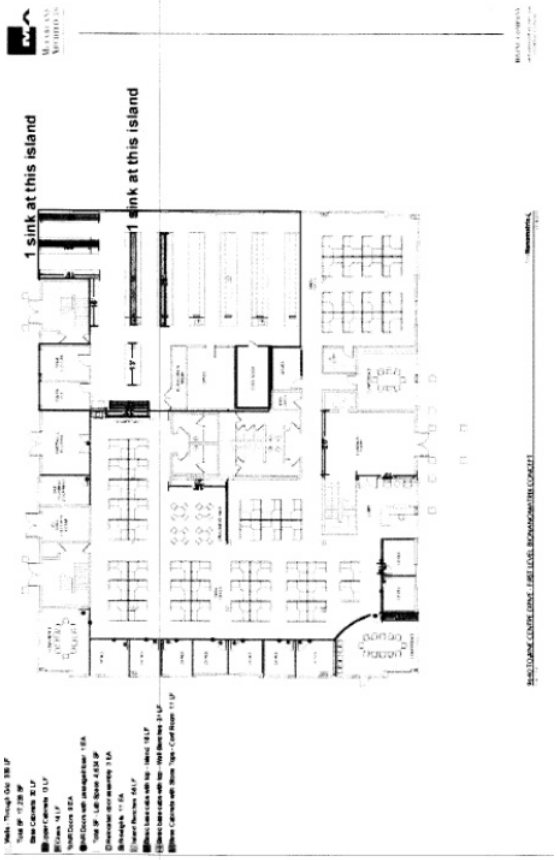
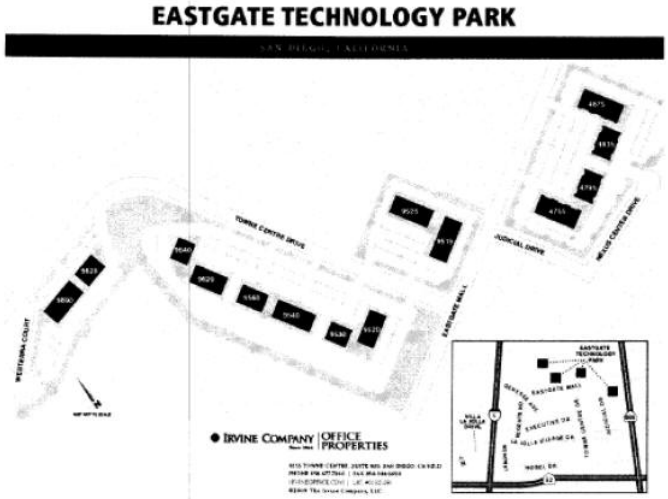


EXHIBIT X-1

EXHIBIT Y
PROJECT DESCRIPTION
Site Plan



IRVINE COMPANY Since 1864 | **OFFICE PROPERTIES**

September 16, 2013

Mr. Garth Monroe
Vice President & CFO BioNano Genomics, Inc.
9640 Towne Centre Drive, Suite 100
San Diego, CA 92121

RE: Lease Amendment –

BioNano Genomics, Inc.
9640 Towne Centre Drive, Suite 100
San Diego, CA 92121

Dear Garth:

Enclosed for your records is a fully-executed First Amendment to Lease for the above-referenced premises.

Should you have any questions regarding the day-to-day operations of the building or services available at Eastgate Technology Park, please call your property manager, Gricelda Dawson, at (858) 455-5148.

We look forward to a mutually beneficial business relationship **with BioNano Genomics, Inc.** in the future.

Sincerely,

/s/ Scott Diggs

Scott Diggs
Lic. 01368593
Senior Leasing Director
Irvine Realty Company
As agent for Landlord

:SC

c: Gricelda Dawson, Property Manager

Enclosure

ORIGINAL

FIRST AMENDMENT TO LEASE

THIS FIRST AMENDMENT TO LEASE (the "**Amendment**) is made and entered into as of September 10, 2013, by and between The Irvine Company LLC ("**Landlord**") and BioNano Genomics, Inc. ("**Tenant**").

RECITALS

A. Landlord and Tenant are parties to that certain lease dated January 16, 2012 (the "**Lease**"). Pursuant to the Lease, Landlord has leased to Tenant space currently containing approximately 16,607 rentable square feet (the "**Premises**") described as Suite No. 100 on the 1st floor at the building located at 9640 Towne Centre Drive (the "**Building**").

B. Tenant and Landlord mutually desire that the Lease be amended on and subject to the following terms and conditions.

NOW, THEREFORE, in consideration of the above recitals which by this reference are incorporated herein, the mutual covenants and conditions contained herein and other valuable consideration, the receipt and sufficiency of which are hereby acknowledged, Landlord and Tenant agree as follows:

I. **AMENDMENT**. Effective as of the date hereof (unless different effective date is specifically referenced in this Section), Landlord and Tenant agree that the Lease shall be amended in accordance with the following terms and conditions:

Article 1, Basic Lease Provisions. Item 9 is hereby amended by deleting "$150,000.00" and the following substituted in lieu thereof: "$110,000.00." Together with Tenant's delivery of this Amendment, Tenant shall promptly provide Landlord with an amendment to the letter of credit in the amount set forth herein.

II. **GENERAL**.

A. Effect of Amendments. The Lease shall remain in full force and effect except to the extent that it is modified by this Amendment.

B. Entire Agreement. This Amendment embodies the entire understanding between Landlord and Tenant and can be changed only by a writing signed by Landlord and Tenant.

C. Counterparts. If this Amendment is executed in counterparts, each is hereby declared to be an original; all, however, shall constitute but one and the same amendment. In any action or proceeding, any photographic, photostatic, or other copy of this Amendment may be introduced into evidence without foundation.

D. Defined Terms. All words commencing with initial capital letters in this Amendment and defined in the Lease shall have the same meaning in this Amendment as in the Lease, unless they are otherwise defined in this Amendment.

E. Authority. If Tenant is a corporation, limited liability company or partnership, or is comprised of any of them, each individual executing this Amendment for the corporation, limited liability company or partnership represents that he or she is duly authorized to execute and deliver this Amendment on behalf of such entity and that this Amendment is binding upon such entity in accordance with its terms.

F. Attorneys' Fees. The provisions of the Lease respecting payment of attorneys' fees shall also apply to this Amendment.

G. Execution of Amendment. Submission of this Amendment by Landlord is not an offer to enter into this Amendment but rather is a solicitation for such an offer by Tenant. Landlord shall not be bound by this Amendment until Landlord has executed and delivered the same to Tenant.

[SIGNATURES ARE ON FOLLOWING PAGE]

IN WITNESS WHEREOF, Landlord and Tenant have duly executed this Amendment as of the day and year first above written.

LANDLORD:

THE IRVINE COMPANY LLC,
a Delaware limited liability company

By: */s/ Steven M. Case*
Steven M. Case
Executive Vice President
Office Properties

By: */s/ Michael T. Bennett*
Michael T. Bennett
Senior Vice President, Operations

TENANT:

BIONANO GENOMICS, INC.,
a Delaware corporation

By: */s/ Erik Holmlin*
Printed Name: Erik Holmlin
Title: CEO

By: */s/ Garth Monroe*
Printed Name: Garth Monroe
Title: VP & CFO

Exhibit 10.22

July 2, 2015

Mr. Joel Jung
BioNano Genomics
9640 Towne Centre Drive Suite 100
San Diego, CA 92121

RE: Lease Amendment — BioNano Genomics, Inc.
9640 Towne Centre Drive, Suite 100
9540 Towne Centre Drive, Suite 100
San Diego, CA 92121

Dear Joel:

Enclosed for your records is a fully-executed Second Amendment to Lease for the above-referenced premises.

Should you have any questions regarding the day-to-day operations of the building or services available at Eastgate, please call your property manager, Lisa Miller, at (858) 412-8800.

IRVINE EASTGATE OFFICE I LLC is pleased you selected Eastgate for your continued office needs. We look forward to continuing a mutually beneficial business relationship with **BioNano Genomics, Inc.** in the future.

Sincerely,

/s/ Scott Diggs
Scott Diggs
Lic. 01368593
Senior Leasing Director
Irvine Realty Company
As agent for Landlord

:sic

c: Lisa Miller, Property Manager

Enclosures

SECOND AMENDMENT

THIS SECOND AMENDMENT (the "**Amendment**") is made and entered into as of July 1, 2015, by and between **IRVINE EASTGATE OFFICE I LLC** a Delaware limited liability company ("**Landlord**") and **BIONANO GENOMICS, INC.**, a Delaware corporation ("**Tenant**").

RECITALS

A. Landlord (as successor in interest to The Irvine Company LLC, a Delaware limited liability company) and Tenant are parties to that certain lease dated January 16, 2012, which lease has been previously amended by a First Amendment to Lease dated September 10, 2013 (collectively, the "**Lease**"). Pursuant to the Lease, Landlord has leased to Tenant space currently containing approximately **16,607** rentable square feet (the "**Original Premises**") described as Suite No. 100 on the 1st floor of the building located at 9640 Towne Centre Drive, San Diego, California (the "**Building**").

B. Tenant has requested that additional space containing approximately **16,521** rentable square feet described as Suite No. 100 on the 15t floor of the building located at 9540 Towne Centre Drive, San Diego, California (the "**9540 Building**") as shown on Exhibit A hereto (the "**Expansion Space**") be added to the Original Premises and that the Lease be appropriately amended and Landlord is willing to do the same on the following terms and conditions.

C. The Lease by its terms shall expire on June 30, 2017 ("**Prior Expiration Date**"), and the parties desire to extend the Term of the Lease, all on the following terms and conditions.

NOW, THEREFORE, in consideration of the above recitals which by this reference are incorporated herein, the mutual covenants and conditions contained herein and other valuable consideration, the receipt and sufficiency of which are hereby acknowledged, Landlord and Tenant agree as follows:

I. **Expansion and Effective Date**.

A. Term. The Term for the Expansion Space shall commence ("**Expansion Effective Date**") on the earlier of (a) the date the Expansion Space is deemed ready for occupancy pursuant to Section I.B below, or (b) the date Tenant commences its business activities within the Expansion Space, and shall expire upon the Extended Expiration Date (hereinafter defined). The Expansion Effective Date is estimated to be January 1, 2016 ("**Estimated Expansion Effective Date**"). Promptly following request by Landlord, the parties shall memorialize on a form provided by Landlord (the "**Expansion Effective Date Memorandum**") the actual Expansion Effective Date; should Tenant fail to execute and return the Expansion Effective Date Memorandum to Landlord within five (5) business days (or provide specific written objections thereto within that period), then Landlord's determination of the Expansion Effective Date as set forth in the Expansion Effective Date Memorandum shall be conclusive. Effective as of the Expansion Effective Date, the Premises, as defined in the Lease, shall be increased from 16,607 rentable square feet to 33,128 rentable square feet by the addition of the Expansion Space.

B. Delay in Possession. If Landlord, for any reason whatsoever, cannot deliver possession of Expansion Space to Tenant on or before the Estimated Expansion Effective Date set forth in Section 1.A above, this Amendment shall not be void or voidable nor shall Landlord be liable to Tenant for any resulting loss or damage. However, Tenant shall not be liable for any rent for the Expansion Space and the Expansion Effective Date shall not occur until Landlord delivers possession of the Expansion Space and the Expansion Space is in fact ready for occupancy as defined below, except that if Landlord's failure to so deliver possession is attributable to any action or inaction by Tenant (including without limitation any Tenant Delay described in the Work Letter attached to this Amendment), then the Expansion Space shall be deemed ready for occupancy, and Landlord shall be entitled to full performance by Tenant (including the payment of rent), as of the date Landlord would have been able to deliver the Expansion Space to Tenant but for Tenant's delay(s). Subject to the foregoing, the Expansion Space shall be deemed ready for occupancy if and when Landlord, to the extent applicable, (a) has put into operation all building services essential for the use of the Expansion Space by Tenant, (b) has provided reasonable access to the Expansion Space for Tenant so that it may be used without unnecessary interference, (c) has substantially completed all the work required to be done by Landlord in this Amendment, and (d) has obtained requisite governmental approvals to Tenant's occupancy.

II. **Extension**. The Term of the Lease is hereby extended and shall expire on December 31, 2020 ("**Extended Expiration Date**"), unless sooner terminated in accordance with the terms of the Lease. That portion of the Term commencing the day immediately following the Prior Expiration Date ("**Extension Date**") and ending on the Extended Expiration Date shall be referred to herein as the "**Extended Term**".

III. **Basic Rent**.

A. Original Premises From and After Extension Date. As of the Extension Date, the schedule of Basic Rent payable with respect to the Original Premises during the Extended Term is the following:

Months of Term or Period	Monthly Rate Per Square Foot	Monthly Basic Rent
7/1/17-12/31/17	$ 1.99	$33,048.00
1/1/18-12/31/18	$ 2.08	$34,543.00
1/1/19-12/31/19	$ 2.17	$36,037.00
1/1/20-12/31/20	$ 2.27	$37,698.00

All such Basic Rent shall be payable by Tenant in accordance with the terms of the Lease.

B. Expansion Space From Expansion Effective Date Through Extended Expiration Date. As of the Expansion Effective Date, the schedule of Basic Rent payable with respect to the Expansion Space for the balance of the original Term and the Extended Term is the following:

Months of Term or Period	Monthly Rate Per Square Foot	Monthly Basic Rent
1/1/17-12/31/16	$ 1.90	$31,390.00
1/1/17-12/31/17	$ 1.99	$32,877.00
1/1/18-12/31/18	$ 2.08	$34,364.00
1/1/19-12/31/19	$ 2.17	$35,851.00
1/1/20-12/31/20	$ 2.27	$37,503.00

All such Basic Rent shall be payable by Tenant in accordance with the terms of the Lease.

Landlord and Tenant acknowledge that the foregoing schedule is based on the assumption that the Expansion Effective Date is the Estimated Expansion Effective Date. If the Expansion Effective Date is other than the Estimated Expansion Effective Date, the schedule set forth above with respect to the payment of any installment(s) of Basic Rent for the Expansion Space shall be appropriately adjusted on a per diem basis to reflect the actual Expansion Effective Date, and the actual Expansion Effective Date shall be set forth in the Expansion Effective Date Memorandum. However, the effective date of any increases or decreases in the Basic Rent rate shall not be postponed as a result of an adjustment of the Expansion Effective Date as provided above.

IV. **Project Costs and Property Taxes**.

A. Original Premises for the Extended Term. Tenant shall be obligated to pay Tenant's Share of Project Costs and Property Taxes accruing in connection with the Original Premises in accordance with the terms of the Lease through the Extended Term.

B. Expansion Space From Expansion Effective Date Through Extended Expiration Date. Tenant shall be obligated to pay Tenant's Share of Project Costs and Property Taxes accruing in connection with the Expansion Space in accordance with the terms of the Lease through the Extended Term. The Floor Area of the 9540 Building is **63,412** rentable square feet.

V. **Additional Security Deposit**. Concurrently with Tenant's delivery of this Amendment, Tenant shall deliver a letter of credit in the sum of $150,000.00 (the "**Letter of Credit**") to Landlord, which Letter of Credit shall be in form and with the substance of Exhibit D attached hereto. The Letter of Credit shall be issued by a financial institution reasonably acceptable to Landlord which may be Square 1 Bank. The Letter of Credit, or any substitute Letter of Credit, shall provide for automatic yearly renewals throughout the Term of the Lease and shall have an outside expiration date that is not earlier than thirty (30) days after the expiration of the Lease Term. In the event the Letter of Credit is not continuously renewed through the period set forth above, or upon any breach under the Lease by Tenant, including specifically Tenant's failure to pay Rent or to abide by its obligations under Sections 7.1 and 15.2 of the Lease, Landlord shall be entitled to draw upon said Letter of Credit by the issuance of Landlord's sole written demand to the issuing financial institution. Any such draw shall be without waiver of any rights Landlord may have under the Lease or at law or in equity as a result of any Default of the Lease by Tenant. Landlord shall authorize reductions to the Letter of Credit in the amount of $50,000.00 each on January 1, 2018 and January 1, 2020; provided that any such reduction shall be conditioned upon (i) Tenant not having been in Default under the Lease at any time beyond applicable notice and cure periods, (ii) a written request for such reduction having been submitted to Landlord not earlier than thirty (30) days prior to the applicable reduction date and (iii) Tenant providing evidence to Landlord of 3 continuous quarters of profitability. Notwithstanding the foregoing, Tenant shall have the right to replace said Letter of Credit with a cash security deposit at any time during the Term. In the event that Tenant closes a new financing of at least $30 million and provides Landlord evidence of such funding, Landlord shall

release the Letter of Credit upon written request by Tenant and Tenant shall provide an additional cash Security Deposit equal to $52,214.00. In such event, the cash Security Deposit under the Lease shall be increased from $30,507.00 to $82,721.00.

VI. **Improvements to Expansion Space**.

A. Condition of Expansion Space. Tenant has inspected the Expansion Space and agrees to accept the same "as is" without any agreements, representations, understandings or obligations on the part of Landlord to perform any alterations, repairs or improvements, except as may be expressly provided otherwise in this Amendment.

B. Tenant Improvements. Landlord hereby agrees to complete the Tenant Improvements for the Expansion Space in accordance with the provisions of **Exhibit B**, Work Letter, attached hereto.

C. Good Working Order. Landlord warrants to Tenant that, as of the Expansion Effective Date, the windows and seals, fire sprinkler system, lighting, heating, ventilation and air conditioning systems and all plumbing, mechanical and electrical systems serving the 9540 Building and the Expansion Space (collectively, the "**Building Systems**"), and the roof and structural components of the 9540 Building, shall be in good operating condition without any material deferred maintenance and that the 9540 Building and the Expansion Space, and all portions thereof, will be in compliance with current building codes and all other applicable Federal, State and local laws, including but not limited to the Americans with Disabilities Act ("**ADA**"), as of the Expansion Effective Date. Notwithstanding the foregoing, Landlord's warranty in the preceding sentence does not include any of the supplemental HVAC units on the roof of the 9540 Building that service the Expansion Space. Provided that Tenant shall notify Landlord that the Building Systems are not in good operating condition within 30 days following the Expansion Effective Date, then Landlord shall, except as otherwise provided in the Lease, promptly after receipt of such notice from Tenant setting forth the nature and extent of such noncompliance, rectify same at Landlord's sole cost and expense and not as part of the Operating Expenses described in Exhibit B of the Lease.

VII. **Other Pertinent Provisions**. Landlord and Tenant agree that, effective as of the date of this Amendment (unless different effective date(s) is/are specifically referenced in this Section), the Lease shall be amended in the following additional respects:

A. Parking. Notwithstanding any contrary provision in Exhibit F to the Lease, "Parking," (i) effective as of the Expansion Effective Date, Landlord shall lease to Tenant, and Tenant shall lease from Landlord, an additional 66 unreserved parking passes for the Expansion Space free of charge through the Extended Expiration Date and (ii) 60 unreserved parking passes for the Original Premises free of charge during the Extended Term. Thereafter, the parking charge shall be at Landlord's scheduled parking rates from time to time.

B. Right To Extend. Section 1 of Exhibit G of the Lease shall apply to the Expansion Space.

C. Project Description. The "Project Description" as defined in Item 2 of the Basic Lease Provisions of the Lease shall mean "Eastgate" and Exhibit C of this Amendment shall be substituted for Exhibit Y of the Lease.

D. Roof Rights. Tenant shall have the right to maintain and operate within an area designated by Landlord on the roof of the Building (the "**Licensed Area**"), during the Term of the Lease, a wireless communication link between the Building and the 9540 Building (the "**Wireless System**") up to twenty-four (24) inches in diameter (of which the height, appearance and installation procedures must be approved in writing by Landlord) in accordance with and subject to the following terms. Landlord may impose a reasonable architectural review fee in connection with its approval of the Wireless System, and Tenant shall pay same promptly following demand. There shall be no license fee for the Licensed Area through the Extended Term. Tenant shall utilize a contractor acceptable to Landlord to install the Wireless System, which contractor shall comply with Landlord's construction rules for the Building, including without limitation Landlord's standard insurance requirements. Landlord reserves the right upon reasonable notice to Tenant to require either (a) the relocation of all equipment installed by Tenant to another location on the roof of the Building, or (b) the removal of any or all of such equipment should Landlord determine that its presence may result in damage to the Building and that Tenant has not made satisfactory arrangements to protect Landlord therefrom. Tenant shall use the Licensed Area only for the operation and maintenance of the Wireless System and the necessary mechanical and electrical equipment to service the Wireless System. The right to utilize the Wireless System and Licensed Area shall be limited solely to Tenant, and in no event may Tenant assign or sublicense such right (except in connection with a Permitted Transfer of the Lease as described in Section 9.1(e) of the Lease). Tenant shall not use or permit any other person to use the Licensed Area for any improper use or for any operation which would constitute a nuisance, and

Tenant shall at all times conform to and cause all persons using any part of the Licensed Area to comply with all public laws, ordinances and regulations from time to time applicable thereto and to all operations thereon. Tenant shall require its employees, when using the Licensed Area, to stay within the immediate confines thereof. In the event a cable television system is operating in the area, Tenant shall at all times conduct its operations so as to ensure that the cable television system shall not be subject to harmful interference as a result of such operations by Tenant. Upon notification from Landlord of any such interference, Tenant agrees to immediately take the necessary steps to correct such situation, and Tenant's failure to do so shall be deemed a Default under the terms of the Lease. During the Lease Term, Tenant shall comply with any standards promulgated by applicable governmental authorities or otherwise reasonably established by Landlord regarding the generation of electromagnetic fields. Should Landlord determine in good faith at any time that the Wireless System poses a health or safety hazard to occupants of the Building, Landlord may require Tenant to remove the Wireless System or make other arrangements satisfactory to Landlord. Any claim or liability resulting from the use of the Wireless System shall be subject to Tenant's indemnification obligation as set forth in Section 10.3 of the Lease. Upon the expiration or earlier termination of this Lease, Tenant shall remove the Wireless System and all other equipment installed by it and shall restore the Licensed Area to its original condition. Tenant understands and agrees that should it fail to install the Wireless System within six (6) months following the Expansion Effective Date, then Tenant's right to install same thereafter shall be null and void.

E. SDN List. Tenant hereby represents and warrants that neither Tenant nor any officer, director, employee, partner, member or other principal of Tenant (collectively, "**Tenant Parties**") is listed as a Specially Designated National and Blocked Person ("SDN") on the list of such persons and entities issued by the U.S. Treasury Office of Foreign Assets Control (OFAC). In the event Tenant or any Tenant Party is or becomes listed as an SDN, Tenant shall be deemed in breach of this Lease and Landlord shall have the right to terminate the Lease immediately upon written notice to Tenant.

VIII. **GENERAL.**

A. Effect of Amendments. The Lease shall remain in full force and effect except to the extent that it is modified by this Amendment.

B. Entire Agreement. This Amendment embodies the entire understanding between Landlord and Tenant and can be changed only by a writing signed by Landlord and Tenant. There have been no additional oral or written representations or agreements. Under no circumstances shall Tenant be entitled to any rent abatement, improvement allowance, leasehold improvements, or any similar economic incentives that may have been provided Tenant in connection with entering into the Lease, unless specifically set forth in this Amendment.

C. Counterparts; Digital Signatures. If this Amendment is executed in counterparts, each is hereby declared to be an original; all, however, shall constitute but one and the same amendment. In any action or proceeding, any photographic, photostatic, or other copy of this Amendment may be introduced into evidence without foundation. The parties agree to accept a digital image (including but not limited to an image in the form of a PDF, JPEG, GIF file, or other e-signature) of this Amendment, if applicable, reflecting the execution of one or both of the parties, as a true and correct original.

D. Defined Terms. All words commencing with initial capital letters in this Amendment and defined in the Lease shall have the same meaning in this Amendment as in the Lease, unless they are otherwise defined in this Amendment.

E. Authority. If Tenant is a corporation, limited liability company or partnership, or is comprised of any of them, each individual executing this Amendment for the corporation, limited liability company or partnership represents that he or she is duly authorized to execute and deliver this Amendment on behalf of such entity and that this Amendment is binding upon such entity in accordance with its terms.

F. Certified Access Specialist. As of the date of this Amendment, there has been no inspection of the Building and Project by a Certified Access Specialist as referenced in Section 1938 of the California Civil Code.

G. Attorneys' Fees. The provisions of the Lease respecting payment of attorneys' fees shall also apply to this Amendment.

H. Brokers. Article 18 of the Lease is amended to provide that the parties recognize the following parties as the brokers who negotiated this Amendment, and agree that Landlord shall be responsible for payment of brokerage commissions to such brokers pursuant to its separate agreements with such brokers: Irvine Realty Company ("**Landlord's Broker**") is the agent of Landlord exclusively and Hughes Marino ("**Tenant's Broker**") is the agent of Tenant exclusively. By the execution of this Amendment, each of Landlord and Tenant hereby acknowledge and confirm (a) receipt of a copy of a Disclosure Regarding Real Estate Agency Relationship conforming to the requirements of California Civil Code 2079.16, and (b)

the agency relationships specified herein, which acknowledgement and confirmation is expressly made for the benefit of Tenant's Broker. If there is no Tenant's Broker so identified herein, then such acknowledgement and confirmation is expressly made for the benefit of Landlord's Broker. By the execution of this Amendment, Landlord and Tenant are executing the confirmation of the agency relationships set forth herein. The warranty and indemnity provisions of Article 18 of the Lease, as amended hereby, shall be binding and enforceable in connection with the negotiation of this Amendment.

I. Execution of Amendment. Submission of this Amendment by Landlord is not an offer to enter into this Amendment but rather is a solicitation for such an offer by Tenant. Landlord shall not be bound by this Amendment until Landlord has executed and delivered the same to Tenant.

J. Nondisclosure of Terms. Except to the extent disclosure is required by law or to its respective financial, legal, space planning consultants and prospective subtenants or assignees, Tenant agrees that neither Tenant nor its agents or any other parties acting on behalf of Tenant shall disclose any matters set forth in this Amendment or disseminate or distribute any information concerning the terms, details or conditions hereof to any person, firm or entity without obtaining the express written consent of Landlord.

[SIGNATURES ARE ON FOLLOWING PAGE]

IN WITNESS WHEREOF, Landlord and Tenant have duly executed this Amendment as of the day and year first above written.

LANDLORD:

IRVINE EASTGATE OFFICE I LLC
a Delaware limited liability company

By: /s/ Steven M. Case
Steven M. Case,
Executive Vice President Office Properties

By: /s/ Michael T. Bennett
Michael T. Bennett,
Senior Vice President Operations
Office Properties

TENANT:

BIONANO GENOMICS, INC.
a Delaware corporation

By /s/ Joel R. Jung

Printed Name Joel R. Jung
Title CFO

By /s/ R. Erik Holmlin

Printed Name R. Erik Holmlin
Title CEO

EXHIBIT A

OUTLINE AND LOCATION OF EXPANSION SPACE

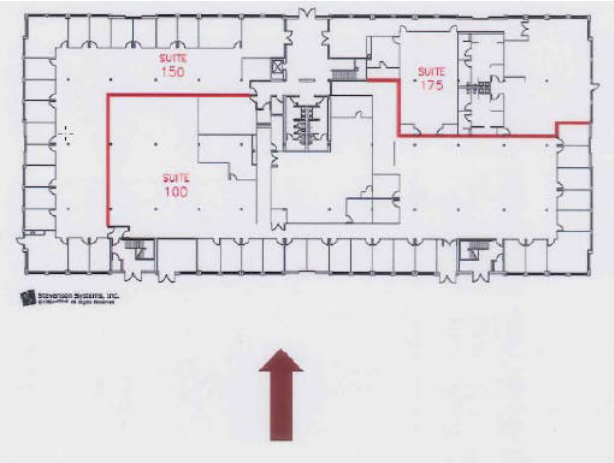


Exhibit A

EXHIBIT B

WORK LETTER

As used in this Work Letter, the "**Premises**" shall be deemed to mean the Original Premises and the Expansion Space, as defined in the attached Amendment.

The Tenant Improvement work (herein "**Tenant Improvements**") shall consist of any work required to complete the Premises pursuant to Working Drawings and Specifications approved by both Landlord and Tenant. All of the Tenant Improvement work shall be performed by a contractor engaged by Landlord and selected on the basis of competitive bids submitted by 3 general contractors, one of which shall consist of Pacific Building Group; provided that Landlord shall choose either (1) the lowest qualified bidder or (2) the general contractor recommended by Tenant even if not the lowest qualified bidder but with endorsement by Tenant and reasonable approval by Landlord taking into account final costs, schedule and previous relevant experience (the "**Contractor Criteria**"). The Tenant Improvements shall be undertaken in accordance with the procedures and requirements set forth below and the Tenant Improvements with respect to the Expansion Space shall comply with the American with Disabilities Act. Landlord shall use commercially reasonable efforts to obtain 12 month warranties on any new Tenant Improvements.

I. ARCHITECTURAL AND CONSTRUCTION PROCEDURES

A. Landlord shall engage McFarlane Architects to prepare a detailed space plan for the Premises which includes interior partitions, ceilings, interior finishes, interior office doors, suite entrance, floor coverings, window coverings, lighting, electrical and telephone outlets, plumbing connections, heavy floor loads and other special requirements ("**Preliminary Plan**"). Not later than thirty (30) days after the full execution and delivery of this Amendment ("**Plan Approval Date**"), Tenant shall approve the Preliminary Plan by signing copies of the appropriate instrument and delivering same to Landlord for Landlord's review and approval. Landlord shall provide an estimate, prepared by the contractor engaged by Landlord for the work herein pursuant to the competitive bidding process described above ("**Landlord's Contractor**"), of the cost for which Landlord will complete or cause to be completed the Tenant Improvements ("**Preliminary Cost Estimate**").

B. On or before the Plan Approval Date, Tenant shall provide in writing to Landlord or Landlord's Architect all specifications and information requested by Landlord (provided that Landlord must request any specific information it desires at least three (3) business days prior to the Plan Approval Date) for the preparation of final construction documents and costing, including without limitation Tenant's final selection of wall and floor finishes, complete specifications and locations (including load and HVAC requirements) of Tenant's equipment, and details of all other non-building standard improvements to be installed in the Premises (collectively, "**Programming Information**"). Tenant's failure to provide the Programming Information by the Plan Approval Date shall constitute a Tenant Delay for purposes of this Lease. Tenant understands that final construction documents for the Tenant Improvements shall be predicated on the Programming Information, and accordingly that such information must be accurate and complete.

C. Upon Tenant's approval of the Preliminary Plan and Preliminary Cost Estimate and delivery of the complete Programming Information, Landlord's Architect and engineers shall prepare and deliver to the parties working drawings and specifications ("**Working Drawings and Specifications**"), and Landlord's Contractor shall prepare a final construction cost estimate ("**Final Cost Estimate**") for the Tenant Improvements in conformity with the Working Drawings and Specifications. Tenant shall have 3 business days from the receipt thereof to approve or disapprove the Working Drawings and Specifications and the Final Cost Estimate, and any disapproval or requested modification shall be limited to items not contained in the approved Preliminary Plan or Preliminary Cost Estimate and/or items that are inconsistent with the Preliminary Plan or Preliminary Cost Estimate; provided that in no event shall Tenant have the right to request changes or additions to the Working Drawings and Specifications for the purpose of utilizing any unused portion of the Landlord Contribution. In no event shall Tenant disapprove the Final Cost Estimate if it does not exceed the approved Preliminary Cost Estimate. Should Tenant disapprove the Working Drawings and Specifications and the Final Cost Estimate, such disapproval shall be accompanied by a detailed list of revisions. Any revision requested by Tenant and accepted by Landlord (provided that any revision requested by Tenant that is consistent with the Preliminary Plan and Preliminary Cost Estimate shall be accepted by Landlord) shall be incorporated by Landlord's Architect into a revised set of Working Drawings and Specifications and Final Cost Estimate, and Tenant shall approve same in writing within 3 business days of receipt without further revision. Tenant's failure to comply in a timely manner with any of the requirements of this paragraph shall constitute a Tenant Delay.

D. It is understood that the Preliminary Plan and the Working Drawings and Specifications,

together with any Changes thereto, shall be subject to the prior approval of Landlord. Landlord shall identify any disapproved items within 3 business days (or 2 business days in the case of Changes) after receipt of the applicable document. In lieu of disapproving an item, Landlord may approve same on the condition that Tenant pay to Landlord, prior to the start of construction and in addition to all sums otherwise due hereunder, an amount equal to the cost, as reasonably estimated by Landlord, of removing and replacing the item upon the expiration or termination of the Lease. Should Landlord approve work that would necessitate any ancillary Building modification or other expenditure by Landlord, then except to the extent of any remaining balance of the "Landlord Contribution" as described below, Tenant shall, in addition to its other obligations herein, promptly fund the cost thereof to Landlord. Notwithstanding the foregoing, in the event the Tenant Improvement work triggers a retrofit of the Common Area restrooms on the first floor of the 9540 Building by the City of San Diego, Landlord, at its sole cost, shall perform such retrofit in accordance with Building standard materials.

E. Landlord shall submit the Preliminary Plan to competitive bid as provided above. Each bidding contractor shall use the electrical, mechanical, plumbing and fire/life safety engineers and subcontractors designated by Landlord. Drywall and ceiling subcontractors shall be union contractors. The lowest responsible bidder shall be selected as Landlord's general contractor, or general contractor recommended by Tenant even if not the lowest qualified bidder but with endorsement of Tenant and reasonable approval by Landlord taking into account the Contractor Criteria, and the bid amount shall be deemed the "Final Cost Estimate" for purposes hereof.

F. In the event that Tenant requests in writing a revision in the approved Working Drawings and Specifications ("**Change**"), then provided such Change is acceptable to Landlord, Landlord shall advise Tenant by written change order as soon within three (3) business days thereafter any increase in the Completion Cost and/or any Tenant Delay such Change would cause. Tenant shall approve or disapprove such change order in writing within 2 business days following its receipt from Landlord. Tenant's approval of a Change shall be accompanied by Tenant's payment of any resulting increase in the Completion Cost except to the extent of any unutilized portion of the Landlord Contribution. It is understood that Landlord shall have no obligation to interrupt or modify the Tenant Improvement work pending Tenant's approval of a change order.

G. Notwithstanding any provision in the Lease to the contrary, if Tenant (a) fails to comply with any of the time periods specified in this Work Letter, (b) fails otherwise to approve or reasonably disapprove any submittal within 3 business days, (c) fails to approve in writing the Preliminary Ran by the Plan Approval Date, (d) fails to provide all of the Programming Information timely requested by Landlord by the Plan Approval Date, (e) fails to approve, or respond to, in writing the Working Drawings and Specifications within the time provided herein, (f) requests any Changes, (g) fails to make timely payment of any sum due hereunder, (h) furnishes inaccurate or erroneous specifications or other information, or (i) otherwise delays in any manner the completion of the Tenant Improvements (including without limitation by specifying materials that are not readily available) or the issuance of an occupancy certificate (any of the foregoing being referred to in this Lease as "**Tenant Delay**"), then Tenant shall bear any resulting additional construction cost or other expenses to the extent the same cause the Completion Cost to exceed the Landlord Contribution, and the Expansion Effective Date shall be deemed to have occurred for all purposes, including Tenant's obligation to pay Rent, as of the date Landlord reasonably determines that it would have been able to deliver the Premises to Tenant but for the collective Tenant Delays (provided, however, that in no event shall the Expansion Effective Date be deemed to have occurred prior to the Estimated Expansion Effective Date). Should Landlord determine that the Expansion Effective Date should be advanced in accordance with the foregoing, it shall so notify Tenant in writing. Landlord's determination shall be conclusive unless Tenant notifies Landlord in writing, within 5 business days thereafter, of Tenant's election to contest same by binding arbitration with the American Arbitration Association under its Arbitration Rules for the Real Estate Industry, and judgment on the arbitration award may be entered in any court having jurisdiction thereof. Pending the outcome of such arbitration proceedings, Tenant shall make timely payment of all rent due under this Lease based upon the Expansion Effective Date set forth in the aforesaid notice from Landlord. Notwithstanding anything to the contrary, no act, omission or circumstance under clause (d) above shall constitute a Tenant Delay unless and until Tenant fails to cure such act, omission or circumstance within one (1) business day from the date that Landlord notifies Tenant in writing that such act, omission, or circumstance is delaying Landlord's construction of the Tenant Improvements and will constitute a Tenant Delay unless cured by Tenant within such one (1) business day time period.

H. Landlord shall permit Tenant and its agents to enter the Expansion Space four (4) weeks prior to the Expansion Effective Date of the Lease in order that Tenant may perform any work to be performed by Tenant hereunder through its own contractors (including without limitation installation of cabling and FF&E), subject to Landlord's prior written approval, and in a manner and upon terms and conditions

and at times reasonably satisfactory to Landlord's representative; provided, however, that the period during which Tenant is permitted to enter the Premises pursuant to the terms of this Subsection H shall in no event be less than the four (4) week period preceding the Expansion Effective Date. The foregoing license to enter the Expansion Space prior to the Expansion Effective Date is, however, conditioned upon Tenant's contractors and their subcontractors and employees working in harmony and not interfering with the work being performed by Landlord. If at any time that entry shall cause disharmony or interfere with the work being performed by Landlord, this license may be withdrawn by Landlord upon 24 hours written notice to Tenant. That license is further conditioned upon the compliance by Tenant's contractors with all requirements imposed by Landlord on third party contractors and subcontractors, including without limitation the maintenance by Tenant and its contractors and subcontractors of workers' compensation and public liability and property damage insurance in amounts and with companies and on forms satisfactory to Landlord, with certificates of such insurance being furnished to Landlord prior to proceeding with any such entry. The entry shall be deemed to be under all of the provisions of the Lease except as to the covenants to pay Rent unless Tenant commences business activities within the Expansion Space. Landlord shall not be liable in any way for any injury, loss or damage which may occur to any such work being performed by Tenant, the same being solely at Tenant's risk. In no event shall the failure of Tenant's contractors to complete any work in the Expansion Space extend the Expansion Effective Date.

I. It is understood that all or a portion of the Tenant Improvements shall be done during Tenant's occupancy of the Original Premises. In this regard, Tenant agrees to assume any risk of injury, loss or damage which may result. Tenant further agrees that it shall be solely responsible for relocating its office equipment and furniture in the Original Premises in order for Landlord to complete the work in the Original Premises and that no rental abatement shall result while the Tenant Improvements are completed in the Original Premises.

J. Tenant hereby designates Chris Breitbarth, Telephone No. (858) 888-7635, as its representative, agent and attorney-in-fact for the purpose of receiving notices, approving submittals and issuing requests for Changes, and Landlord shall be entitled to rely upon authorizations and directives of such person(s) as if given directly by Tenant. Tenant may amend the designation of its construction representative(s) at any time upon delivery of written notice to Landlord.

II. COST OF TENANT IMPROVEMENTS

A. Landlord shall complete, or cause to be completed, the Tenant Improvements, at the construction cost shown in the Final Cost Estimate (subject to the provisions of this Work Letter), in accordance with final Working Drawings and Specifications approved by both Landlord and Tenant. Landlord shall pay towards the final construction costs ("**Completion Cost**") as incurred a maximum of $1,050,244.50.00 ("**Landlord Contribution**"), based on $50.00 per rentable square foot of the Expansion Space and $13.50 per rentable square foot of the Original Premises but which the actual portion of Landlord Contribution allocated to improvements in each of the Expansion Space and Original Premises shall be at Tenant's discretion with Landlord's reasonable approval, and Tenant shall be fully responsible for the remainder ("Tenant Contribution"). Tenant shall have the right to apply a portion of the Landlord Contribution equal to $13.50 per rentable square foot based on the Original Premises towards the cost of the HVAC upgrade underway at Original Premises as of June 11, 2015 even if those improvements are started or completed prior to the full execution of the Amendment. If there is (i) any portion of the Landlord Contribution based on the $50.00 per rentable square foot of the Expansion Space that remains unspent on Tenant Improvements in the Expansion Space after December 31, 2016 and (ii) any portion of the Landlord Contribution based on the $13.50 per rentable square foot of the Original Premises that remains unspent on Tenant Improvements in the Original Premises after December 31, 2017 ("**Use By Date**"), such savings shall inure to the benefit of Landlord and Tenant shall not be entitled to any credit or payment or to apply the savings toward additional work.

B. The Completion Cost shall include all direct costs of Landlord in completing the Tenant Improvements, including but not limited to the following: (i) payments made to architects, engineers, contractors, subcontractors and other third party consultants in the performance of the work (including without limitation preparation of the Preliminary Plan and Working Drawings and Specifications), (ii) permit fees and other sums paid to governmental agencies, (iii) costs of all materials incorporated into the work or used in connection with the work (excluding any furniture, fixtures and equipment relating to the Premises), and (iv) keying and signage costs. The Completion Cost shall also include an administrative/supervision fee to be paid to Landlord in the amount of 2.5% of all such direct costs. Subject to the Use By Date, in the event any portion of the Landlord Contribution remains unspent after completion of all Landlord Work pursuant to this Work Letter, and Tenant applies those remaining funds to improvements in the Original Premises at a future date, there shall be no

administrative/supervision fee paid out of those funds to Landlord so long as such improvements cost $25,000 or less in the aggregate and require less than 3 trades.

C. Prior to start of construction of the Tenant Improvements, Tenant shall pay to Landlord 50% of the amount of the Tenant Contribution set forth in the approved Final Cost Estimate; and 50% upon substantial completion of the Tenant Improvements (provided, however, that to the extent the actual Completion Cost ultimately amounts to less than the approved Final Cost Estimate, then the final installment(s) of the Tenant Contribution shall be reduced accordingly). In addition, if the actual Completion Cost of the Tenant Improvements is greater than the Final Cost Estimate because of Changes requested by Tenant and not reflected on the approved Working Drawings and Specifications, or because of Tenant Delays, then except to the extent of any unused portion of the Landlord Contribution, Tenant shall pay to Landlord, within 10 days following submission of an invoice therefor, all such additional costs, including any additional architectural fee. If Tenant defaults in the payment of any sums due under this Work Letter, Landlord shall (in addition to all other remedies) have the same rights as in the case of Tenant's failure to pay rent under the Lease.

III. DISPUTE RESOLUTION

A. All claims or disputes between Landlord and Tenant arising out of, or relating to, this Work Letter shall be resolved by the parties in good faith.

B. If any claims or disputes between Landlord and Tenant arising out of, or relating to, this Work Letter cannot be resolved in good faith, the claim or dispute shall be decided by the JAMS/ENDISPUTE ("**JAMS**"), or its successor, with such arbitration to be held in San Diego County, California, unless the parties mutually agree otherwise. Within 10 business days following submission to JAMS, JAMS shall designate three arbitrators and each party may, within 5 business days thereafter, veto one of the three persons so designated. If two different designated arbitrators have been vetoed, the third arbitrator shall hear and decide the matter. If less than 2 arbitrators are timely vetoed, JAMS shall select a single arbitrator from the non-vetoed arbitrators originally designated by JAMS, who shall hear and decide the matter. Any arbitration pursuant to this section shall be decided within 30 days of submission to JAMS. The decision of the arbitrator shall be final and binding on the parties. All costs associated with the arbitration shall be awarded to the prevailing party as determined by the arbitrator.

C. Notice of the demand for arbitration by either party to the Work Letter shall be filed in writing with the other party to the Work Letter and with JAMS and shall be made within a reasonable time after the dispute has arisen. The award rendered by the arbitrator shall be final, and judgment may be entered upon it in accordance with applicable law in any court having jurisdiction thereof. Except by written consent of the person or entity sought to be joined, no arbitration arising out of or relating to this Work Letter shall include, by consolidation, joinder or in any other manner, any person or entity not a party to the Work Letter unless (1) such person or entity is substantially involved in a common question of fact or law, (2) the presence of such person or entity is required if complete relief is to be accorded in the arbitration, or (3) the interest or responsibility of such person or entity in the matter is not insubstantial.

D. The agreement herein among the parties to arbitrate shall be specifically enforceable under prevailing law. The agreement to arbitrate hereunder shall apply only to disputes arising out of, or relating to, this Work Letter, and shall not apply to other matters of dispute under the Lease except as may be expressly provided in the Lease.

EXHIBIT C

Protect Description

EASTGATE

Site Plan

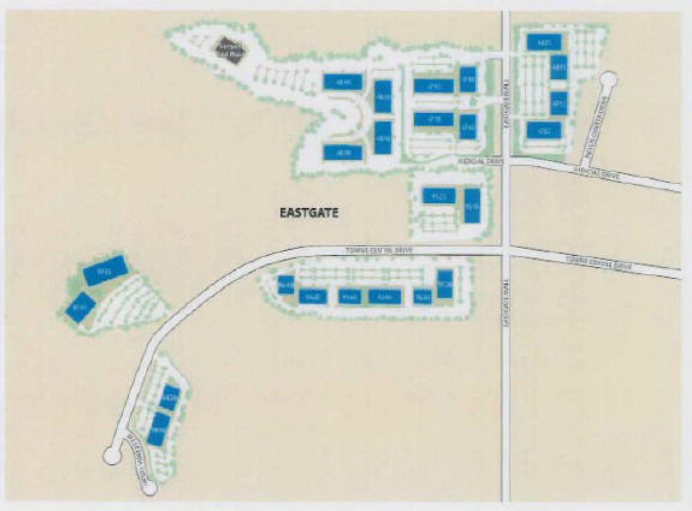


Exhibit Y

Exhibit 10.23

*****Text Omitted and Filed Separately**
with the Securities and Exchange Commission
Confidential Treatment Requested
Under 17 C.F.R. Sections 200.80(b)(4)
and 230.406

MASTER SERVICES AGREEMENT

This **MASTER SERVICES AGREEMENT** (the "Agreement") is entered into effective as of March 2, 2009 ("***Effective Date***") by and between **SVTC TECHNOLOGIES, LLC**, a Delaware limited liability company, with principal offices at 3901 North First Street, San Jose, CA 95134, USA, ("SVTC") and BioNanomatrix, Inc., a Delaware Corporation, with principal offices located at 3701 Market St, 4th Floor, Philadelphia, Pennsylvania 19104, USA ("Customer").

RECITALS

WHEREAS, SVTC including its facilities located in San Jose, CA and Austin, TX, own and operate semiconductor manufacturing, research and development facilities, offers semiconductor-process engineering development and related services, and also licenses related intellectual property; and,

WHEREAS, Customer desires to engage SVTC to provide certain of the above services or to licenses SVTC intellectual property,

NOW THEREFORE, for valuable consideration, the parties hereby agree as follows:

1. DEFINITIONS

1.1 ***"Affiliate"*** shall mean any entity that controls, is controlled by or is under common control with SVTC or Customer. For purposes of this definition, "control" shall mean beneficial ownership of (i) more than fifty percent (50%) of the shares of the subject entity entitled to vote in the election of directors (or, in the case of an entity that is not a corporation, for the election of the corresponding managing authority); or (ii) such lesser percentage as is the maximum control or ownership right permitted in the country where the subject entity exists. A "Wholly Owned Affiliate" shall mean an entity that is at least eighty percent (80%) controlled by a party to this Agreement.

1.2 ***"Confidential Information"*** shall mean information that is disclosed between the parties under this Agreement conspicuously marked or confirmed in writing if oral, that the disclosure is confidential, including the disclosure of any Technology, intellectual property or other documentation or any product plans, business, financial or personnel information. "Confidential Information" shall not include information which: (i) is publicly disclosed by the receiving party with the prior written approval of the disclosing party; (ii) is independently developed by the receiving party without use of the disclosing party's Confidential Information; (iii) is intentionally disclosed by the disclosing party to a third party without restriction on disclosure; (iv) is rightfully received by the receiving party from a third party without a duty of confidentiality; or (v) is disclosed pursuant to any judicial or governmental order, provided that the receiving party gives the disclosing party sufficient prior written notice to contest such order.

1.3 ***"Customer Personnel"*** shall mean all employees, contractors, agents and any others brought onto SVTC premises by or at the behest of Customer, who are therefore subject to provisions of this Agreement.

1.4 ***"Intellectual Property Rights"*** shall mean those rights emanating from forms of intellectual property as defined by applicable laws including any or all of the following and all rights in, arising out of, or associated therewith: (i) all patent rights and all reissues, renewals, re-examinations, continuations, continuations in part, divisions and extensions thereof or foreign counterparts thereto, and all applications for any of the foregoing; (ii) all trade secrets and other rights in know-how and confidential or proprietary information; (iii) all copyrights, copyrights registrations and related applications and all other rights in or to works of authorship corresponding thereto throughout the world; (iv) all mask works, mask work registrations and applications, and any equivalent or similar rights in semiconductor masks, layouts, architectures or topology; (v) all trademarks, service marks, trade names, service names, trade dress, domain names and similar rights; and (vi) any corresponding or equivalent rights to any of the foregoing now known or hereafter recognized anywhere in the world.

1.5 ***"Line"*** or ***"Pilot Line"*** shall mean semiconductor wafer processing facilities, which also may be referred to as the "fab" or "foundry" and that are operated by SVTC.

1.6 ***"Start Date"*** shall mean the mutually agreed date that SVTC will begin providing services under this Agreement and the attached Schedules.

1.7 ***"Schedule"*** means one or more documents attached to this Agreement, spelling out the details of Customer projects and the specific terms and conditions that will apply to the provision of SVTC services for those projects; exhibits may be attached to Schedules. By way of example, A "Statement of Work" or "Scope of Work" or "SOW" may be attached.

1.8 ***"SVTC Personnel"*** shall mean all employees, contractors or agents of SVTC.

1.9 ***"Technology"*** means embodiments of Intellectual Property Rights, whether in electronic, written or other media, including technical documentation, specifications, designs, bills of material, build instructions, test reports, schematics, algorithms, user interfaces, routines, formulae, process libraries or recipe books, test vectors, IP cores, net lists, photomasks, reticles, databases, lab notebooks, processes, prototypes, samples, studies, wafers, chips, know-how, or other works of authorship.

1.10 ***"Term"*** means the period commencing on the Effective Date and ending on the date that this Agreement expires or is terminated.

2. SERVICES AND SUPPORT

2.1 **Services**. SVTC will provide Customer the services described in Schedules and other attachments to this Agreement, which are incorporated by reference. In the event of a conflict between the terms and conditions of any attachment and this Agreement, the terms and conditions of this Agreement shall govern unless explicitly superseded in such attachment.

2.2 **Premises Support for Customer Personnel**. Customer may request support or facilities for Customer Personnel on SVTC premises such as that provided to Resident Partner customers, as defined and described in applicable attachments. Unless agreed in writing otherwise, SVTC shall not make available for Customer, clerical, administrative or infrastructure support or any physical space on its premises.

2.3 **Equipment**. Except as otherwise set forth herein or in a Schedule, as between the parties, SVTC will own all equipment in the fab or elsewhere on SVTC's premises and Customer will acquire no rights or interest in or to any equipment at SVTC premises as a result of this Agreement. If it is agreed in an attachment that Customer may bring equipment into the fab or elsewhere on SVTC premises, whether to be operated by SVTC or by Customer, such equipment must be pre-approved by SVTC, is subject to being located or relocated during the term of this Agreement if required by SVTC, and must be promptly removed on the termination of this Agreement. Customer shall have no right to any particular space on the premises and the space that is assigned may expand or contract as required or as mutually agreed for specific projects pursuant to this Agreement.

2.4 **Legal Status While On Premises**. The legal status of Customer Personnel while on SVTC premises is that of an invitee. In the event that any individual who is an employee of Customer, or anyone else who is on the SVTC premises at the invitation of Customer, fails to comply with the safety, security, confidentiality, or other applicable conditions in this Agreement, its attachments, or in other mutually agreed documents, then SVTC may order such individuals off the premises and their continued presence will be considered that of a trespasser.

2.5 **Wafer/Silicon Reclamation and Recycling**. SVTC supports the reclamation and recycling of discarded wafers and scrap silicon. If applicable to Customer, it is acknowledged that if any is not removed by Customer, it will be destroyed, reclaimed, or recycled at SVTC's sole discretion.

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2.6 Hazardous Materials. No hazardous or toxic materials may be brought onto SVTC premises without SVTC's prior written consent. All materials to be used in the fab, whether or not toxic or otherwise hazardous, must be pre-approved by SVTC.

3. CUSTOMER PAYMENT ARRANGEMENTS

3.1 Fees and Costs. All information on prices, fees, and costs to be paid by Customer shall be listed in attached Schedule[s]. Unless otherwise specifically stated in the applicable Schedule, the payment terms shall be as described below in Section 3.4.

3.2 Taxes. All fees stated herein or otherwise provided by SVTC pursuant to this Agreement are exclusive of taxes. Customer shall be responsible for and shall pay any applicable sales, use, excise, withholding or similar taxes, including value added taxes (VAT) and customs duties, that may be due for the provision of services and licenses under this Agreement, or for the purchase of wafers or other deliverables hereunder, excluding any taxes based on SVTC's net income. Customer will make all payments hereunder free and clear of, and without reduction for, any withholding taxes; any such taxes imposed on payments of the fees to SVTC will be Customer's sole responsibility. Customer will provide SVTC with official receipts issued by the appropriate taxing authority, or such other evidence as SVTC may reasonably request, to establish that such taxes have been paid. No tax shall be billed to Customer if Customer provides SVTC with either (i) an exemption certificate provided in good faith and in accordance with applicable law, or (ii) a direct pay permit number provided in accordance with applicable law.

3.3 Extraordinary Expenses. To the extent that Customer intends to use raw materials that are different or more expensive than those used by SVTC, or to take any other action that it or SVTC expects (or should expect in the exercise of prudent technical and commercial judgment) will increase expenses above those in the normal course (any expense so incurred, an "Extraordinary Expense"), SVTC will invoice Customer in accordance with Section 3.4 or as otherwise specified in the applicable Schedule. Extraordinary Expenses will not be incurred without the prior written approval of Customer, and no activities that might result in such Extraordinary Expenses will be conducted by SVTC absent Customer's agreement to bear such Extraordinary Expenses.

3.4 Payment Terms.

(a) Customer will be invoiced monthly for all services and deliverables provided by SVTC during the previous month. All other payments required hereunder shall be invoiced on a monthly basis at the beginning of each calendar month and shall be paid within […***…]. Each SVTC invoice hereunder shall be accompanied by a detailed report containing supporting information, as Customer may reasonably request, used to determine the amounts due hereunder.

(b) Except as may be agreed otherwise in writing, all payments due to SVTC under this Agreement shall be made by bank wire transfer to a designated bank account. All payments shall be made in U.S. dollars unless otherwise agreed by the parties. If any payments are more than […***…] late, Customer will pay SVTC, in addition to any other remedies that may be available to SVTC, a late payment of the lower of […***…] per month or the highest rate allowed by law for all past due amounts until paid.

4. INTELLECTUAL PROPERTY RIGHTS

4.1 Joint Development. Unless otherwise expressly set forth in a Schedule attached hereto, SVTC and Customer do not plan any joint development at the time of this Agreement. Any joint development activities intended by the parties must be agreed to in writing and ownership of any resulting Technology and Intellectual Property Rights shall be as set forth therein. If Technology and Intellectual Property Rights are created or invented jointly, unless expressly agreed in writing otherwise, such Technology and Intellectual Property Rights shall be jointly owned in accordance with US intellectual property laws but without any right of accounting, except that it is agreed that any jointly created patent improvements or copyright derivatives shall be assigned to the owner of the underlying Technology.

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4.2 New Technology and Related Intellectual Property Rights. Any Technology and related Intellectual Property Rights, invented, created, or authored solely or independently by either party shall be owned by that party, except that it is agreed that all rights in any patent improvements or copyright derivatives to the other party's Technology shall be assigned to the other party subject to a license back for use solely in connection with the purposes of this Agreement. The creating party agrees to promptly notify the other party and to cooperate in any government filings undertaken.

4.3 Pre-existing Technology and Ownership. Any Technology and any related Intellectual Property Rights, pre-existing this Agreement shall stay with the owning party and is no ownership rights are assigned or otherwise transferred by this Agreement, save and except for license rights granted by each party to the other necessary to perform the obligations of this Agreement or as otherwise provided in section 5, below. For purposes of clarity, SVTC agrees that the chip design, composition, layout, topology, fabrication process flow, process selection and material selection described in Exhibit D is Customer Technology and all related Intellectual Property is the property of the Customer.

4.4 Trade Secrecy. SVTC shall treat all knowledge of Customer's projects and development work pursuant to this Agreement, including by way of example process flows and recipes, whether or not subject to protection under other intellectual property laws, as Customer's trade secrets subject to the confidentiality provisions of section 10, below, and/or other agreements between the parties; SVTC agrees to scrupulously prevent other customers of SVTC or third parties from gaining knowledge of such Customer trade secrets.

4.5 Intellectual Property Prosecution. To avoid a flawed prosecution, Customer agrees that if it decides to file for a patent or to otherwise perfect ownership through any other government registration for Technology created pursuant to the performance of this Agreement that is related to or is an improvement of SVTC Technology, Customer agrees to notify SVTC before filing to confirm whether the subject matter of the intended filing has not previously become part of SVTC's intellectual property program or whether it has been previously disclosed by SVTC to other customers or is already intellectual property owned by others.

5. LICENSES

5.1 License from Customer. Customer grants no rights to SVTC except for a non-exclusive, non-transferable, royalty-free license under Customer's applicable Intellectual Property Rights, to use any of Customer's Technology, products or processes as necessary for SVTC to provide the services requested by Customer pursuant to this Agreement, for the purposes of this Agreement.

5.2 License from SVTC. Subject to the terms and conditions of this Agreement, SVTC grants Customer a non-exclusive, perpetual, irrevocable, royalty free and paid up right and license, under all applicable SVTC Intellectual Property Rights (including any Technology developed by SVTC pursuant to activities under this Agreement) (the "***Licensed Technology***") for the manufacture of Customer's products (including any unique equipment configurations and modifications used therein and any unique semiconductor or integrated circuit structures resulting from such modules). Subject to the terms and conditions set forth herein, such right and license shall include (i) the right to have Customer products made by third party manufacturers, and (ii) the right to sublicense such rights to third parties solely as a part of a license to such party for the manufacture of a Customer product.

5.3 No Other Rights. Except as expressly provided in this Section or the applicable Schedule, neither party grants to the other party any license, right, title or interest in or to any Intellectual Property Rights or Technology, whether by implication, estoppel or otherwise. All rights not specifically granted herein are reserved by the Party owning the respective Technology and Intellectual Property Rights.

6. INDEMNIFICATION

6.1 SVTC Indemnification Obligations. SVTC shall defend, indemnify, and hold Customer harmless from

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and against any claim of liability, loss, damage, cost or expense (including reasonable attorneys' fees and other legal expenses) (collectively, "***Losses***") resulting from any third party claim that (i) is based upon any act or omission of SVTC or any SVTC Personnel, (ii) based upon any material breach by SVTC of any obligation imposed by this Agreement (iii) use of Customer equipment by SVTC Personnel or (iv) Licensed Technology infringes or misappropriates the Intellectual Property Rights of any third party. This indemnity shall not apply to the extent that any such claim is based upon (i) modification to the Licensed Technology made by or on behalf of Customer, (ii) Customer's use of the Licensed Technology outside of the scope of the license granted pursuant to this Agreement, or (iii) a claim that is subject to Customer's indemnification obligations pursuant to Section 7.2. SVTC's obligation under this paragraph shall expire as to any claim that Customer has not provided written notification of to SVTC within one year after receipt by Customer or becomes known by Customer.

6.2 Customer Indemnification Obligations. Customer shall defend, indemnify, and hold SVTC or any Affiliate of SVTC harmless from and against any Losses (as defined in the preceding paragraph) resulting from any third party claim (i) that any Customer Personnel is an employee of SVTC (such Losses including any employee benefit that any such person claims to be entitled to from SVTC as an employee of SVTC), (ii) based upon any act or omission of any Customer Personnel (such Losses including but not limited to any fire or other catastrophic loss to the Line or any significant portion of the Line that is attributable to any such act or omission), (iii) based upon any breach by Customer or any Customer Personnel of any obligation imposed by this Agreement, (iv) relating to Customer equipment in the event that customer equipment fails to perform as designed, (v) relating to Customer's implementation or use of Customer's Technology at the SVTC premises, including claims related to bodily injury, damage or loss of tangible property, and (vi) that Customer equipment, Customer processes or Customer Technology infringes or misappropriates the Intellectual Property Rights of any third party. Customer shall not be obligated to defend, indemnify, or hold SVTC harmless to the extent that any such claim is based upon a modification to the Customer equipment or Customer's Technology made by SVTC, if such modification was not made at the instruction or on behalf of Customer. Customer's obligation under this paragraph shall expire as to any claim that SVTC has not provided written notification of to Customer within one year after receipt by SVTC or becomes known by SVTC.

6.3 Procedure. Each party seeking indemnification under this Section 6 (i) agrees to provide the indemnifying party prompt written notice of an indemnifiable claim, (ii) agrees to provide control of the defense or settlement of such claim to the indemnifying Party, provided that the indemnifying party shall not settle or compromise a claim in a manner that does not unconditionally release the indemnified party from liability and that does not adversely affect the Intellectual Property Rights owned by the indemnified party unless the indemnifying party obtains the indemnified party's prior written consent; and (iii) agrees to provide assistance in the defense or settlement of a claim at the indemnifying Party's request and reasonable expense.

6.4 Insurance. During the term of this Agreement, each party will, for its respective liability, secure and maintain a comprehensive general liability insurance policy providing sufficient coverage for personal injury (including as a result of product liability) and property damage, at the level as is usual and customary in the industry to procure, provided, that in the event that Customer Personnel is actually working on the Line and using SVTC equipment, then such insurance shall be in accordance with Exhibit C.

7. REPRESENTATIONS AND WARRANTIES

7.1 SVTC Limited Warranties. SVTC represents and warrants that (i) SVTC has the full right and authority to enter into this Agreement and grant the rights and licenses granted herein; (ii) SVTC has not previously granted and will not grant any rights that prevent SVTC from fulfilling its obligations under this Agreement; and (iii) SVTC will comply with all applicable laws and regulations in connection with its performance under this Agreement. SVTC warrants that it will use commercially reasonable efforts to provide the services contracted for in this Agreement. Due to the research and development nature of the services to be provided, and in particular, any services that are novel or unprecedented, no warranty is offered or made that all services performed by SVTC

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will be successful or that the goals of the Customer will be achieved.

7.2 Customer Limited Warranties. Customer represents and warrants that (i) Customer has the full right and authority to enter into this Agreement and grant the rights and licenses granted herein; (ii) Customer has not previously granted and will not grant any rights that prevent Customer from fulfilling its obligations under this Agreement; and (iii) Customer will comply with all applicable laws and regulations in connection with its performance under this Agreement. Customer warrants that it has fully disclosed information to SVTC in advance regarding any hazardous or toxic materials. Customer further warrants that none of the wafers or other materials processed by SVTC will be used in or on human subjects, experimental or otherwise, without SVTC's prior written consent.

7.3 Disclaimer of Warranties. EXCEPT AS EXPRESSLY STATED IN THIS AGREEMENT OR IN A SCHEDULE ATTACHED HERETO, SVTC AND CUSTOMER EACH EXPRESSLY DISCLAIM ANY AND ALL REPRESENTATIONS, WARRANTIES OR CONDITIONS, RELATING TO ANY TECHNOLOGY OR SERVICES PROVIDED UNDER THIS AGREEMENT, WHETHER EXPRESS, IMPLIED, OR STATUTORY, INCLUDING ANY WARRANTIES OF TITLE, NON-INFRINGEMENT, MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE.

8. LIMITATION ON LIABILITY

8.1 Damages Waiver. EXCEPT FOR THE BREACH OF A CONFIDENTIALITY OBLIGATION, AND EXCEPT FOR AN INDEMNIFICATION OBLIGATION UNDER THIS AGREEMENT, AND EXCEPT FOR MISCONDUCT OR NEGLIGENT ACTS OF CUSTOMER PERSONNEL THAT INTERFERE WITH THE NORMAL OPERATIONS OF THE FAB, IN NO EVENT SHALL EITHER PARTY BE LIABLE TO THE OTHER, OR TO ANY THIRD PARTY CLAIMING THROUGH OR UNDER SUCH PARTY, FOR ANY LOST PROFITS, LOSS OF DATA, EQUIPMENT DOWNTIME OR FOR ANY INDIRECT, SPECIAL OR CONSEQUENTIAL DAMAGES, EVEN IF SUCH PARTY HAS BEEN ADVISED OF THE POSSIBILITY THEREOF.

8.2 Liability Cap. EXCEPT FOR CLAIMS BASED ON BREACHES OF A CONFIDENTIALITY OBLIGATION, AND EXCEPT FOR AN INDEMNIFICATION OBLIGATION UNDER THIS AGREEMENT, , AND EXCEPT FOR MISCONDUCT OR NEGLIGENT ACTS OF CUSTOMER PERSONNEL THAT INTERFERE WITH THE NORMAL OPERATIONS OF THE FAB, IN THE EVENT THAT ANY LIABILITY IS IMPOSED ON EITHER PARTY HEREUNDER, THE AGGREGATE AMOUNTS PAYABLE BY EITHER PARTY TO THE OTHER BY REASON THEREOF SHALL NOT EXCEED THE AMOUNT PAID OR PAYABLE BY CUSTOMER TO SVTC DURING THE TWELVE (12) MONTHS PRECEDING THE CLAIM TO WHICH SUCH LIABILITY RELATES.

8.3 Acknowledgement. Each party acknowledges that the foregoing limitations are an essential element of the Agreement between the parties and that in the absence of such limitations the pricing and other terms set forth in this Agreement would be substantially different. Customer acknowledges that the risk of its acts may interfere with the normal operations of the Line and that it has been advised to exercise special caution in its activities in the fab.

9. CONFIDENTIALITY

9.1 Obligations. All Confidential Information exchanged between the parties pursuant to this Agreement shall not be disclosed by the recipient to anyone except its own employees, consultants or subcontractors or those of its Affiliates, who have a need to know such Confidential Information consistent with the purposes of this Agreement and who have been advised of the confidential nature and who have been contractually obligated to observe the terms and conditions hereof; nor shall Confidential Information be used by the receiving party for any purpose other than exercising its rights or fulfilling its obligations under this Agreement. Parties shall not disclose confidential information of third parties without the owner's prior consent. Parties shall at all times and notwithstanding any termination or expiration of this Agreement hold received Confidential Information in strict

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confidence with at least the degree of care it uses for its own confidential information and with not less than a legally reasonable degree of care. Recipient's obligations to maintain confidentiality shall survive termination of the Agreement and shall be binding upon the Recipient's heirs, successors and assigns. Upon request of the disclosing party, copies and embodiments of the disclosing party's Confidential Information shall be promptly returned to the disclosing party by the receiving party, unless such copies are required to fulfill the terms of this Agreement. Upon termination of this Agreement for any reason, each party shall promptly return to the other party all Confidential Information provided by the other party, including all copies, except that a receiving party may keep one copy solely for archival purposes. If either party becomes an unauthorized disclosure, even if not confirmed, it shall promptly notify the original disclosing party and promptly take reasonable actions to mitigate the effects of the unauthorized disclosure.

9.2 Independent Development. The disclosing party acknowledges that the receiving party may currently or in the future be developing information internally, or receiving information from other parties, that is similar to provided Confidential Information. Nothing in this Agreement will prohibit the receiving party from developing or having developed for it products, concepts, systems or techniques that are similar to or compete with the products, concepts, systems or techniques contemplated by or embodied in the Confidential Information, provided that no Confidential Information is referenced, accessed or used and the receiving party does not violate its obligations under this Agreement. Parties shall have no obligation to limit or restrict the assignment of its employees or consultants as a result of their having had access to Confidential Information.

9.3 Terms of Agreement; Publicity. Parties shall not to disclose to any third party the financial terms of this Agreement without the prior written consent of the other party, except to its advisors, independent accountants, investors and others on a need-to-know basis under circumstances that reasonably ensure confidentiality, or to the extent required by law. Any press release relating to this Agreement that is issued by one party and which mentions the other party shall be jointly released and mutually agreed upon by the parties or, if released by one party, approved by the other party. Notwithstanding the foregoing, SVTC may disclose that Customer is a customer of SVTC and Customer may disclose that it is a customer of SVTC. Notwithstanding the foregoing, either party may disclose the terms of this Agreement to existing or potential acquirers or merger candidates; investment bankers, existing or potential investors, venture capital firms or other financial institutions or investors solely for purposes of obtaining financing, each of whom prior to disclosure must be bound by obligations of confidentiality and non-use no less stringent than those set forth in this Agreement.

10. NON-SOLICITATION

10.1 Non-solicitation. During the term of this Agreement and for one (1) year after expiration or termination of this Agreement, neither party shall, directly or indirectly, without the prior written consent of the other party solicit, encourage, or take any other action which is intended to induce or encourage, any employee of the other party to terminate his or her employment with the other party. Customer shall not directly or indirectly, without prior written consent of the other SVTC customer solicit, encourage, or take any other action that is intended to induce or encourage, any employee of another customer working on the SVTC premises to terminate his or her employment with the other customer.

11. TERM AND TERMINATION

11.1 Initial Term. Unless terminated earlier pursuant to the terms and conditions of this Agreement, this Agreement shall commence on the Effective Date and shall remain in force for two (2) year(s) from the Start Date. The Agreement will automatically renew thereafter for additional one (1) year terms, unless either party notifies the other party in writing at least thirty (30) days prior to the expiration of the then-current term of its intent not to renew the Agreement for any further additional term.

11.2 Early Termination

(a) Customer may terminate this Agreement or any Schedule after the Start Date upon giving SVTC at least

thirty (30) days written notice. At the same time as giving notice of termination for convenience, SVTC shall invoice and Customer shall make a non-refundable payment to SVTC for all Services provided under this proposal up to and including the date of final termination net 30.

(b) Either party may terminate this Agreement upon written notice as set forth in Section 12.4 below in the event of a Force Majeure event.

11.3 Termination for Breach. Either party to this Agreement may terminate this Agreement in the event the other Party materially breaches this Agreement and does not cure such breach within thirty (30) days after written notice thereof by the non-breaching party.

11.4 Customer Equipment and Personnel. If applicable, then no later than the date of termination or expiration of this Agreement, Customer shall remove all of its equipment and shall cause all Customer Personnel to have removed all of their personal property from the SVTC premises. After that date, no such persons shall have any right to access the SVTC premises, except such reasonable access as SVTC and Customer shall agree in advance in writing in furtherance of the purposes hereof. Unless otherwise agreed, access badges and passwords will be disabled on the date of termination or expiration of this Agreement.

11.5 Survival; Effect of Termination. Sections 1, 4, 5.2 (unless Customer materially breachs an obligation under this Agreement), 6, 7, 8, 9, 10 (for one year following expiration or termination of the Agreement), 11.5 and 12 shall survive any termination or expiration of this Agreement. Except for purposes of exercising continuing license rights hereunder, upon termination or expiration of this Agreement, each party shall return or destroy any Confidential Information of the other party then in its possession.

12. MISCELLANEOUS

12.1 Governing Law. The rights and obligations of the parties under this Agreement shall not be governed by the provisions of the 1980 United Nations Convention on Contracts for the International Sale of Goods or the United Nations Convention on the Limitation Period in the International Sale of Goods, as amended. This Agreement and any dispute arising from the performance or breach hereof shall be governed by and construed and enforced in accordance with the laws of the State of Delaware, without reference to conflicts of laws provisions.

12.2 Assignment. This Agreement shall not be assigned by either party, whether voluntarily or involuntarily or by operation of law, in whole or in part, to any other entity without the prior written consent of the other party, which consent shall not unreasonably be withheld, conditioned or delayed. Notwithstanding the foregoing, either party may assign this Agreement to an Affiliate, without the other's prior consent, subject to providing written notice of such assignment. Further, upon written notice to the other party, either party may assign this Agreement to a successor in interest, upon a merger, acquisition, reorganization, change of control, or sale of all or virtually all of the assets of the assigning party, and any such assignment shall not require the consent of the non-assigning party. Any assignment in violation of this Section 13.3 shall be null and void from the beginning, and shall be deemed a material breach of this Agreement.

12.4 Force Majeure. Neither party shall be liable to the other in any way whatsoever for any failure or delay in performance of any of the obligations under this Agreement (other than obligations to make payment), arising out of any event or circumstance beyond the reasonable control of such party (including, war, rebellion, civil commotion, strikes, lock-outs or industrial disputes; fire, explosion, earthquake, acts of God, flood, drought or bad weather; the unavailability of deliveries, supplies, software, disks or other media or the requisitioning or other act or order by any government department, council or other constituted body). If either party's performance is prevented by a force majeure event for a period of more than forty-five (45) days, the other party may terminate this Agreement without further obligation or liability, subject to any payment amounts due and payable immediately prior to the commencement of such force majeure event.

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12.5 Compliance with Law. In performing its duties under this Agreement, each party shall at all times comply with all applicable international, federal, state and local laws and shall not engage in any illegal or unethical practices. Without limiting any of the foregoing, each party agrees to comply with all applicable US and foreign export control laws and regulations.

12.6 Waiver. Failure or neglect by either party to enforce at any time any of the provisions hereof shall not be construed nor shall be deemed to be a waiver of such party's rights hereunder nor affect the validity of the whole or any part of this Agreement nor prejudice such party's rights to take subsequent action.

12.7 Independent Contractors. It is agreed and understood that neither party is the agent, representative or partner of the other and neither has the authority or power to bind or contract in the name of or to create any liability against the other party in any way or for any purpose. It is understood that each party is an independent contractor. Each party expressly reserves the right to enter other similar agreements with other parties on the same or on different terms.

12.8 Notices. All notices, requests and other communications hereunder shall be in writing and shall be (a) personally delivered or (b) sent by facsimile and registered or certified mail, return receipt requested, postage prepaid, in each case to the respective address specified below, or such other address as may be specified in writing to the other party hereto:

To SVTC:

SVTC, LLC
3901 North First Street
San Jose, CA 95134
Attn: […***…]
cc: Legal Department

To Customer:

BioNanomatrix, Inc.
3701 Market St, 4th Floor
Philadelphia, PA 19104
Attn: Michael Boyce-Jacino, President and CEO

Notices shall be deemed received on the earlier of the following: (i) notices delivered by hand or sent by fax shall be deemed received the first business day following such delivery or sending; and (ii) notices which have been posted or sent via courier shall be deemed received on the date of the courier's delivery receipt.

12.9 Modification. No amendment or modification of any provision of this Agreement shall be effective unless in writing signed by both parties hereto. No provision of this Agreement shall be varied, contradicted or explained by any oral agreement, course of dealing or performance or any other matter not set forth in an agreement in writing and signed by both parties.

12.10 Severability. In the event that any clause, sub-clause or other provision contained in this Agreement shall be determined by any competent authority to be invalid, unlawful or unenforceable to any extent, such clause, sub-clause or other provision shall to that extent be severed from the remaining clauses and provisions, or the remaining part of the clause in question, which shall continue to be valid and enforceable to the fullest extent permitted by law.

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12.11 Headings; Construction. The headings to the clauses, sub-clause and parts of this Agreement are inserted for convenience of reference only and are not intended to be part of or to affect the meaning or interpretation of this Agreement. The terms "this Agreement," "hereof," "hereunder" and any similar expressions refer to this Agreement and not to any particular Section or other portion hereof. The Parties hereto agree that any rule of construction to the effect that ambiguities are to be resolved against the drafting Party will not be applied in the construction or interpretation of this Agreement. As used in this Agreement, the words "include" and "including," and variations thereof, will be deemed to be followed by the words "without limitation."

12.12 Counterparts. This Agreement may be executed in multiple counterparts, each of which shall be deemed an original and all of which together shall constitute one instrument.

12.13 Entire Agreement. This Agreement, together with the Schedules and any exhibits attached to the Schedules, listed below, all of which are hereby incorporated into this Agreement by reference, supersedes any arrangements, understandings, promises or agreements made or existing between the parties hereto prior to or simultaneously with this Agreement and constitutes the entire understanding between the parties hereto. It is acknowledged that the terms of this Agreement have been negotiated between the parties.

LIST OF ATTACHMENTS. Following is a list of attachments to this Agreement, including all Schedules and Exhibits. Each future added attachment must include a dated Amendment cover page or provision referencing this Agreement and must be executed by all parties.

Customer Managed Project Services Schedule

Exhibit A - Proposal

Exhibit B - Equipment List

Exhibit C — Insurance Requirements

Exhibit D — […***…] — deliverables, timeline, details and specifications quoted are goals only and not binding on SVTC. Actual project work will be as specified in Exhibit A.

IN WITNESS WHEREOF, the parties hereto have caused this Agreement to be duly executed and delivered in duplicate originals as of the date first above written.

	SVTC Technologies, Inc.		**BioNanomatrix, Inc.**
Signature:	/s/ Jon Myers	**Signature:**	/s/ Michael Boyce-Jacino
Printed Name:	Jon Myers	**Printed Name:**	Michael Boyce-Jacino
Title:	Vice President, Global Sales	**Title:**	President & CEO
Date:	February 19, 2009	**Date:**	March 23, 2009

CUSTOMER MANAGED PROJECT SERVICES SCHEDULE

This **Customer Managed Project Services Schedule** (the "**Schedule**") is entered into effective as of March , 2009 ("Effective Date") between **SVTC TECHNOLOGIES, LLC**, and BioNanomatrix, Inc., ("Customer") as an attachment to the Master Services Agreement ("Agreement"), between the parties, dated March 2, 2009. Capitalized terms used but not defined herein have the meanings ascribed to them in the Agreement. All terms and conditions in this Schedule are in addition to the terms and conditions set forth in the Agreement. In the event of any conflict between the provisions of this Schedule and the Agreement, the Agreement shall govern unless explicitly superseded in this Schedule.

Customer desires access to the fab and other premises of SVTC in connection with the provision of services. Customer Personnel may operate SVTC equipment and have other capabilities as provided in this Schedule.

1. DEFINITIONS

1.1 "***Activity***" or "***Move***" shall mean one wafer going through one semiconductor wafer production process step as delineated by SVTC in its normal operating practice. A semiconductor wafer production process step constitutes the actions performed and processes, procedures or associated equipment used in a single physical transformation of a wafer or one or more layers thereon, including: (i) […***…] (ii) […***…] (iii) […***…] (iv) […***…] (v) […***…]; and (vi) […***…].

1.2 "***Activity Allocation***" shall mean the allocation of Activities set forth in Exhibit A attached hereto.

1.3 "***Customer Equipment***" shall mean any equipment on the Line owned or installed by Customer and shall include any upgrades thereto.

1.4 "***Engineering Services***" means services performed by SVTC's personnel, agents or subcontractors.

1.5 "***Minimum Batch Size***" shall mean the minimum total number of wafers in a Process Batch.

1.6 "***Moves per Inventory***" or "***M/I***" is defined as the activities generated in a given day divided by the average Work In Progress ("WIP") that is not on hold for engineering development or on problem lot for engineering evaluation.

1.7 "***Non-Hold WIP***" shall mean semiconductor wafers that can be processed and are not subject to any move restrictions by Customer. The current standard procedure for calculating Non-Hold WIP is as follows:

$$\text{Daily Required Non-Hold WIP} = \frac{[\ldots***\ldots]}{[\ldots***\ldots]}$$

1.8 "***Product***" means a wafer manufactured by SVTC for Customer hereunder prior to qualification by Customer per Customer's qualification specifications, excluding all Prototypes.

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1.9 "***Prototype***" means prototypes of Products provided to Customer by SVTC.

1.10 "***Problem Lot***" means a Process Batch that is not moveable due to unforeseen issues that must be resolved by engineering.

1.11 "***Process Lot***" or "***Process Batch***" shall mean a group of wafers that are processed together as a group.

1.12 "***Production Product***" means products or wafers ordered by Customer after qualification and issuance of a prototype approval by Customer.

1.13 "***Standard Operating Procedure***" or "***SOP***" shall mean SVTC's then current standard administrative operating procedure, including the standard operating manual, specifications, and other applicable documentation,. . SVTC may update the SOP from time to time in its sole discretion.

1.14 "***Start-Up Costs***" shall have the meaning set forth in Exhibit A and which may include a separate "***Library Access Fees***" for the applicable process libraries.

1.15 "***Wafer Starts***" shall mean the number of new wafers that will be allowed.

2. PROCESS OPERATIONS

2.1 Activity Allocation to Customer.

2.1.1 SVTC will allocate Wafer Starts on a weekly basis and review and assign Activities on a daily basis, and shall provide the detail of its Activity Allocation in accordance with the process described in Exhibit A attached hereto.

2.1.2 Subject to the terms and conditions set forth herein, the allocation of Activities to Customer will be made by SVTC in its sole discretion and in accordance with SVTC's SOP for the allocation of Activities among SVTC's Customers, provided, that allocation of Activities to Customer for a specific period of time shall not be less than the amount provided for such period in Exhibit A unless agreed to by Customer.

2.1.3 Customer will have the responsibility for maintaining Customer's Non-Hold WIP at levels defined by SVTC to ensure that it receives its Activity Allocation. SVTC will not be held accountable for Activity Allocations missed by Customer if Customer does not maintain the Non-Hold WIP level required by SVTC. The current standard procedure for calculating Non-Hold WIP is as set forth in this Schedule A, Section 1.7, above.

2.1.4 The minimum Process Batch size is […***…] wafers for wafers in the Pre-Prototype, Prototype and Production product Phases. Any process batch that is smaller than […***…] wafers will be charged as if […***…] wafers are in the Process Batch, thus the minimum Activity charge is […***…] for any step. The Maximum Process Batch size is […***…].

2.2 Carry-forward. If for any reason whatsoever Customer does not use Activities or engineering hours allocate to the Customer for the project (as defined in Exhibit A), Customer shall have the right to carry forward either the total unused Activities and total unused engineering hours, or up to […***…] Activity and engineering hour Allocation (as defined in Exhibit A), whichever is less, for a period of up to […***…] beyond the termination date of the Agreement. If the Carry Forward is not used within the […***…], any residual of the Carry Forward Allocation will terminate.

2.3 Additional Allocations. Customer may request to increase its Activity Allocation upon thirty (30) days' prior written notice. Customer may request an increase in its Activity Allocation only up to an additional […***…] per fiscal quarter. Any increased Activity Allocation is subject to an increased payment as defined in attached Exhibits. Additional Allocations shall be provided at SVTC's sole discretion.

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3. PROCESS MANAGEMENT

3.1 SVTC shall exercise day-to-day managerial authority over the semiconductor wafer fabrication facilities, referred to as the "**Line**," including over the allocation of Activities and all aspects of the operation, development and planning of the Line, consistent with the provisions of this Agreement.

3.2 Customer shall appoint employees with decision-making authority to an operating committee ("Operating Committee") to work with SVTC. The Operating Committee shall meet in person or telephonically once every […***…] at a regularly scheduled time to review operational results and approve future operational matters, including changes to the Line operating procedures applicable to Customer; provided however, that SVTC shall retain ultimate control over any changes to the Line and its operating procedures. The Operating Committee shall attempt to resolve by good faith negotiations any operating disputes that arise with respect to the Line, or any other disputes arising under this Agreement, except as specifically set forth herein.

3.3 SVTC will hold a daily Line operations meeting in which the daily Activities on the Line are reviewed, discussed and planned; a Customer representative is expected to attend all operations meetings.

3.4 Customer shall submit for prior written approval to the Operating Committee or its designee, a list of all proposed operations, including all equipment intended to be used. Failure to adhere to the approved list may be considered grounds for termination as provided in Section 12.3 of the Master Services Agreement.

3.5 SVTC shall have no liability nor be responsible for any costs or damages arising out of or related to the work of Customer Personnel including but not limited to results other than those desired by Customer in the wafers processed on the Line solely by Customer Personnel.

4. EQUIPMENT

4.1 The Line. The Line is equipped to run various process technologies utilizing the equipment listed in Exhibit B. SVTC may update this list from time to time in its sole discretion.

4.2 Equipment Ownership on the Line. Except as may otherwise agreed in writing between the parties, SVTC will own the Line including all its equipment and Intellectual Property Rights. Customer acknowledges that the Line including all of the equipment, is used by multiple customers and that Customer is obligated under this Schedule and the Agreement to avoid misusing any equipment, causing any damages, or causing Line operations to be interrupted.

4.2.1 If Customer damages any equipment other than it own, Customer agrees to indemnify SVTC without limitation for the costs of repair, replacement, or extraordinary servicing.

4.2.2 If Customer damages any equipment other than it own, or otherwise causes any disruption to the Line, and if the forgoing results in lost revenue to SVTC, or if claims are made against SVTC by other customers for delays attributable to Customer, then Customer agrees to indemnify SVTC without limitation for all such claims and lost revenue.

4.2.3 Sections 4.2.1 and 4.2.2 shall not apply if Customer has strictly adhered to the operations approved by the Operating Committee, all Customer use of equipment was within normal or approved parameters, and all Customer Personnel involved had satisfactorily completed all required training.

4.2.4 No Customer Personnel except those who have satisfactorily completed the required training to the satisfaction of SVTC, whether or not paid for, shall be allowed into the fab or to operate SVTC equipment; SVTC reserves the right at its sole discretion, to determine if Customer Personnel have achieved sufficient knowledge and understanding of the training materials to be considered having satisfactorily completed the training. If SVTC

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reasonably determines that someone needs more or retraining, it may require such training to allow continued access and use privileges.

4.3 Customer Equipment.

4.3.1 Upon Customer's request, SVTC will, in its sole discretion, permit Customer to install Customer Equipment on SVTC premises. SVTC, in its sole discretion, may allow Customer to make modifications to the applicable SVTC premises reasonably necessary for the installation and operation of the Customer Equipment. Customer shall bear the responsibility and cost of such installation, project management and clean room rental. Customer shall pay the applicable taxing authority any tax invoice with respect to Customer Equipment. Customer shall also pay all costs to upgrade such Customer Equipment. Any such upgrade will be performed in accordance with Customer's specifications, but all such specifications are subject to the pre-approval of SVTC in its sole discretion. Customer has the right to remove any Customer Equipment at any time, provided that the removal minimizes disturbance to the Line and is done with reasonable advance written notice to SVTC and solely at Customer's expense. Without limiting the foregoing, Customer shall bear all costs of installation, deinstallation and removal of Customer Equipment and any damages resulting therefrom.

4.3.2 Customer shall bear all costs associated with ownership of any Customer Equipment or upgrade, including all sales or use taxes or property taxes imposed on or otherwise determined on the basis of any such Customer Equipment or upgrade, and all insurance costs associated with any Customer Equipment.

4.3.3 SVTC shall have no responsibility to Customer for loss or damage to any Customer Equipment unless such damage or loss is caused by SVTC. Customer shall be responsible for securing insurance for Customer Equipment on SVTC premises. Customer shall be responsible for installation, all maintenance and repairs for Customer Equipment unless stated otherwise. Customer shall be responsible for maintaining Customer Equipment at a satisfactory working level defined by the equipment manufacturers listed uptime and operational quality specifications.

4.3.4 Customer shall allow SVTC access to Customer Equipment for safety and maintenance purposes as well as for other mutually agreed purposes. No SVTC Personnel except those who have satisfactorily completed the required training to the satisfaction of Customer, whether or not paid for, shall be allowed to operate Customer equipment; Customer reserves the right at its sole discretion, to determine if SVTC Personnel have achieved sufficient knowledge and understanding of the training materials to be considered having satisfactorily completed the training.

4.4 Use of Equipment. All equipment listed in Exhibit B may be used in manufacturing the products of either Party without cost to Customer other than such amount payable under Section 4. Customer Equipment shall only be used to manufacture Customer products or otherwise for the benefit of Customer and for no other purpose except during instances in which SVTC is the user of such customer owned equipment.

4.5 Access of Equipment. Customer shall not have access to equipment that is not included in Exhibit B under this Agreement unless the new equipment replaces a piece of equipment listed in Exhibit B or is otherwise added to Exhibit B by SVTC. Customer and SVTC may agree upon conditional access to SVTC-owned, non-replacement equipment as needed for newly added equipment.

4.6 Maintenance Down Time. Although the Line generally operates 24/7/365, occasionally the Line must be shut down in whole or in part for maintenance. Customer will be given notice of planned shut-downs in advance. If there is an unplanned shut-down, as may happen if there is an event beyond SVTC's control, SVTC will use commercially reasonable efforts to get the Line back up as soon as possible; Customer agrees that SVTC shall not

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be liable for any damages resulting from the aforementioned shut-downs.

5. EXPENSES

5.1 Training. Included in the Start-Up Costs shall be the number of hours as defined in any Exhibits attached hereto for up to […***…] from the Start Date of SVTC Engineering Services to be used for equipment training, wafer management training and integration support. The number of Customer Personnel who will be trained and/or the number of hours allocated to training Customer Personnel is limited to that stated in the attachments, however, if Customer desires later to train a greater number than agreed, SVTC shall provide such training at an additional charge.

5.2 Non-Recurring Engineering Expenses. After the initial set-up included in the Start-Up Costs, Customer will have the option to purchase from SVTC Engineering Services at a rate as defined in an attached Exhibits or in other documents attached to the Agreement such an Engineering Services Schedule. SVTC may increase the hourly rate from time to time in its sole discretion upon advance written notice. Customer understands that Engineering Services may not always be available due to staffing availability. The terms and conditions for such Engineering Services shall be set forth on a separate Schedule.

5.3 Reticle and Analytical Laboratory Services Expenses. Customer will have the option to purchase photomasks or to have analytical laboratory services through SVTC's approved vendors subject to specifically applicable terms and conditions.

5.4 Payment Terms. Customer will be invoiced monthly based upon Activities allocated as described in Section 2.1. The invoice will be for at least the minimum number of Moves equal to the monthly Activity Allocation. If the actual Moves for the preceding month are more than the Activity Allocation, the total Moves will be invoiced. Each SVTC invoice hereunder shall be accompanied by a detailed report containing Activity Allocation, actual Moves, quantity of Moves invoiced and other payment due and payable. Payment obligations under this Schedule shall survive any termination or expiration of this Schedule.

6. PREMISES SERVICES, SECURITY AND SUPPORT

6.1 Limited Support for Customer Personnel. Customer acknowledges that SVTC will not be providing support or facilities for Customer Personnel except as expressly set forth in the Agreement or it attachments, and in particular shall not make available clerical, administrative or technical support personnel other than for the limited purposes explicitly referred to herein. If requested by Customer for a designated number of Customer Personnel, and as agreed by SVTC, then in addition to cubicle or office space that may be made temporarily available to Customer Personnel, SVTC may make available office telephones and internet connectivity and may provide access to conference rooms (subject to allowing access to such rooms on an equal priority basis to other customers and SVTC needs), break rooms, printers, faxes, copiers, and equipment for engineering-only time for recipe development or optimization (subject to allowing access to such equipment to other SVTC customers as determined by SVTC in its reasonable judgment). SVTC will ensure that all Customer Personnel are provided prompt and unqualified access at all times to data and information residing on SVTC equipment and computers that is specific to Customer.

6.2 Status of Personnel. Customer acknowledges that Customer is responsible for the activities of all Customer Personnel on the SVTC premises and to assure compliance with all SVTC rules and guidelines. Customer has an affirmative duty to inform all Customer Personnel, including but not limited to agents, contractors or employees of affiliates of Customer, of their obligations under this Agreement. Customer Personnel who are other than immediate employees of Customer, including but not limited to agents, contractors or employees of

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affiliates of Customer, shall not enter or work within SVTC fab facilities without SVTC's prior written consent expressly naming each such individual.

6.3 Security.

6.3.1 Customer acknowledges that the security of SVTC's facilities generally and of SVTC's computer systems and networks in particular is of paramount importance to SVTC and to all of SVTC's customers, including Customer. Customer Personnel are not authorized to enter any zone of SVTC's facilities other than the SVTC premises specified in the applicable Schedule or the parking lot associated with such SVTC premises unaccompanied by an authorized employee of SVTC. For security purposes, SVTC will require each one of the Customer Personnel to wear a security badge at all times that each is on SVTC property and to conform with all site policies and procedures, as updated from time to time by SVTC in its sole discretion.

6.3.2 Customer Personnel shall not access any SVTC computer or networking equipment except as agreed upon by SVTC on a case-by-case basis. If provided access, each one of the Customer Personnel shall be assigned his or her own individual password by SVTC in order to obtain any such access, and such individual may not share that password with any other Customer Personnel or others.

6.3.3 SVTC shall keep and maintain logs of access to its network and systems by Customer Personnel, and in the event SVTC discovers that any Customer Personnel has gained unauthorized access to any portion of SVTC's systems or network or has removed, used or disclosed any Confidential Information of SVTC or of any other SVTC customer, or if any Customer Personnel have otherwise failed to comply with SVTC's site policies and procedures, such persons may immediately have their access badge and passwords canceled and may be physically barred from SVTC premises; such persons' actions may be deemed a material breach of this Agreement by Customer.

6.4 Safety. When using the SVTC premises, Customer shall at all times comply with all of SVTC's environmental, health, security and safety site policies, procedures, and programs, and to ensure that all Customer Personnel also comply. SVTC will provide Customer copies of any such policies, as updated from time to time by SVTC in its sole discretion. It is Customer's responsibility to understand all site policies, procedures and programs relating to site security, environmental protection, safety and health and to ensure that the Customer Personnel also understand and comply with such policies, procedures, and programs. This includes chemical handling, lock-out-tag-out, EHS and OHS safety rules, and use of safety gear. Customer also understands that all chemicals brought onto the SVTC premises or any SVTC location must be approved on a case-by-case basis by SVTC in advance in order to maintain compliance with local, state and federal codes. The foregoing does not limit Customer's responsibility for compliance with all applicable law.

6.5 Insurance. Customer represents that it has procured, and at all times during the Term shall maintain, levels of insurance as necessary or as may be specified by SVTC to cover the activities and obligations of Customer and Customer Personnel while working on the SVTC premises. Customer shall provide evidence of insurance to SVTC on the Effective Date of this Agreement, and at other times upon request by SVTC. Depending upon the nature of Customer's activities on the premises, SVTC may require specific insurance levels and certificates in an attachment to this Agreement.

6.6 Third-Party Materials and Information. Except as otherwise set forth herein, Customer shall not permit Customer Personnel, to knowingly use, remove or tamper with any equipment, materials or documents of other customers that may be on the SVTC premises.

7. ENGINEERING SERVICES

462694-1-6-7
SCHED462694*1*0648871884108183877682496013579978894083590683 27*6*7

7.1 Work. Customer may request advanced engineering services including but not limited process development. Depending upon the nature and complexity of the requested engineering services, additional documentation may be required such as an SOW, that would include the number and qualifications of the desired engineers, the period of time needed, and what type of work is desired. SVTC will provide a written quote or proposal for such services and if mutually agreed, a written confirmation will be provided. SVTC will use commercially reasonable efforts to render the mutually agreed services by the projected completion dates. The manner and means by which SVTC chooses to complete such services are in SVTC's sole discretion and control. Unless otherwise agreed in writing, all SVTC engineering services pursuant to this section of the Schedule will be during its normal local weekday business hours (not fab hours); services required outside normal hours (including after hours weekdays and/or on weekends) shall be subject to SVTC staff availability and shall be charged at additional cost to Customer.

462694-1-7-7
SCHED462694*1*0648871684108183877682496013579978894083590683 27*7*7

Exhibit A
Commercial Terms
For BioNanomatrix, Inc.'s Nanochannel Array Development

START DATE: 04-07-2009 **DURATION:** Six (6) Months

SVTC proposes the date above on which SVTC will begin providing the following services under the Master Services Agreement ("***Start Date***"). Project Duration commences upon the ("***Start Date***").

1.0 DESCRIPTION OF SERVICES:

SVTC shall provide access to SVTC's Line for the defined Project Duration commencing upon the Start Date in order to process silicon wafers in support of BioNanomatrix, Inc.'s Nanochannel Array Development. SVTC will use manufacturing processes that exist or are being developed by BioNanomatrix, Inc., and BioNanomatrix, Inc. will be allocated a specific number of Activities, as well as other support and services, as described herein ("Services"). SVTC shall use commercially reasonable efforts to perform the Services requested by BioNanomatrix, Inc., subject to the ability of SVTC to perform these Services on SVTC's existing equipment and equipment contributed by BioNanomatrix, Inc. using standard materials and process recipes that are compatible with the equipment and resources of SVTC.

2.0 SUMMARY OF SERVICES TO BE PROVIDED:

- […***…]
- […***…]
- […***…]
- […***…]
- […***…]

3.0 SVTC SERVICE FEES:

Development	Fees	Frequency
Fab Access	[…***…]	[…***…]
• Included Activities[…***…]		
• On-Site Workspace for 1 cube for 1 engineer […***…]		
Activity Fee for activities in excess of the included 600 activities	[…***…]	[…***…]
Engineering Services - Fixed Fee Process Engineering Support	[…***…]	[…***…]
• Up to […***…]		
• Duration for 1 quarter		
Engineering Services for hours exceeding contracted hours per quarter	[…***…]	[…***…]
Process Library Access	[…***…]	[…***…]
Mask Design Services (including reticles) - Estimate	[…***…]	[…***…]
Analytical Services - Estimate	[…***…]	[…***…]

Prototype Production	Fees	Frequency
Prototype production - 2 months estimated duration	[…***…]	[…***…]
- […***…] **Activities**		
- Excess Activities at […***…]		
- Minimum lot: […***…]		
Prototype production Engineering Support - 2 months	[…***…]	[…***…]
-[…*…]**		
- Excess Hours at […***…]		

Volume Production	Fees	Frequency
Volume Production		
- 101-200 wpm:	[…***…]	Per Wafer
- 201-300 wpm:	[…***…]	Per Wafer
- 301-400 wpm:	[…***…]	Per Wafer
- > 400 wpm:	[…***…]	Per Wafer

[…*…]**
[…*…]**
[…*…]**

4.0 TERMS:

1) *Not withstanding herein or within related agreements and documents, SVTC agrees that if for any reason whatsoever Customer does not use Activities or engineering hours allocate to the Customer for the project (as defined in Exhibit A), Customer shall have the right to carry forward either the total unused Activities and total unused engineering hours, or up to* […***…] *Activity and engineering hour Allocation (as defined in Exhibit A), whichever is less, for a period of up to* […***…] *beyond the termination date of the Agreement. If the Carry Forward is not used within the* […***…], *any residual of the Carry Forward Allocation will terminate.*

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EXHIBIT B

Equipment List — BioNanomatrix Vision Corporation

Table B1 — Equipment with Activity Multipliers and with Access Only Through SVTC Operation and/or Engineering — No Direct Hands-on Usage

[…*…]**

***Confidential Treatment Requested

Table B2, P1 — Equipment with Access Only Through SVTC Operation and/or Engineering — No Direct Hands-on Usage
(Note – List includes tools both with and without activity multipliers.)

[…***…]

***Confidential Treatment Requested

Table B2, P2 — Equipment with Access Only Through SVTC Operation and/or Engineering — No Direct Hands-on Usage
(Note – List includes tools both with and without activity multipliers.)

[…***…]

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Table B2, P3 — Equipment with Access Only Through SVTC Operation and/or Engineering — No Direct Hands-on Usage
(Note – List includes tools both with and without activity multipliers.)

[…***…]

***Confidential Treatment Requested

Table B2, P4 — Equipment with Access Only Through SVTC Operation and/or Engineering — No Direct Hands-on Usage
(Note – List includes tools both with and without activity multipliers.)

[…***…]

***Confidential Treatment Requested

Exhibit C

Insurance Requirements for SVTC Customers

Within the timeframe specified in the Agreement stating insurance requirements or when requested by SVTC, Customer must provide Certificates of Insurance verifying it has the following types of insurance (including an attachment specifying additional or named insureds and any waiver endorsements). If the Agreement requires limits other than those below, the limits stated in the Agreement shall supersede those below. Customer agrees to maintain all such applicable insurance during its operations at SVTC.

Note that the following insurance requirements apply only to Customers working on SVTC premises using SVTC equipment. If there will be no use of SVTC equipment, the below insurance requirements do not apply. If the nature of Customer's work on SVTC premises changes during the term of the Agreement, the insurance requirements below may be imposed, waived or re-imposed. By way of example, if a customer desires access to the fabs but does not actually use the equipment , a lesser level of insurance may be acceptable, subject to the level being increased if the customer later starts directly using SVTC equipment.

Commercial General Liability Coverage: Policy must name SVTC, Technologies LLC., ("SVTC"), as an additional insured and include a waiver of subrogation in favor of SVTC; include Broad Form Property Damage, Blanket Contractual Liability (covering liability assumed by Supplier), Premises/Operations, and Products/Completed Operations.

$ […***…] General Aggregate
$ […***…] Products-Completed Operations Aggregate (as needed)
$ […***…] Personal & Advertising Injury $ 1,000,000 Each Occurrence
$ […***…] Fire Damage (Any one fire)
$ […***…] Medical Expense (any one person)

Excess/Umbrella Coverage: This policy must be in force in addition to the underlying coverage required above without any gaps and subject to all of the same requirements as the underlying coverage so that the total amount of insurance coverage (underlying plus umbrella) equals the following:

$ […***…] Each occurrence and general aggregate

AMENDMENT 1

This Amendment, ("Amendment"), dated July 13, 2009 ("Effective Date") is to the Master Services Agreement dated March 2, 2009, and Exhibit A - Commercial Terms dated April 7, 2009 ("Agreement") between SVTC Technologies, LLC ("SVTC"), and BioNanomatrix, Inc. ("Company"). The Agreement mandates that all changes must be in a writing signed by the parties. Except as provided below, all the provisions of the Agreement shall remain in effect and apply to the amended language. Accordingly, the parties agree to the following:

1) Exhibit A states the Commercial Terms for development phase of the described six month Company project. Section 3.0 of Exhibit A states the Service Fees including the amount charged for Engineering Services which currently provides that Engineering Services hours in excess of […***…] will be billed at the rate of […***…].

2) It is hereby agreed to amend the forgoing language to provide that Engineering Services hours in excess of […***…] will be billed at the rate of […***…]. It is also agreed that this reduction only applies during the period of time ending September 25, 2009, when development is complete.

Effect of this Amendment. In the event of any conflict between the Agreement and this Amendment, this Amendment shall control. Except as amended or otherwise set forth in this Amendment, all terms and conditions of the Agreement remain in full force and effect and shall apply to this Amendment and the interpretation thereof.

With due authority from our respective companies, we hereby signify our consent to this Agreement by signing below,

SVTC Technologies, LLC

Signature: /s/ Brian A. Stein
Printed Name: Brian A. Stein
Title: CFO
Date: October 2, 2009

Customer: **BioNanomatrix, Inc.**

Signature: /s/ Michael Boyce-Jacino
Printed Name: Michael Boyce-Jacino
Title: President and CEO
Date:

*****Confidential Treatment Requested**

AMEND462693-001*3*07351331651069523093351257156528649427565203602 3*1*1

AMENDMENT 2

This Amendment 2, ("Amendment"), dated October 21, 2009 ("Effective Date") is to the Master Services Agreement dated March 2, 2009 ("Agreement") between SVTC Technologies, LLC ("SVTC"), and BioNanomatrix, Inc. ("Company"). The Agreement mandates that all changes must be in a writing signed by the parties. Except as provided below, all the provisions of the Agreement, including section 11, shall remain in effect and apply to the amended language. Accordingly, the parties agree to the following:

1) The Agreement included an Exhibit A which included specific commercial terms to cover the development phase of the ongoing project. The services and charges in Exhibit A were for work during the six month period starting April 7, 2009. The parties are now ready to proceed to the next phase in the project . Note that an Amendment 1, dated July 13, 2009, was executed but is not relevant to this Amendment 2.

2) Pursuant to Section 2.1 of the SVTC Agreement, the SVTC Agreement is hereby amended to include attached Exhibit A2 describing services that will be provided by SVTC to Company for the next phase. SVTC will provide Company the services described in Exhibit A2 for the prices set forth therein, subject to any additional terms and conditions set forth therein. All work by SVTC for the project described in Exhibit A2 shall be pursuant only to the Agreement as amended herein, and not pursuant to any other agreements.

Effect of this Amendment. In the event of any conflict between the Agreement and this Amendment, this Amendment shall control. Except as amended or otherwise set forth in this Amendment, all terms and conditions of the Agreement remain in full force and effect and shall apply to this Amendment and the interpretation thereof.

LIST OF ATTACHMENTS: Following is a list of attachments to this Amendment, including all Schedules and Exhibits. Any future added attachment must include a dated Amendment or provision referencing the Agreement and must be executed by all parties.

Exhibit A2

(signatures on next page)

With due authority from our respective companies, we hereby signify our consent to this Agreement by signing below,

SVTC Technologies, LLC

Signature: /s/ Brian A. Stein
Printed Name: Brian A. Stein
Title: CFO
Date: 10/23/09

Customer: **BioNanomatrix, Inc.**

Signature: /s/ Lorraine G. LoPresti
Printed Name: Lorraine G. LoPresti
Title: VP – Finance & Administration
Date: 10/22/2009

Exhibit A2
Commercial Terms
For BioNanomatrix, Inc.'s Revised Nanochannel Array Development Project

START DATE: 10-19-2009 **DURATION:** Six (6) Months*

SVTC proposes the date above on which SVTC will begin providing the following services under the Agreement ("Start Date"). *Project Duration commences upon the ("Start Date") and shall continue for six months unless extended as provide in section 6, 2), below.

1.0 DESCRIPTION OF SERVICES:

SVTC shall provide services for the defined Project Duration in order to develop and process experimental prototype silicon wafers in support of BioNanomatrix, Inc.'s Revised Nanochannel Array Development Project. SVTC will use manufacturing processes that are being developed and BioNanomatrix, Inc. will be allocated a specific number of Activities, as well as other support and services, as described herein ("Services"). SVTC shall use commercially reasonable efforts to perform the Services requested by BioNanomatrix, Inc., subject to the ability of SVTC to perform these Services on SVTC's existing equipment and equipment contributed by BioNanomatrix, Inc. using standard materials and process recipes that are compatible with the equipment and resources of SVTC.

2.0 SUMMARY OF SERVICES TO BE PROVIDED:

- Fab Services for experimental prototype wafers
- Engineering Services
- Process Library Access

3.0 SVTC SERVICE DEFINITIONS:

Fab Access Services:

1. […***…]
2. […***…]
3. […***…]
4. […***…]
5. […***…]
6. […***…]

*****Confidential Treatment Requested**

Engineering Services: (in addition to those included within the Activities pricing)

1. Contracted engineering time may be utilized for the following development tasks

a. […***…]

b […***…]

c. […***…]

d. […***…]

e. […***…]

2. These services are to be executed in collaboration with Company

Process Library Services:

1. […***…]

4.0 ADDITIONAL SERVICES:

Additional Services are subject to availability at SVTC's sole discretion for additional fees

Reticles	[…***…]
Analytical Services	[…***…]

*****Confidential Treatment Requested**

5.0 SVTC ESTIMATED SERVICE FEES:

BioNanomatrix Fees Summary	Cal Q4'09	Cal Q1'10
[…***…]	[…***…]	
[…***…]		
[…***…]		
[…***…]		[…***…]
[…***…]		
[…***…]		
[…***…]	[…***…]	[…***…]
[…***…]		
[…***…]	[…***…]	[…***…]
Total Revised Prototype Wafers	**[…***…]**	**[…***…]**
[…***…]	[…***…]	[…***…]
- […***…]		
- […***…]		
- […***…]		
- […***…]		
- […***…]		
IP License Fee (actual - not estimated)	[…***…]	[…***…]
Total Alpha2 Development	**[…***…]**	**[…***…]**
Sub-Total (By Quarter)	**[…***…]**	**[…***…]**
TOTAL		**[…***…]**

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6.0 TERMS:

1) *The project summary in Section 5.0 represents a non-binding total estimated project cost and timeline. However, the Minimum Financial Commitment Fee for the Duration is […***…]. As part of this Amendment, Company commits to have […***…] Prototype wafers constructed on the existing […***…] flow upon execution of this Amendment.*
2) *Fees for all services actually provided by SVTC to Company. shall be invoiced at the end of each SVTC fiscal month and payment shall be due within 30 days. IP License fees shall be billed at the end the first month of each quarter. Company will have the option to extend the Duration by up to three months, at the same rates as above, in the event that the above development services are not concluded within six months; to exercise the extension, Company must notify SVTC in writing at least thirty days prior to the end of the initial six month Duration. Should the extension occur, SVTC will waive the associated quarterly IP License fee for the extension.*
3) *All invoicing shall follow SVTC fiscal month start and end dates.*
4) *Additional Activities, Engineering Hours, Additional Tool Training, access to additional equipment and resources, and other Extraordinary Expenses ("Additional Services) shall be made available at SVTC's sole discretion and shall be agreed to in writing prior to being performed by SVTC. Company shall pay for all Additional Services per the terms of the Agreement, with rates fixed at […***…] and […***…].*
5) *No Company terms and conditions, including but not limited to any stated on Company's Purchase Orders or other documents, shall apply to SVTC's services.*
6) *Outsourcing charges for any outsourced steps are estimates only and may be subject to additional fees and/or outsource non-reoccurring engineering charges. If outsourcing occurs, […***…].*

7.0 LICENSED TECHNOLOGY:

The Services listed above and SVTC's process technology, including recipes and steps, used in the performance of services shall be provided and licensed to Company under the terms, conditions and limitations of the Agreement, which shall override and supersede any terms and conditions in any Company provided documents.

*****Confidential Treatment Requested**

Table 1
Process Flows

[…*…]**

***Confidential Treatment Requested**

[…*…]**

*****Confidential Treatment Requested**

AMENDMENT 3

This Amendment 3, ("Amendment"), dated July 9, 2010 ("Effective Date") is to the Master Services Agreement dated March 2, 2009 ("Agreement") between SVTC Technologies, LLC ("SVTC"), and BioNanomatrix, Inc. ("Company"). The Agreement mandates that all changes must be in a writing signed by the parties. Except as provided below, all the provisions of the Agreement shall remain in effect and apply to the amended language. Accordingly, the parties agree to the following:

1) Previous draft of Amendment 3, dated in November, 2009, which was not finalized or executed, is superseded and replaced with this version of Amendment 3.

2) SVTC and Customer agree to again extend the expiration of the Commercial Terms in Exhibit A2 of Amendment 2 of the Agreement, which Customer previously extended, by exercising the option to extend the duration as stated in Section 6, sub-paragraph 2 of Exhibit A2, for a prior revised expiration date of July 19, 2010. By this Amendment the parties agree that the Commercial Terms in Exhibit A2 shall now extended to now expire on October 19, 2010.

3) SVTC agrees to […***…] for the duration of this extension.

4) During the duration of this extension SVTC shall invoice Customer at the end of each SVTC fiscal month for actual services provided and payment shall be due within 30 days.

Effect of this Amendment: In the event of any conflict between the Agreement and this Amendment, this Amendment shall control. Except as amended or otherwise set forth in this Amendment, all terms and conditions of the agreement remain in full force and effect and shall apply to this Amendment and the interpretation thereof.

With due authority from our respective companies, we hereby signify our consent to this Agreement by signing below,

SVTC Technologies, LLC

Signature: /s/ Jeffrey E. Calvello
Printed Name: ~~Brian A. Stein~~ JEFFREY E. CALVELLO
Title: ~~Chief Financial Officer~~ CORPORATE CONTROLLER
Date: July 20, 2010

Customer: **BioNanomatrix, Inc.**

Signature: /s/ Edward L. Erickson
Printed Name: Edward L. Erickson
Title: President & CEO
Date: 7/19/2010

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AMENDMENT 4

This Amendment 4, ("Amendment"), dated September 23, 2010 ("Effective Date") is to the Master Services Agreement dated March 2, 2009 ("Agreement") between SVTC Technologies, LLC ("SVTC"), and BioNanomatrix, Inc. ("Company"). The Agreement mandates that all changes must be in a writing signed by the parties. Except as provided below, all the provisions of the Agreement shall remain in effect and apply to the amended language. Accordingly, the parties agree to the following:

1) The Agreement is hereby amended to include attached Exhibit A4 describing services that will be provided by SVTC for Customer starting on the Effective Date. SVTC will provide Customer the services described in Exhibit A4 for the fees set forth therein, subject to any additional terms and conditions set forth therein. Starting ~~September 23~~, 2010, attached Exhibit A4, including the service and fee provisions therein, shall replace and supersede the provisions of prior Exhibit A2 to the Agreement in its entirety. *October 15 JC LL*

Effect of this Amendment: In the event of any conflict between the Agreement and this Amendment, this Amendment shall control. Except as amended or otherwise set forth in this Amendment, all terms and conditions of the agreement remain in full force and effect and shall apply to this Amendment and the interpretation thereof.

LIST OF ATTACHMENTS: Following is a list of attachments to this Amendment, including all Schedules and Exhibits. Any future added attachment must include a dated Amendment or provision referencing the Agreement and must be executed by all parties.

Exhibit A4 - Commercial Terms

With due authority from our respective companies, we hereby signify our consent to this Agreement by signing below,

SVTC Technologies, LLC

Signature:	/s/ Jeffrey E. Calvello
Printed Name:	~~Brian A. Stein~~ JEFFREY E. CALVELLO
Title:	~~Chief Financial Officer~~ CORPORATE CONTROLLER
Date:	10/20/2010

Customer: **BioNanomatrix, Inc.**

Signature:	/s/ Lorraine G. LoPresti
Printed Name:	Lorraine G. LoPresti
Title:	VP – Finance & Admin, CFO
Date:	10/20/2010

556253-1-1-11
AMEND462693-005*1*35626762226127857420416777591443084753969004587l*1*11

Exhibit A4
Commercial Quotation
For BioNanomatrix, Inc.'s Alpha3.0 Technology

START DATE: 10-15-2010 **DURATION:** One (1) Year

SVTC proposes the date above on which SVTC will begin providing the following services under the Master Services Agreement ("Start Date"). Project Duration is the period of time for the project described in this Quotation.

1.0 DESCRIPTION OF SERVICES:

SVTC shall provide research and development services in support of BioNanomatrix, lnc.'s Alpha3.0 Technology. SVTC will start with semiconductor processes that exist or are being developed by BioNanomatrix, Inc., and will provide such research and development services, as well as other support as described herein (collectively, "Services"). SVTC shall use its best efforts, which shall be no less than commercially reasonable efforts, to perform the Services requested by BioNanomatrix, Inc.,in accordance with this Exhibit A4 subject to the ability of SVTC to perform these Services on SVTC's existing equipment and using standard materials and process recipes that are compatible with the equipment and resources of SVTC.

2.0 SUMMARY OF SERVICES THAT MAY BE PROVIDED:

- Fab Services
- Engineering Services
- Process Library Licenses

3.0 SVTC SERVICE DEFINITIONS:

Fab Access Services:

1. […***…]
2. […***…]
3. […***…]
4. […***…]
5. […***…]
6. […***…]
7. […***…]

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556253-1-2-11
AMEND462693-005*1*35626762226127857420416777591443084753969004587l*2*11

Engineering Services: (Defined in the Agreement)

1. Contracted engineering time may be utilized for the following development tasks

a. […***…]

b […***…]

c. […***…]

d. […***…]

e. […***…]

f. […***…]

2. These services are to be executed in collaboration with customers direction and management

Library License Fee:

1. […***…]

4.0 ADDITIONAL SERVICES:**

Additional Training Services	[***]
Additional Cubicles & Lockable Office Space	Subject to availability priced upon request
Reticles	[***]
Analytical Services	Full service capabilities available priced upon request

** Additional Services subject to availability

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556253-1-3-11
AMEND462693-005*1*3562676222612785742041677759144308475396900458 71*3*11

5.0 SVTC SERVICE FEE SCHEDULE:

	Development Contract	Fees	Frequency
a)	**Fab Services**		
	[…***…]		
	Development Activity unit pricing	[…***…]	per activity
	Yield Engineering Activity unit pricing	[…***…]	per activity
d)	**Engineering Services - Process Engineering Support**		
	• Duration for 4 quarters		
	Engineering Services hours exceeding Included Hours	[…***…]	hourly
f)	**Library License Fee**	[…***…]	quarterly
	• IP License Fee waived with 1 year contract commitment		
g)	**Analytical Services**	[…***…]	
	• […***…]		
g)	**Reticles**	[…***…]	
	Flexible spending with quarterly Financial Commitment	**[…***…]**	**Quarterly**

*** Actual spend rate is expected to exceed the minimum financial commit. Predicted run rate based on scope of work is between $175 and $225K per quarter**

6.0 PILOT / LOW VOLUME PRODUCTION:

Wafers per year	Activity Pricing
100 – 1,200	[…***…]
12,000 – 3,000	[…***…]
> 3,000	[…***…]

- […***…]

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556253-1-4-11
AMEND462693-005*1*3562676222612785742041677759144308475396900458 71*4*11

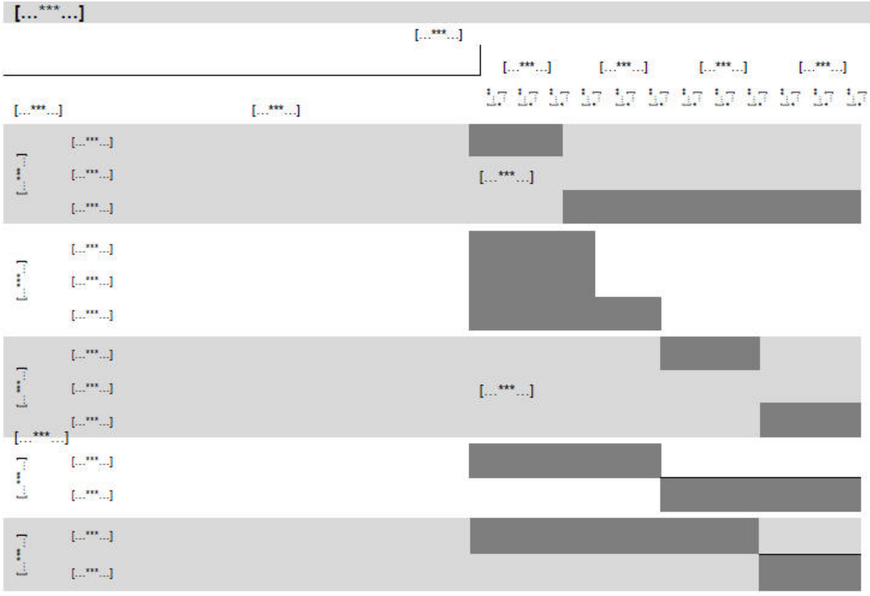
7.0 SCOPE OF WORK:

- **Alpha2.0 Chip Development Requirements**
  - **Remaining technical challenges:**
    - None; baseline process exists
  - **Estimated Scope:**
    - […***…]
      - […***…]
- **Alpha3.0 Chip Development Requirements:**
  - **Remaining technical challenges**
    - […***…]
    - […***…]
    - […***…]
  - **Estimated Scope:**
    - […***…]
    - […***…]
    - […***…]
      - […***…]
    - […***…]
- **Total Scope Estimate: […***…]**

*****Confidential Treatment Requested**

556253-1-5-11
AMEND462693-005*1*35626762226127857420416777591443084753969004587 1*5*11

[…*…]**



9.0 TERMS:

1) *Actual usage shall be invoiced at the end of each SVTC fiscal month for actual activities or engineering hours used, due NET30 days. It is anticipated that actual spend rate will exceed the monthly minimum financial commitment. Minimum financial commitment shall be […***…], with a minimum of […***…]. Any adjustments to fulfill the contracted fee requirements shall be invoiced at the end of every six (6) month duration.*

2) *Product wafers will be ordered under this agreement, and will be invoiced upon shipment, and shall be included in the minimum financial commitment.*

3) *The first and last billing cycle fees and service quantities other than set up shall be prorated to the actual start date and then continue in accordance with SVTC's fiscal calendar such that all invoicing shall follow SVTC fiscal month start and end dates.*

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10.0 PRODUCT WAFER SPECIFICATIONS:

- **Production Wafer Specifications**
  - **SVTC and BNM agree that at the conclusion of process verification of the Alpha2.0 chip, a robust, in-line test specification will be established to determine "good wafers". It is expected that this specification will include top-down CD, profilometry for depth verification, and visual defect inspect. Actual criteria to be mutually agreed by SVTC and BNM.**
  - **SVTC and BNM agree that at the conclusion of the Alpha3.0 technology development and process verification, a robust, in-line test specification will be established to determine "good wafers". Specification requirements are yet to be determined, and will be mutually agreed by SVTC and BNM.**
  - **It is the intent of SVTC and BNM to integrate the TSV module into the Alpha2.0 flow and eliminate the back-grind process. Once the TSV module is fully developed and the existing Alpha2.0 flow has been released, it is expected that the development required to integrate the two will be minimal. SVTC cannot predict the absolute effort required, as there is currently no data on which to base this conclusion. However, SVTC anticipates at least 2 lots of 6 wafers will be required for validation. SVTC will commit to complete this specific development at pilot production activity pricing, and at the least number of validation lots reasonable to mitigate the cost.**

11.0 SUPPLY CHAIN MANAGEMENT:

- **Supply Chain**
  - Incoming Material: SVTC will by the end of the second quarter of this contract, assume control of incoming supply chain, specifically silicon substrates and glass lid wafers. These materials will be added to monthly invoices with SVTC standard […***…] applied
  - Packaging: SVTC will engage prospective packaging suppliers to develop an integrated solution for BNM. Once a viable technology demonstrator has been produced, SVTC will manage it as part of the integrated supply chain solution with a standard […***…]

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556253-1-7-11
AMEND462693-005*1*35626762226127857420416777591443084753969004587 1*7*11

12.0 STANDARD ANALYTICAL SERVICES PRICE LIST:

Note: Pricing listed is typical pricing per technique. Actual price will be determined following review of customer specific material and objectives and is subject to change

SVTC Analytical Services	Price	Unit
[…***…]	[…***…]	Sample
[…***…]	[…***…]	Sample
[…***…]	[…***…]	Each
[…***…]		
[…***…]	[…***…]	Each
[…***…]	[…***…]	Each
[…***…]	Quote	Each
[…***…]	[…***…]	1st Wafer
[…***…]	[…***…]	Additional Wafer
[…***…]		
[…***…]	[…***…]	Each
[…***…]	[…***…]	Each
[…***…]	[…***…]	Each
[…***…]	[…***…]	Each
[…***…]		
[…***…]	[…***…] Lot	
[…***…]	[…***…]	Each
[…***…]	[…***…]	Each
[…***…]	[…***…]	Hour
[…***…]	[…***…]	Hour
[…***…]	[…***…]	Each
[…***…]	[…***…]	Each
[…***…]		
[…***…]	[…***…]	Each
[…***…]	[…***…]	Each
[…***…]	[…***…]	Each
[…***…]	[…***…]	Each
[…***…]	[…***…]	Each

*****Confidential Treatment Requested**

556253-1-8-11
AMEND462693-005*1*35626762226127857420416777591443084753969004587 1*8*11

[…***…]		
[…***…]		
[…***…]	[…***…]	Each
[…***…]	[…***…]	Each
[…***…]	[…***…]	Each
[…***…]	[…***…]	Each
[…***…]	[…***…]	Each
[…***…]	[…***…]	Each
[…***…]	[…***…]	Lot
[…***…]	[…***…]	Each
[…***…]	[…***…]	Lot
[…***…]	[…***…]	Each
[…***…]	[…***…]	Each
[…***…]	[…***…]	Each
[…***…]		
[…***…]	[…***…]	Each
[…***…]	[…***…]	Each
[…***…]	[…***…]	Each
[…***…]	[…***…]	Each
[…***…]	[…***…]	Each
[…***…]	[…***…]	Each
[…***…]	[…***…]	Each
[…***…]	[…***…]	Each
[…***…]	[…***…]	Each
[…***…]	[…***…]	Lot
[…***…]	[…***…]	Each
[…***…]		
[…***…]	[…***…]	Hour
[…***…]	[…***…]	Hour
[…***…]	[…***…]	Hour
[…***…]		
[…***…]	[…***…]	Hour
[…***…]	[…***…]	Hour
[…***…]	[…***…]	Hour
[…***…]	[…***…]	Hour
[…***…]	[…***…]	Hour
[…***…]	[…***…]	Hour
[…***…]	[…***…]	Hour
[…***…]		
[…***…]	[…***…]	Each
[…***…]	[…***…]	Each
[…***…]	[…***…]	Each
[…***…]	[…***…]	Hour

*****Confidential Treatment Requested**

556253-1-9-11
AMEND462693-005*1*3562676222612785742041677759144308475396900458 71*9*11

[...***...]	[…***…]	Hour
[…***…]		
[…***…]		
[…***…]	[…***…]	Sample
[…***…]	[…***…]	Sample
[…***…]	[…***…]	Sample
[…***…]	[…***…]	Sample
[…***…]		
[…***…]	[…***…]	Sample
[…***…]	[…***…]	Sample
[…***…]	[…***…]	Sample
[…***…]	[…***…]	Sample
[…***…]	[…***…]	Hour
[…***…]	[…***…]	Sample
[…***…]		
[…***…]	[…***…]	Hour
[…***…]	[…***…]	Hour
[…***…]	[…***…]	Sample
[…***…]	[…***…]	Sample
[…***…]	[…***…]	Each
[…***…]	[…***…]	Sample
[…***…]	[…***…]	Sample
[…***…]	[…***…]	Sample
[…***…]	[…***…]	Each
[…***…]	[…***…]	Sample
[…***…]		
[…***…]	[…***…]	Each
[…***…]	[…***…]	Each
[…***…]	[…***…]	Each
[…***…]	[…***…]	Each
[…***…]	[…***…]	Each
[…***…]	[…***…]	Each
[…***…]	[…***…]	Each
[…***…]	[…***…]	Each
[…***…]	[…***…]	1st Wafer
[…***…]	[…***…]	Additional Wafer
[…***…]	[…***…]	Sample w/prep
[…***…]	[…***…]	Sample w-out prep

** Expedite Pricing Options Available for ALL Services Listed**

*****Confidential Treatment Requested**

NOTES:
Prices listed above should be used as a reference point.
Final pricing may be customized following a detailed review of customer material specifics.

Confidential

556253-1-10-11

AMEND462693-005*1*35626762226127857420416777591443084753969004587l*10*11

TERMS AND CONDITIONS FOR ANALYTICAL SERVICES

SVTC, LLC 3901 North First Street, San Jose, CA 95134

1. Except as otherwise agreed in writing by the parties, these Terms and Conditions shall govern analytical services provided to Customer by SVTC. These Terms and Conditions supersede all previous communications, representations, or agreements, either verbal or written, between the parties. The Parties also agree that these Terms and Conditions shall supersede additional, inconsistent or conflicting terms, whether printed or otherwise set forth in any purchase order or other documents provided by Customer to SVTC.

2. Services. SVTC agrees to perform the services described in the proposal/quotation to which these Terms and Conditions are attached. Unless specifically agreed, completion times are not assured. Unless otherwise agreed, SVTC will electronically transmit the results of the analytical services which constitute full performance of SVTC's obligations.

3. Legal. This agreement shall be interpreted under the laws of the State of California. The invalidity or unenforceability, in whole or in part of any provision shall not affect the validity or enforceability of the remainder of the Terms and Conditions. Wavier by SVTC of any provision or of any breach by or obligation of the Customer shall not constitute a waiver of such provision on any other occasion or a waiver of any other breach by or obligation of the Customer. Modifications to this Agreement must be in writing and approved by authorities of the Parties.

4. Methodology. Customer acknowledges that unless otherwise agreed in writing, analytical services may be outsourced to subcontractors of SVTC at SVTC's sole discretion. Industry standard methodologies will normally be used; however, SVTC reserves the right if necessary to deviate from standard methodologies. Customer shall provide a prior written disclosure of known or suspected hazards of toxicity and shall provide written instructions concerning handling. Customer warrants that all submissions will be packaged, labeled, transported and delivered in accordance with applicable laws. Customer will be responsible for disposal.

5. Warranty. SVTC warrants only that it will perform analytical services and prepare reports consistent with current generally accepted analytical laboratory principles and practices. No specific results are guaranteed. Preliminary results may be given in advance of a final report. If provided to Customer, preliminary results are subject to change and final review by SVTC and Customer's use of preliminary results shall be at Customer's risk. SVTC DISCLAIMS ALL OTHER WARRANTIES, EXPRESS OR IMPLIED.

6. Liability. Customer's exclusive remedy in the event of a breach of this Agreement shall be that SVTC will repeat the services at its own expense, and SVTC shall have no other liability whatsoever. All claims shall be deemed waived unless made in writing and received by SVTC within sixty (60) days following completion of services. Results are provided only for the use of SVTC Customers. Customer shall indemnify SVTC from any claims by third parties arising out of or related to the services provided under this agreement. IN NO EVENT SHALL SVTC BE LIABLE TO CUSTOMER OR TO ANY THIRD PARTY CLAIMING THROUGH OR UNDER CUSTOMER FOR INDIRECT, INCIDENTAL OR CONSEQUENTIAL DAMAGES, EVEN IF ADVISED OF THE POSSIBILITY THEREOF IN THE EVENT THAT ANY LIABILITY IS IMPOSED ON SVTC HEREUNDER. AWARDED DAMAGES SHALL NOT EXCEED THE AMOUNT PAID OR PAYABLE BY CUSTOMER TO SVTC FOR THE SERVICE TO WHICH SUCH LIABILITY RELATES. Each party acknowledges that the foregoing limitations are an essential element of the Agreement and that in the absence of such limitations the pricing and other terms set forth in this Agreement would be substantially different.

7. Handling. SVTC shall have no responsibility or liability for the actions of any carrier or for delivery problems to or from SVTC. All shipment arrangements will be at Customer's expense. If not picked up, submissions will be held for a limited time after which they will be destroyed unless otherwise agreed in writing. Disposal of hazardous materials is the responsibility of the Customer. SVTC reserves the right to refuse accept any submission if SVTC determines in its sole discretion, that a submission is of insufficient volume, or that it poses a risk due to health, safety, environmental or other factors, even if not a hazardous substance or notice was made by Customer.

8. Compensation. Services performed will be billed in the amounts quoted or as stated on applicable SVTC Fee Schedules. If Customer notified SVTC to terminate services prior to completion. Customer shall remain liable for all services performed prior to receipt of notice. Payment terms are stated on SVTC's invoice. Unless stated, charges do not include any sales, use or other taxes that will be added to invoice prices if required. SVTC reserves the right to require payment prior to commencing services or release of data. Forensic testimony or other services not stated on the quotation are not included the services to be provided.

9. Intellectual Property. Customer's proprietary data or information submitted by SVTC shall remain the Customer's property. Upon satisfactory payment to SVTC for services provided, data or information generated by SVTC for the Customer shall be deemed the Customer's property. SVTC or its subcontractors shall retain ownership of all analytical methods, protocols, and equipment. Without SVTC's prior written consent, Customer shall not use SVTC's or its subcontractor's names or trademarks in any marketing or reporting materials, press releases or in any other manner and shall not attribute to SVTC any test result tolerance or specification derived from SVTC's data.

556253-1-11-11
AMEND462693-005*1*3562676222612785742041677759144308475396900458 71*11*11

AMENDMENT 5

This Amendment 5, ("Amendment"), dated September 26, 2011 ("Effective Date") is to the Master Services Agreement dated March 2, 2009 ("Agreement") between SVTC Technologies, LLC ("SVTC"), and BioNanomatrix, Inc. ("Customer"). The Agreement mandates that all changes must be in a writing signed by the parties. Except as provided below, all the provisions of the Agreement shall remain in effect and apply to the amended language. Accordingly, the parties agree to the following:

1) The Agreement is here by amended to include attached Exhibit A5 describing services that will be provided by SVTC for Customer starting on the effective Date. SVTC will provide to Customer the services described in Exhibit A5 for the fees set forth therein, subject to any additional terms and conditions set forth therein. Starting on September 26, 2011, attached Exhibit A5, including the service and fee provisions herein, shall replace and supersede the provisions of prior Exhibit A4 to the Agreement in its entirety.

2) SVTC and Customer also agree to extend the expiration of the Agreement itself from its current expiration date of March 02, 2012, so that the Agreement shall now expire on September 25, 2012 to coincide with the expiration of the Duration in Exhibit A5.

Effect of this Amendment: In the event of any conflict between the Agreement and this Amendment, this Amendment shall control. Except as amended or otherwise set forth in this Amendment, all terms and conditions of the agreement remain in full force and effect and shall apply to this Amendment and the interpretation thereof.

LIST OF ATTACHMENTS: Following is a list of attachments to this Amendment, including all Schedules and Exhibits. Any future added attachment must include a dated Amendment or provisions referencing the Agreement and must be executed by all parties.

Exhibit A5 - Commercial Terms

With due authority from our respective companies, we hereby signify our consent to this Agreement by signing below,

SVTC Technologies, LLC

Signature: /s/ Kevin Kassekert
Printed Name: Kevin Kassekert
Title: General Manager
Date: 9/22/11

Customer; **BioNanomatrix, Inc.**

Signature: /s/ R. Erik Holmlin
Printed Name: R. Erik Holmlin
Title: CEO
Date: 9/22/2011

Exhibit A5
Commercial Terms
For BioNanomatrix, Inc.'s Fluidics Chip Technology

START DATE: 09-26-2011 **DURATION: One (1) Year**

SVTC proposes the dale above on which SVTC will begin providing the following services under the Master Services Agreement ("Start Date"). Project Duration is the period of time for the project described in this Amendment.

1.0 DESCRIPTION OF SERVICES:

SVTC shall provide research and development services in support of Customer's Fluidics Chip Technology. SVTC will start with semiconductor processes that exist or are being developed by Customer. and will provide other support as described herein ("Services"). SVTC shall use commercially reasonable efforts to perform the Services requested by BioNanomatrix. Inc., subject to the ability of SVTC to perform these Services on SVTC's existing equipment and using standard materials and process recipes that are compatible with the equipment and resources of SVTC.

2.0 SUMMARY OF SERVICES THAT MAY BE PROVIDED:

- Fab Services
- Engineering Services
- Process Library Licenses

3.0 SVTC SERVICE DEFINITIONS:

Fab Services:

1. […***…]
2. […***…]
3. […***…]
4. […***…]
5. […***…]
6. […***…]

*****Confidential Treatment Requested**

Engineering Services: (Defined in the Agreement)

1. Contracted engineering services may be utilized for the following developmental tasks
   a. […***…]
   b. […***…]
   c. […***…]
   d. […***…]
   e. […***…]
   f. […***…]

Library License Fee:

1. […***…]

4.0 ADDITIONAL SERVICES :**

Reticles	[…***…]
Analytical Services	[…***…]

** Additional Services subject to availability

*****Confidential Treatment Requested**

5.0 SVTC SERVICE FEE SCHEDULE:

	Development Contract Fees Frequency	Fees	Frequency
a)	**Fab Services**		
	[…***…]		
	Development Activities unit pricing	[…***…]	per activity
b)	**Engineering Services - Process Engineering Support**		
	• […***…]		
		[…***…]	hourly
	Engineering Services hours exceeding Included Hours		
		[…***…]	quarterly
c)	**Library License Fee**		
	• […***…]		
		[…***…]	
d)	**Analytical Services**		
	• […***…]		
e)	**Reticles**	Quoted upon request	
	[…*…]**	**[…***…]**	**Annual**

6.0 PILOT / LOW VOLUME PRODUCTION:

Wafers per year	Activity Pricing
[…*…]**	[…***…]
[…*…]**	[…***…]
[…*…]**	[…***…]

- […***…]
- […***…]

*****Confidential Treatment Requested**

AMEND462693-006*3*5901443864711598711471849000845853978796119085 12*4*12

9.0 TERMS:

1) *Actual usage shall be invoiced* at *the end of each SVTC fiscal month for actual activities or engineering hours used, due NET 30 days. Minimum Financial Commitment (MFC) shall be […***…].*

2) Product wafers will be ordered under this agreement, and will be invoiced upon shipment, and shall be included in the quarterly minimum financial commitment.

3) The first and last billing cycle fees and service quantities other than set up shall be prorated to the actual start date and then continue in accordance with SVTC's fiscal calendar such that all invoicing shall follow SVTC fiscal month start and end dates.

4) […***…]

10.0 PRODUCT WAFER SPECIFICATIONS:

(BNM refers to BioNanomatrix, Inc.)

Production Wafer Specifications

SVTC and BNM agree that at the collision of process verification of the alpha 2.0 chip, a robust, in-line test specification will be established to determine "good wafers". It is expected that this specification will include top-down CD, profilometry for depth verification, and visual defect inspect. Actual criteria to be mutually agreed

by SVTC and BNM.

SVTC and BNM agree that at the conclusion of the Alpha 3.0 technology development and process verification, a robust, in-line test specification will be established to determine "good wafers". Specification requirements are yet to be determined, and will be mutually agreed by SVTC and BNM.

It is the intention of SVTC and BNM to integrate the TSV module into the Alpha 2.0 flow and eliminate the back-grind process. Once the TSV module is fully developed and the existing Alpha 2.0 flow has been released, it is expected that the development required to integrate the two will be minimal. SVTC cannot predict the absolute the absolute effort required, as there is currently no data on which to base this conclusion. However, SVTC anticipates at least 2 lots of 6 wafers will be required for validation. SVTC will commit to complete this specific development at pilot production activity pricing, and the least number of validation lots reasonable to mitigate the cost.

*****Confidential Treatment Requested**

12.0 STANDARD ANALYTICAL SERVICES PRICE LIST:

Note: Pricing listed is typical pricing per technique. Actual price will be determined following review of customer specific material and objectives and is subject to change

SVTC Analytical Services	Price	Unit
[…***…]	[…***…]	Sample
[…***…]	[…***…]	Sample
[…***…]	[…***…]	Each
[…***…]		
[…***…]	[…***…]	Each
[…***…]	[…***…]	Each
[…***…]	[…***…]	Each
[…***…]	[…***…]	1st Wafer
[…***…]	[…***…]	Additional Wafer
[…***…]		
[…***…]	[…***…]	Each
[…***…]	[…***…]	Each
[…***…]	[…***…]	Each
[…***…]	[…***…]	Each
[…***…]		
[…***…]	[…***…]	
[…***…]	[…***…]	Each
[…***…]	[…***…]	Each
[…***…]	[…***…]	Hour
[…***…]	[…***…]	Hour
[…***…]	[…***…]	Each
[…***…]	[…***…]	Each
[…***…]		
[…***…]	[…***…]	Each
[…***…]	[…***…]	Each
[…***…]	[…***…]	Each
[…***…]	[…***…]	Each
[…***…]	[…***…]	Each

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[…***…]		
[…***…]		
[…***…]	[…***…]	Each
[…***…]	[…***…]	Each
[…***…]	[…***…]	Each
[…***…]	[…***…]	Each
[…***…]	[…***…]	Each
[…***…]	[…***…]	Each
[…***…]	[…***…]	Lot
[…***…]	[…***…]	Each
[…***…]	[…***…]	Lot
[…***…]	[…***…]	Each
[…***…]	[…***…]	Each
[…***…]	[…***…]	Each
[…***…]		
[…***…]	[…***…]	Each
[…***…]	[…***…]	Each
[…***…]	[…***…]	Each
[…***…]	[…***…]	Each
[…***…]	[…***…]	Each
[…***…]	[…***…]	Each
[…***…]	[…***…]	Each
[…***…]	[…***…]	Each
[…***…]	[…***…]	Lot
[…***…]	[…***…]	Each
[…***…]		
[…***…]	[…***…]	Hour
[…***…]	[…***…]	Hour
[…***…]	[…***…]	Hour
[…***…]		
[…***…]	[…***…]	Hour
[…***…]	[…***…]	Hour
[…***…]	[…***…]	Hour
[…***…]	[…***…]	Hour
[…***…]	[…***…]	Hour
[…***…]	[…***…]	Hour
[…***…]	[…***…]	Hour
[…***…]	[…***…]	Hour
[…***…]	[…***…]	Each
[…***…]	[…***…]	Each
[…***…]	[…***…]	Each
[…***…]	[…***…]	Hour

*****Confidential Treatment Requested**

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[…***…]	[…***…]	Hour
[…***…]		
[…***…]		
[…***…]	[…***…]	Sample
[…***…]	[…***…]	Sample
[…***…]	[…***…]	Sample
[…***…]	[…***…]	Sample
[…***…]		
[…***…]	[…***…]	Sample
[…***…]	[…***…]	Sample
[…***…]	[…***…]	Sample
[…***…]	[…***…]	Sample
[…***…]	[…***…]	Hour
[…***…]	[…***…]	Sample
[…***…]		
[…***…]	[…***…]	Hour
[…***…]	[…***…]	Hour
[…***…]	[…***…]	Sample
[…***…]	[…***…]	Sample
[…***…]	[…***…]	Each
[…***…]	[…***…]	Sample
[…***…]	[…***…]	Sample
[…***…]	[…***…]	Sample
[…***…]	[…***…]	Each
[…***…]	[…***…]	Sample
[…***…]	[…***…]	Each
[…***…]	[…***…]	Each
[…***…]	[…***…]	Each
[…***…]	[…***…]	Each
[…***…]	[…***…]	Each
[…***…]	[…***…]	Each
[…***…]	[…***…]	Each
[…***…]	[…***…]	Each
[…***…]	[…***…]	1st Wafer
[…***…]	[…***…]	Additional Wafer
[…***…]	[…***…]	Sample w/prep
[…***…]	[…***…]	Sample w-out prep

** Expedite Pricing Options Available for ALL Services Listed**

*****Confidential Treatment Requested**

AMENDMENT 6

This Amendment 6, ("Amendment"), dated September 26, 2011 ("Effective Date") is to the Master Services Agreement dated March 2, 2009 ("Agreement") between SVTC Technologies, LLC ("SVTC"), and BioNanomatrix, Inc. ("Customer"). The Agreement mandates that all changes must be in a writing signed by the parties. Except as provided below, all the provisions of the Agreement shall remain in effect and apply to the amended language. Accordingly, the parties agree to the following:

The Agreement is hereby amended to include attached Exhibit C1, Insurance Requirements for SVTC Customers. Starting on September 26, 2011, attached Exhibit C1, including the insurance requirements therein, shall replace and supersede the provisions of prior Exhibit C to the Agreement in its entirety.

Effect of this Amendment: In the event of any conflict between the Agreement and this Amendment, this Amendment shall control. Except as amended or otherwise set forth in this Amendment, all terms and conditions of the agreement remain in full force and effect and shall apply to this Amendment and the interpretation thereof.

LIST OF ATTACHMENTS: Following is a list of attachments to this Amendment, including all Schedules and Exhibits. Any future added attachment must include a dated Amendment or provision referencing the Agreement and must be executed by all parties.

Exhibit C1 – Insurance Requirements for SVTC Customers

With due authority from our respective companies, we hereby signify our consent to this Agreement by signing below.

SVTC Technologies, LLC

Signature: /s/ Kevin Kassekert
Printed Name: Kevin Kassekert
Title: General Manager
Date: 9/23/11

Customer; **BioNanomatrix, Inc.**

Signature: /s/ Lorraine LoPresti
Printed Name: Lorraine LoPresti
Title: CFO
Date: 9/23/2011

Exhibit C1

Insurance Requirements

BioNanomatrix September 26, 2011

Insurance Requirements for SVTC Customers

Within the timeframe specified in the Agreement stating insurance requirements or when requested by SVTC, Customer must provide Certificates of insurance verifying it has the following types of insurance (including an attachment specifying additional or named insureds and any waiver endorsements). If the Agreement requires limits other than those below, the limits stated in the Agreement shall supersede those below. Customer agrees to maintain all such applicable insurance during its operations at SVTC.

Note that the following insurance requirements apply only to Customers working on SVTC premises using SVTC equipment. If there will be no use of SVTC equipment, the below insurance requirements do not apply. If the nature of Customer's work on STC premises changes during the term of the Agreement, the insurance requirement below may be imposed, waived or re-imposed. By way of example, if a customer desires access to the fabs but does not actually use the equipment, a lesser value of insurance may be acceptable, subject to the level being increased if the customer later starts directly using SVTC equipment.

Commercial General Liability Coverage: Policy must name SVTC, Technologies LLC., ("SVTC"), as an additional insured and include a waiver of subrogation in favor of SVTC; include Broad Form Property Damage, Blanket Contractual Liability (covering liability assumed by Supplier), Premises/Operations, and products/Completed Operations.

$ […***…] General Aggregate

$ […***…] Products-Completed Operations Aggregate (as needed)

$ […***…] Personal 7 Advertising Injury

$ […***…] Each Occurrence

$ […***…] Fire Damage (Any one fire)

$ […***…] Medical Expense (any one person)

Excess/Umbrella Coverage: This policy must be in force in addition to the underlying coverage required above without any gaps and subject to all of the same requirements as the underlying coverage so that the total amount of insurance coverage (underlying plus umbrella) equals the following:

$ […***…] Each occurrence and general aggregate

SVTC and BioNanomatrix agree that under no circumstances will BioNanomatrix personnel enter SVTC's facilities unescorted, nor will Bionanomatrix personnel operate SVTC equipment.

*****Confidential Treatment Requested**

AMENDMENT 7

This Amendment 7, ("Amendment"), dated March 26, 2012 ("Effective Date") is to the Master Services Agreement dated March 2, 2009, as amended, (collectively, the "Agreement") between SVTC Technologies, LLC ("SVTC"), and BioNanomatrix, now known as BioNano Genomics, ("Customer"). The Agreement mandates that all changes must be in a writing signed by the parties. Except as provided below, all the provisions of the Agreement shall remain in effect and apply to the amended language. Accordingly, the parties agree to the following:

1) The Agreement is hereby amended to include attached Exhibit A7 describing services that will be provided by SVTC for Customer starting on the Effective Date. SVTC will provide to Customer the services described in Exhibit A7 for the fees set forth therein, subject to any additional terms and conditions set forth therein. Starting on March 26, 2012, attached Exhibit A7, including the service and fee provisions therein, shall replace and supersede the provisions of prior Exhibit A5 to the Agreement in its entirety.

2) SVTC and Customer also agree to amend the Agreement to include attached Exhibit D.

3) SVTC and Customer also hereby agree to extend the expiration of the Agreement from its current expiration date of September 25, 2012, to March 24, 2013.

Effect of this Amendment. IN THE EVENT OF ANY CONFLICT BETWEEN THE AGREEMENT AND THIS AMENDMENT, THIS AMENDMENT SHALL CONTROL. Except as amended or otherwise set forth in this Amendment, all terms and conditions of the Agreement remain in full force and effect and shall apply to this Amendment and the interpretation thereof.

LIST OF ATTACHMENTS: Following is a list of attachments to this Amendment, including all Schedules and Exhibits. Any future added attachment must include a dated Amendment or provision referencing the Agreement and must be executed by all parties.

Exhibit A7 - Commercial Terms

Exhibit D — Process Controls and Metrics

With due authority from our respective companies, we hereby signify our consent to this Agreement by signing below,

SVTC Technologies, LLC

Signature:	
Printed Name:	Kevin Kassekert
Title:	Vice President, Silicon Services
Date:	

Customer:	BioNano Genomics
Signature:	/s/ Erik Holmlin
Printed Name:	Erik Holmlin
Title:	CEO
Date:	May 3, 2012

[***AMEND462693-008*1*522568879341273687043830578031211096846023583693*2*10***]

Exhibit A7
Commercial Terms
For BioNano Genomics's […*…] Validation Phase**

START DATE: 03-26-2012 **DURATION:** Twelve (12) Fiscal Months

SVTC proposes the date above on which SVTC will begin providing the following services under the Master Services Agreement ("Start Date"). Project Duration is the period of time for the project described in this Amendment.

1.0 DESCRIPTION OF SERVICES:

SVTC shall provide research and development services in support of Customer's […***…]. SVTC will start with […***…], as well as other support as described herein ("Services"). SVTC shall use commercially reasonable efforts to perform the Services requested by Customer, subject to the ability of SVTC to perform these Services on SVTC's existing equipment and using standard materials and process recipes that are compatible with the equipment and resources of SVTC.

2.0 SUMMARY OF SERVICES THAT MAY BE PROVIDED:

- […***…]
- […***…]
- […***…]

3.0 SVTC SERVICE DEFINITIONS

Fab Services:

1. […***…]
2. […***…]
3. […***…]
4. […***…]
5. […***…]
6. […***…]

["*AMEND462693-008*1*52256887934127388704383057803121110968466235839*3*10**]

Engineering Services: (Defined in the Agreement)

1. Contracted engineering services may be utilized for the following development tasks
   a. […***…]
   b. […***…]
   c. […***…]
   d. […***…]
   e. […***…]
   f. […***…]
2. These services are to be executed in collaboration with customers direction and management

Library License Fee:

1. Library access, use, and license is limited to recipes available on the SVTC equipment list (MSA Exhibit B) at the time of contract closure.

4.0 ADDITIONAL SERVICES*:

Reticles	[…***…]
Analytical Services	[…***…]

** Additional Services subject to availability

[***AMEND462693-008*1*522558879341273587043830578031211096848623583893*4*10***]

5.0 SERVICE FEE SCHEDULE: ONGOING DEVELOPMENT: […*…] OPTIMIZATION & NEXT GEN PRODUCT**

Item		Fees	Frequency
a) Tier 1 Pricing			
• […***…]			
– […***…]		[…***…]	[…***…]
Engineering Services - Process Engineering Support		[…***…]	[…***…]
Analytical Services		[…***…]	[…***…]
	Tier 1 Minimum Financial Commitment	**[…***…]**	**[…***…]**
b) Tier 2 Pricing (Baseline Commitment)			
• […***…]			
– […***…]		[…***…]	[…***…]
Engineering Services - Process Engineering Support		[…***…]	[…***…]
Analytical Services		[…***…]	[…***…]
	Tier 2 Minimum Financial Commitment	**[…***…]**	**[…***…]**
c) Tier 3 Pricing			
– […***…]		[…***…]	[…***…]
Engineering Services - Process Engineering Support		[…***…]	[…***…]
Analytical Services		[…***…]	[…***…]
	Tier 3 Minimum Financial Commitment	**[…***…]**	**[…***…]**
d) Hot Lot Fee		[…***…]	[…***…]
e) Baseline Minimum Financial Commitment (Tier 2 Above)		**[…***…]**	**[…***…]**

[***AMEND462693-008*1*52256937934127366704389057900121110968462358669*5*10***]

6.0 SERVICE FEE SCHEDULE: […*…] CHARACTERIZATION & VALIDATION - DURATION – 9 FISCAL MONTHS**

Phase	Deliverables: Turnkey Project	Total
6.1 Phase 1	**Complete Process Characterization for Validation**	**[…***…]**
	[…***…]	
	[…***…]	
	[…***…]	
	[…***…]	
	[…***…]	
	[…***…]	
	Milestones:	
	[…***…]	[…***…]
	[…***…]	[…***…]
	[…***…]	[…***…]
	[…***…]	[…***…]
	[…***…]	[…***…]
	[…***…]	[…***…]
	[…***…]	[…***…]
	[…***…]	[…***…]

["***AMEND462693-008*1*52256887934!27358704383057603!211086646623583893*6*!0***]

Phase	Deliverables: Turnkey Project	Total
6.2 Phase 2	**Validate Process for Specialty Production**	**[…***…]**
	[…*…]**	
	[…*…]**	
	[…***…]	
	Milestones:	
	[…***…]	[…***…]
	[…***…]	[…***…]
	[…***…]	[…***…]
	[…***…]	[…***…]
	[…***…]	[…***…]
	[…***…]	[…***…]
	[…***…]	[…***…]
	[…***…]	[…***…]
	[…***…]	[…***…]
	[…***…]	[…***…]

Change in the scope of work: If Customer, during the course of the project execution, materially changes the scope of work such that the SVTC's engineering resources are increased or if the costs to SVTC increase to perform the work as per the changes, Customer will be notified in order to reconvene to re-negotiate the agreement. In case the parties do not agree regarding the changes, Customer is responsible for the payments according to the Early Termination clause, below.

["*AMEND462693-008"1*622568879341273587043830578031211096846623583893*7*10***]

7.0 TERMS:

1) *Section 5.0 (above) Actual usage shall be invoiced at the end of each SVTC fiscal month for actual services provided, due NET30 days. At the end of SVTC's fiscal year, […***…].*

2) *Customer must provide SVTC with advanced written notice of its election of the pricing tier, section 5 above, twice a year, at least […***…] prior to the start of the first and third SVTC fiscal quarters. If no written notice is received […***…] prior to the beginning of any quarter, the pricing tier […***…]. In the event […***…] is selected by Customer, the price structure for that tier will be applied to […***…]. In the event a […***…].*

3) *These commercial terms may be terminated with 90 days prior written notice of project termination.*

4) *Product/sample wafers will be ordered under this agreement, and will be invoiced upon shipment, and shall be included in the quarterly financial commitment.*

5) *The first and last billing cycle fees and service quantities other than set up shall be prorated to the actual start date and then continue in accordance with SVTC's fiscal calendar such that all invoicing shall follow SVTC fiscal month start and end dates.*

6) *Section 6.0 (above): SVTC shall invoice Customer upon completion of each milestone as defined in sub-sections 6.1 and 6.2 above, and payment shall be due 30 days from date of invoice.*

7) *Upon execution, this proposal will supersede the existing agreement between Customer and SVTC, and that agreement (AMEND462693-006) will become null and void with no penalty to Customer.*

8) *The parties agree that the final outcome of the […***…] cannot be known at the time of this agreement. Therefore it is agreed that in the event […***…], then the parties will agree to convene and decide on next steps. In such case, BioNano Genomics would be under no obligation to […***…]. In the event that […***…], then […***…] will be the responsibility of SVTC.*

8.0 LICENSED TECHNOLOGY:

The Services listed above and SVTC's process technology, including recipes and steps, used in the performance of services shall be provided and licensed to Customer under the terms, conditions and limitations of the Master Services Agreement, which shall override and supersede any terms and conditions in any customer provided documents.

[***AMEND462693-008*1*522568879341273687043630578031211009846623583803*8*10***]

9.0 ASSUMPTIONS, RISKS & MITIGATIONS:

Cornerstone Assumptions

[…***…] process flow as developed will not require major changes in process integration.

[…***…] will provide hardware for new wetting quality checks.

Risks	Risk Mitigation Plan
[…***…]	[…***…]
[…***…]	[…***…]
[…***…]	[…***…]
[…***…]	[…***…]
[…***…]	[…***…]
[…***…]	[…***…]

["***AMENDA62693-008*1*52258887934127368704383057803121109684682358389 3*9*10***]

*****Confidential Treatment Requested**

Exhibit D
Process Controls and Metrics

To be defined at a future date

["**AMEND462693-008*1*52255887934127358704383057803121109584662358389*1D*10**"]

AMENDMENT 8

This Amendment 8, ("Amendment"), dated October 29, 2012 ("Effective Date") is to the Master Services Agreement dated March 2, 2009 ("Agreement") between Novati Technologies, Inc. ("Novati"), and BioNano Genomics ("Customer"). The Agreement mandates that all changes must be in a writing signed by the parties. Except as provided below, all the provisions of the Agreement shall remain in effect and apply to the amended language. Accordingly, the parties agree to the following:

1) The parties acknowledge the successful assignment of the Agreement by SVTC Technologies, LLC to Novati Technologies, Inc. ("Novati") effective as of October 15, 2012.

2) The parties agree to amend the Agreement describing services that Novati will perform for Customer starting on the Effective Date.

3) Starting on October 19, 2012 and ending on December 31, 2012, Novati will continue the ongoing Development of the […***…]. Accordingly, the parties agree to use the Tier 2 pricing in Section 5 of Exhibit A7. The proposed estimated volume is […***…] over this time period.

4) Customer agrees to prepay the charges for the activities and engineering hours in item 2) above, for a total amount of […***…] which is the estimated November and December spend. Novati shall invoice the November prepayment of […***…] upon execution of this Amendment, and Customer agrees to pay on or before November 16, 2012. Furthermore, Customer agrees to prepay […***…] on or before December 1, 2012 which is the estimated spend for December.

5) The Wafer minimum Lot size for all activities under this agreement shall be 6.

6) Any pre-paid funds which are unutilized as of December 31, 2012 shall be carried forward as a credit balance. Any activities, engineering hour charges, or other billable services in excess of the pre-paid amount shall be reconciled and billed as of December 31, 2012 at the unit cost consistent with that specified in 3) above and are due Net 30.

7) The parties may extend the term of the Agreement by mutual agreement in writing on a quarterly basis.

8) Novati's address for notices, set forth in section 12.8 of the Agreement is hereby replaced with: 2706 Montopolis Drive, Austin, TX 78741, ATTN: Legal Department.

Effect of this Amendment: In the event of any conflict between the Agreement and this Amendment, this Amendment shall control. Except as amended or as otherwise set forth in this Amendment, the Agreement shall continue unchanged and in full force and effect in accordance with its terms.

*****Confidential Treatment Requested**

With due authority from our respective companies, we hereby signify our consent to this Agreement by signing below,

Novati Technologies, Inc.

Signature: _____
Printed Name: David B. Anderson
Title: CEO
Date: _____

Customer: **BioNano Genomics**

Signature: /s/ Erik Holmlin
Printed Name: Erik Holmlin
Title: Chief Executive Officer
Date: 11/14/12

[***AMEND462693-009*1*262910851493418303730766471954995764738069276926*2*2***]

AMENDMENT 9

This Amendment 9, ("Amendment"), dated December 31, 2012 ("Effective Date") is to the Master Services Agreement dated March 2, 2009 ("Agreement") between Novati Technologies, Inc. ("Novati"), and BioNano Genomics ("Customer"). Novati is the legal successor in interest to SVTC Technologies, LLC on the Agreement. The Agreement mandates that all changes must be in a writing signed by the parties. Except as provided below, all the provisions of the Agreement shall remain in effect and apply to the amended language. Accordingly, the parties agree to the following:

1) The parties agree to amend the Agreement to describe services that will be provided by Novati for Customer on the effective date. Novati will continue to provide to Customer the services described in Amendment 7 for the fees set forth therein using the Tier 2 pricing in Section 5.0, subject to any additional terms and conditions set forth therein.

2) The parties hereby agree to amend paragraph 3 of Amendment 7 to revise the expiration date from March 24, 2013 to March 31, 2013 to align with the Novati fiscal quarter.

3) The parties agree to delete in its entirety Section 6.2 – Phase 2, described in Amendment 7.

4) The parties agree that section 12.1 of the Agreement is hereby amended to state that the laws of the State of Texas, without regard to the conflict of laws provisions, shall govern this Agreement.

Effect of this Amendment: In the event of any conflict between the Agreement and this Amendment, this Amendment shall control. Except as amended or as otherwise set forth in this Amendment, the Agreement shall continue unchanged and in full force and effect in accordance with its terms.

With due authority from our respective companies, we hereby signify our consent to this Agreement by signing below,

Novati Technologies, Inc.

Signature: /s/ David B. Anderson
Printed Name: David B. Anderson
Title: Chief Executive Officer
Date: 1-31-13

Customer: **BioNano Genomics**

Signature: /s/ Erik Holmlin
Printed Name: Erik Holmlin
Title: Chief Executive Officer
Date: Jan 30, 2013

["**AMEND462693-010*4*1915920038756435593228954947655481003605128102 54*1*1**"]

AMENDMENT 10

This Amendment 10, ("Amendment"), dated April 1, 2013 ("Effective Date") is to the Master Services Agreement dated March 2, 2009 ("Agreement") between Novati Technologies, Inc. ("Novati"), and BioNano Genomics ("Customer"). The Agreement mandates that all changes must be in a writing signed by the parties. Except as provided below, all the provisions of the Agreement shall remain in effect and apply to the amended language. Accordingly, the parties agree to the following:

1) The parties agree to amend the Agreement describing services that will be provided by Novati for Customer starting on the Effective Date. Novati will provide to Customer the services described in Exhibit A10 for the fees set forth therein subject to any additional terms and conditions set forth therein.

Effect of this Amendment: In the event of any conflict between the Agreement and this Amendment, this Amendment shall control. Except as amended or as otherwise set forth in this Amendment, the Agreement shall continue unchanged and in full force and effect in accordance with its terms.

LIST OF ATTACHMENTS: Following is a list of attachments to this Amendment, including all Schedules and Exhibits. Any future added attachment must include a dated Amendment or provision referencing the Agreement and must be executed by all parties.

Exhibit A10

With due authority from our respective companies, we hereby signify our consent to this Agreement by signing below,

Novati Technologies, Inc.

Signature: /s/ David B. Anderson
Printed Name: David B. Anderson
Title: President and CEO
Date: March 18, 2013

Customer: **BioNano Genomics**

Signature: /s/ Erik Holmlin
Printed Name: Erik Holmlin
Title: Chief Executive Officer
Date: March 15, 2013

Exhibit A
Commercial Quotation
For BioNano Genomics's Alpha Chip Continued Development - Q2'13 - Q1'14

START DATE: 04-01-20139 **DURATION:** Four Fiscal (4) Quarters

Novati proposes the date above on which Novati will begin providing the following services under the Master Services Agreement ("Start Date"). Project Duration is the period of time for the project described in this Quotation.

1.0 DESCRIPTION OF SERVICES:

Novati shall provide research and development services in support of BioNano Genomics's Alpha Chip Continued Development Q2'13 - Q1'14. Novati will start with semiconductor processes that exist or are being developed by BioNano Genomics, and will provide other support as described herein ("Services"). Novati shall use commercially reasonable efforts to perform the Services requested by BioNano Genomics, subject to the ability of Novati to perform these Services on Novati's existing equipment and using standard materials and process recipes that are compatible with the equipment and resources of Novati.

2.0 SUMMARY OF SERVICES THAT MAY BE PROVIDED:

- Fab Services
- Engineering Services

3.0 NOVATI SERVICE DEFINITIONS:

Fab Services:

1. […***…]
2. […***…]
3. […***…]
4. […***…]
5. […***…]
6. […***…]
7. […***…]

[***AMEND462693-011*2*550619168665826308795323705867240751779597722463*2*5***]

***Confidential Treatment Requested

Engineering Services: (Defined in the Agreement)

1. […***…]

2. These services are to be executed in collaboration with customers direction and management

4.0 ADDITIONAL SERVICES:**

Additional Training Services	[…***…]
Additional Cubicles & Lockable Office Space	[…***…]
Reticles	[…***…]
Analytical Services	[…***…]

** Additional Services subject to availability

[***AMEND462693-011*2*550619168865826308795323706867240751779597722463*3*5***]

5.0 NOVATI SERVICE FEE SCHEDULE:

	Item	Fees	Frequency
a)	**Tier 1 Pricing**	[…***…]	Per activity
	[…*…]**	[…***…]	per hour
	[…*…]**		per standard price list
	Tier 1 Minimum Financial Commitment	[…***…]	Quarterly
b)	**Tier 2 Pricing (Baseline Minimum Financial Commitment)**	[…***…]	Per activity
	[…*…]**	[…***…]	per hour
	[…*…]**		per standard price list
	Tier 2 Minimum Financial Commitment	[…***…]	Quarterly
c)	**Tier 3 Pricing**	[…***…]	Per activity
	[…*…]**	[…***…]	per hour
	[…*…]**		per standard price list
	Tier 3 Minimum Financial Commitment	[…***…]	Quarterly
d)	**Tier 4 Pricing**	[…***…]	Per activity
	[…*…]**	[…***…]	per hour
	[…*…]**		per standard price list
	Tier 4 Minimum Financial Commitment	[…***…]	Quarterly
e)	**Hot Lot Fee**	[…***…]	Per request
f)	**Baseline Minimum Financial Commitment (Tier 2 above)**	**[…***…]**	**Quarterly**

[***AMEND462693-011*2*550619168865826308795323703867240751779597722463*4*5***]

*****Confidential Treatment Requested**

6.0 TERMS:

1) *The Minimum Financial Commitment (MFG) for Fab Services and Engineering Services shall be per the selected Tier in Section 5. At the signing of contract, the Minimum Financial Commitment will be set at the Tier 2 Baseline. Novati will invoice Customer […***…] 15 days prior to the start of the fiscal quarter and each subsequent fiscal month thereafter. All prepayments are due immediately upon receipt of invoice. Actual usage shall be invoiced at the end of each Novati fiscal month for actual services provided and is due within 30 days from date of invoice. At the end of Novati's fiscal quarter, the actual usage will be 'trued-up" against the designated MFC tier, and any under usage shall be invoiced and is due within 30 days from date of invoice. Other than the foregoing, Novati shall invoice Customer when services are rendered, products shipped and/or deliverables are provided in the Novati fiscal month that they occur. Payments shall be due within 30 days from date of Invoice.*

2) *Customer may change the election of the pricing tier on a quarterly basis by providing 20 days advanced written notice prior to each Novati fiscal quarter. If no written notice is received 20 days prior to the beginning of any quarter, the pricing tier will automatically be set to Tier 2.*

3) *The first and last billing cycle fees and service quantities other than set up shall be prorated to the actual start date and then continue in accordance with Novati's fiscal calendar such that all invoicing shall follow Novati fiscal month start and end dates.*

4) *Additional Activities, Engineering Hours, Additional Tool Training, access to additional equipment and resources, and other Extraordinary Expenses ("Additional Services") shall be made available at Novati's sole discretion and shall be agreed to in writing prior to being performed by Novati BioNano Genomics shall pay for all Additional Services per the terms of the Master Services Agreement.*

7.0 LICENSED TECHNOLOGY:

The Services listed above and Novati's process technology, including recipes and steps, used in the performance of services shall be provided and licensed to Customer under the terms, conditions and limitations of the Master Services Agreement, which shall override and supersede any terms and conditions in any customer provided documents.

["***AMEND462693-011*2*550619168865826308795323706867240751779597722463*5*5***]

*****Confidential Treatment Requested**

AMENDMENT 11

This Amendment 11, ("Amendment"), dated April 29, 2013 ("Effective Date") is to the Master Services Agreement dated March 2, 2009 ("Agreement") between Novati Technologies, Inc. ("Novati"), and BioNano Genomics ("Customer"). The Agreement mandates that all changes must be in a writing signed by the parties. Except as provided below, all the provisions of the Agreement shall remain in effect and apply to the amended language. Accordingly, the parties agree to the following:

1) The parties agree to amend the Agreement describing services that will be provided by Novati for Customer starting on the Effective Date. Novati will provide to Customer the services described for the fees set forth therein subject to any additional terms and conditions set forth therein.

2) The following activity has occurred against Amendment 10 to date: Novati invoiced Customer the April prepayment against invoice 616 on 3/18/13 for […***…] and has been paid by Customer. Novati invoiced Customer the May prepayment against invoice 800 on 4/15/13 for […***…]. Novati agrees to credit Customer for the invoice amount.

3) Starting on April 29, 2013 Section 6, item 1 in Amendment 10 shall be replaced and superseded in its entirety with the following.

4) The Minimum Financial Commitment (MFC) for Fab Services and Engineering Services shall be per the selected Tier in Section 5. At the signing of contract, the Minimum Financial Commitment will be set at the Tier 2 Baseline. Novati will invoice Customer actual usage bi-weekly for actual services provided and will be due immediately upon receipt of invoice. At the end of Novati's fiscal quarter, the actual usage will be "trued-up" against the designated MFC tier, and any under usage shall be invoiced and is due immediately upon receipt of invoice. Other than the foregoing, Novati shall invoice Customer when services are rendered, products shipped and/or deliverables are provided in the Novati fiscal month that they occur. Payments shall be due Net 0 from date of invoice.

Effect of this Amendment: In the event of any conflict between the Agreement and this Amendment, this Amendment shall control. Except as amended or as otherwise set forth in this Amendment, the Agreement shall continue unchanged and in full force and effect in accordance with its terms.

LIST OF ATTACHMENTS: Following is a list of attachments to this Amendment, including all Schedules and Exhibits. Any future added attachment must include a dated Amendment or provision referencing the Agreement and must be executed by all parties.

*****Confidential Treatment Requested**

With due authority from our respective companies, we hereby signify our consent to this Agreement by signing below,

Novati Technologies, Inc.

Signature: /s/ David B. Anderson
Printed Name: David B. Anderson
Title: President and CEO
Date: April 24, 2013

Customer: **BioNano Genomics**

Signature: /s/ R. Erik Holmlin
Printed Name: R. Erik Holmlin
Title: President CEO
Date: 24-Apr-2013

[***AMEND462693-012*2*08269422494996201526602110702747021190908335033 1*2*2***]

AMENDMENT 12

This Amendment 12, ("Amendment"), dated December 15, 2013 ("Effective Date") is to the Master Services Agreement dated March 2, 2009 ("Agreement") between Novati Technologies, Inc. ("Novati"), and BioNano Genomics ("Customer"). The Agreement mandates that all changes must be in a writing signed by the parties. Except as provided below, all the provisions of the Agreement shall remain in effect and apply to the amended language. Accordingly, the parties agree to the following:

1) The parties agree to amend the Agreement describing services that will be provided by Novati for Customer starting on the Effective date. Novati will provide to Customer the services described for the fees set forth therein subject to any additional terms and conditions set forth therein.

2) Starting on December 15th, 2013 Section 4 in Amendment 11 shall be replaced and superseded in its entirety with the original language stated Section 6.0, paragraph (1) in Amendment 10 to reinstate the prepayment provisions for Q1 2014.

Effect of this Amendment: In the event of any conflict between the Agreement and this Amendment, this Amendment shall control. Except as amended or as otherwise set forth in this Amendment, the Agreement shall continue unchanged and in full force and effect in accordance with its terms.

With due authority from our respective companies, we hereby signify our consent to this Agreement by signing below,

Novati Technologies, Inc.

Signature: /s/ David B. Anderson
Printed Name: David B. Anderson
Title: President and CEO
Date: DEC 17, 2013

Customer: **BioNano Genomics**

Signature: /s/ Lynne R. Rollins
Printed Name: Lynne R. Rollins
Title: CFO
Date: Dec 16 2013

[***AMEND462693-013*3*3987630281732240640956571811596199703235711501521*1*1***]

AMENDMENT 13

This Amendment 13, ("Amendment"), dated March 7, 2014 ("Effective Date") is to the Master Services Agreement dated March 2, 2009 ("Agreement") between Novati Technologies, Inc. ("Novati"), and BioNano Genomics ("Customer"). The Agreement mandates that all changes must be in a writing signed by the parties. Except as provided below, all the provisions of the Agreement shall remain in effect and apply to the amended language. Accordingly, the parties agree to the following:

1) Both parties agree to extend the expiration date of the Agreement from April 1, 2014 to March 31, 2015.

2) Effective April 1, 2014 item 4 in Amendment 11 shall be replaced and superseded with the following paragraph which was originally set forth in Section 6, item 1 in Amendment 10:

   The Minimum Financial Commitment (MFC) for Fab Services and Engineering Services shall be per the selected Tier in Section 5. At the signing of contract, the Minimum Financial Commitment will be set at the Tier 2 Baseline. Novati will invoice Customer 1/3 of the quarterly commitment 15 days prior to the start of the fiscal quarter and each subsequent fiscal month thereafter. All prepayments are due immediately upon receipt of invoice. Actual usage shall be invoiced at the end of each Novati fiscal month for actual services provided and is due within 30 days from date of invoice. At the end of Novati's fiscal quarter, the actual usage will be "trued-up" against the designated MFC tier, and any under usage shall be invoiced and is due within 30 days from date of invoice. Other than the foregoing, Novati shall invoice Customer when services are rendered, products shipped and/or deliverables are provided in the Novati fiscal month that they occur. Payments shall be due within 30 days from date ofinvoice.

Effect of this Amendment: In the event of any conflict between the Agreement and this Amendment, this Amendment shall control. Except as amended or as otherwise set forth in this Amendment, the Agreement shall continue unchanged and in full force and effect in accordance with its terms.

LIST OF ATTACHMENTS: Following is a list of attachments to this Amendment, including all Schedules and Exhibits. Any future added attachment must include a dated Amendment or provision referencing the Agreement and must be executed by all parties.

[***AMEND462693-014*7*0168015554457690091701291414410379334901620306O2*1*2***]

With due authority from our respective companies, we hereby signify our consent to this Agreement by signing below,

Novati Technologies, Inc.

Signature: /s/ David B. Anderson
Printed Name: David B. Anderson
Title: President and CEO
Date: 3/13/2014

Customer: **BioNano Genomics**

Signature: /s/ Erik Holmlin
Printed Name: Erik Holmlin
Title: CEO
Date: 3/13/14

[***AMEND462693-014*7*0168015554457690091701291414410379334901620306O2*2*2***]

AMENDMENT 14

This Amendment 14, ("Amendment"), dated June 10, 2014 ("Effective Date") is to the Master Services Agreement dated March 2, 2009 ("Agreement") between Novati Technologies, Inc. ("Novati"), and BioNano Genomics ("Customer"). The Agreement mandates that all changes must be in a writing signed by the parties. Except as provided below, all the provisions of the Agreement shall remain in effect and apply to the amended language. Accordingly, the parties agree to the following:

1) The parties agree that the unspent portion of Customer's MFC for 2Q2014, shall carry forward into the next calendar quarter, 3Q2014.

Effect of this Amendment: In the event of any conflict between the Agreement and this Amendment, this Amendment shall control. Except as amended or as otherwise set forth in this Amendment, the Agreement shall continue unchanged and in full force and effect in accordance with its terms.

LIST OF ATTACHMENTS: Following is a list of attachments to this Amendment, including all Schedules and Exhibits. Any future added attachment must include a dated Amendment or provision referencing the Agreement and must be executed by all parties.

With due authority from our respective companies, we hereby signify our consent to this Agreement by signing below,

Novati Technologies, Inc.

Signature: /s/ David B. Anderson
Printed Name: David B. Anderson
Title: President and CEO
Date: June 10 2014

Customer: **BioNano Genomics**

Signature: /s/ Joel R. Jung
Printed Name: Joel R. Jung
Title: CFO
Date: June 11, 2014

["**AMEND462693-015*5*399062922730200116526774277491331432257718938622*1*1***]

AMENDMENT 15

This Amendment 15, ("Amendment"), dated September 18, 2014 ("Effective Date") is to the Master Services Agreement dated March 2, 2009 ("Agreement") between Novati Technologies, Inc. ("Novati"), and BioNano Genomics ("Customer"). The Agreement mandates that all changes must be in a writing signed by the parties. Except as provided below, all the provisions of the Agreement shall remain in effect and apply to the amended language. Accordingly, the parties agree to the following:

1) The parties agree that the unspent portion of Customer's MFC for 3Q2014, shall carry forward into the next calendar quarter, 4Q2014.

Effect of this Amendment: In the event of any conflict between the Agreement and this Amendment, this Amendment shall control. Except as amended or as otherwise set forth in this Amendment, the Agreement shall continue unchanged and in full force and effect in accordance with its terms.

LIST OF ATTACHMENTS: Following is a list of attachments to this Amendment, including all Schedules and Exhibits. Any future added attachment must include a dated Amendment or provision referencing the Agreement and must be executed by all parties.

With due authority from our respective companies, we hereby signify our consent to this Agreement by signing below,

Novati Technologies, Inc.

Signature: /s/ David B. Anderson
Printed Name: David B. Anderson
Title: President and CEO
Date: 25 Sep. 2014

Customer: **BioNano Genomics**

Signature: /s/ R. Erik Holmlin
Printed Name: R. Erik Holmlin
Title: President & CEO
Date: 26 Sept 2014

["**AMEND462693-016*5*4441460192313718450944675936729040868082776253336*1*1***]

AMENDMENT 16

This Amendment 16, ("Amendment"), dated October 7, 2014 ("Effective Date") is to the Master Services Agreement dated March 2, 2009 ("Agreement") between Novati Technologies, Inc. ("Novati"), and BioNano Genomics ("Customer"). The Agreement mandates that all changes must be in a writing signed by the parties. Except as provided below, all the provisions of the Agreement shall remain in effect and apply to the amended language. Accordingly, the parties agree to the following:

1) Pricing for the […***…] is […***…] per wafer. Min lot size = […***…] wafers which is consistent with the current commercial terms.

Effect of this Amendment: In the event of any conflict between the Agreement and this Amendment, this Amendment shall control. Except as amended or as otherwise set forth in this Amendment, the Agreement shall continue unchanged and in full force and effect in accordance with its terms.

LIST OF ATTACHMENTS: Following is a list of attachments to this Amendment, including all Schedules and Exhibits. Any future added attachment must include a dated Amendment or provision referencing the Agreement and must be executed by all parties.

With due authority from our respective companies, we hereby signify our consent to this Agreement by signing below,

Novati Technologies, Inc.

Signature: /s/ David B. Anderson
Printed Name: David B. Anderson
Title: President and CEO
Date: 2014-10-22

Customer: **BioNano Genomics**

Signature: /s/ R. Erik Holmlin
Printed Name:
Title:
Date:

*****Confidential Treatment Requested**

AMENDMENT 17

This Amendment 17, ("Amendment"), dated April 1, 2015 ("Effective Date") is to the Master Services Agreement dated March 2, 2009 ("Agreement") between Novati Technologies, Inc. ("Novati"), and BioNano Genomics ("Customer"). The Agreement mandates that all changes must be in a writing signed by the parties. Except as provided below, all the provisions of the Agreement shall remain in effect and apply to the amended language. Accordingly, the parties agree to the following:

1) Both parties agree to extend the expiration date of the Agreement from March 31, 2015 to May 31, 2015.

Effect of this Amendment: In the event of any conflict between the Agreement and this Amendment, this Amendment shall control. Except as amended or as otherwise set forth in this Amendment, the Agreement shall continue unchanged and in full force and effect in accordance with its terms.

LIST OF ATTACHMENTS: Following is a list of attachments to this Amendment, including all Schedules and Exhibits. Any future added attachment must include a dated Amendment or provision referencing the Agreement and must be executed by all parties.

With due authority from our respective companies, we hereby signify our consent to this Agreement by signing below,

Novati Technologies, Inc.

Signature: /s/ David B. Anderson
Printed Name: David B. Anderson
Title: President and CEO
Date: 4/5/2015

Customer: **BioNano Genomics**

Signature: /s/ Mark Borodkin
Printed Name: Mark Borodkin
Title: VP, Systems Development
Date: 4/2/2015

[***AMEND462693-018*5*1477158233031678143960812750467235237470254372651*1***]

AMENDMENT 18

This Amendment 18, ("Amendment"), dated June 1, 2015 ("Effective Date") is to the Master Services Agreement dated March 2, 2009 ("Agreement") between Novati Technologies, Inc. ("Novati"), and BioNano Genomics ("Customer"). The Agreement mandates that all changes must be in a writing signed by the parties. Except as provided below, all the provisions of the Agreement shall remain in effect and apply to the amended language. Accordingly, the parties agree to the following:

1) The parties agree to amend the Agreement describing services that will be provided by Novati for Customer starting on the Effective Date. Novati will provide to Customer the services described in Exhibit A for the fees set forth therein subject to any additional terms and conditions set forth therein.

Effect of this Amendment: In the event of any conflict between the Agreement and this Amendment, this Amendment shall control. Except as amended or as otherwise set forth in this Amendment, the Agreement shall continue unchanged and in full force and effect in accordance with its terms.

LIST OF ATTACHMENTS: Following is a list of attachments to this Amendment, including all Schedules and Exhibits. Any future added attachment must include a dated Amendment or provision referencing the Agreement and must be executed by all parties.

Exhibit A

With due authority from our respective companies, we hereby signify our consent to this Agreement by signing below,

Novati Technologies, Inc.

Signature: /s/ David B. Anderson
Printed Name: David B. Anderson
Title: President and CEO
Date: 6-2-2015

Customer: **BioNano Genomics**

Signature: /s/ Erik Holmlin
Printed Name: Erik Holmlin
Title: Chief Executive Officer
Date: 29 May 2015

Exhibit A
Commercial Quotation
For BioNano Genomics's Alpha Chip Development & Production

START DATE: 06-01-2015 **DURATION:** 05-31-2016

Novati proposes the date above on which Novati will begin providing the following services under the Master Services Agreement ("Start Date"). Project Duration is the period of time for the project described in this Quotation.

1.0 DESCRIPTION OF SERVICES:

Novati shall provide development and pilot production services in support of BioNano Genomics' Alpha Chip requirements. Novati will start with semiconductor processes that exist or are being developed by BioNano Genomics, and will provide other support as described herein ("Services"). Novati shall use commercially reasonable efforts to perform the Services requested by BioNano Genomics, subject to the ability of Novati to perform these Services on Novati's existing equipment and using standard materials and process recipes that are compatible with the equipment and resources of Novati.

2.0 SUMMARY OF SERVICES THAT MAY BE PROVIDED:

- Fab Services
- Engineering Services

3.0 NOVATI SERVICE DEFINITIONS:

Fab Services:

1. [...***...]
2. [...***...]
3. [...***...]
4. [...***...]
5. [...***...]
6. [...***...]

* or as available per Novati's then-current standard operating schedule

[***AMEND462693-011*2*550619168858263087953237068672407517795977224 63*2*5***]

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Engineering Services: (Defined in the Agreement)

1. […***…]

2. These services are to be executed in collaboration with customers direction and management

4.0 ADDITIONAL SERVICES**:

Additional Training Services	[...***...]
Additional Cubicles & Lockable Office Space	[...***...]
Reticles	[...***...]
Analytical Services	[...***...]

** Additional Services subject to availability

5.0 TABLE-1–MOVE PRICING:

		Development (6-wfr min lot)			Fixed Flow	Fixed Flow
Tool Type /Area	**Category**	**Tier 1**	**Tier 2**	**Tier 3**	**(25-wfr min lot)**	**(25-wfr min lot)**
[...***...]	[...***...]	[...***...]	[...***...]	[...***...]	[...***...]	[...***...]
[...***...]	[...***...]	[...***...]	[...***...]	[...***...]	[...***...]	[...***...]
[...***...]	[...***...]	[...***...]	[...***...]	[...***...]	[...***...]	[...***...]
[...***...]	[...***...]	[...***...]	[...***...]	[...***...]	[...***...]	[...***...]
[...***...]	[...***...]	[...***...]	[...***...]	[...***...]	[...***...]	[...***...]
[...***...]	[...***...]	[...***...]	[...***...]	[...***...]	[...***...]	[...***...]
[...***...]	[...***...]	[...***...]	[...***...]	[...***...]	[...***...]	[...***...]
[...***...]	[...***...]	[...***...]	[...***...]	[...***...]	[...***...]	[...***...]
[...***...]	[...***...]	[...***...]	[...***...]	[...***...]	[...***...]	[...***...]

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6.0 NOVATI SERVICE FEE SCHEDULE:

	Item	Fees	Frequency
a)	**Tier 1 Pricing**		
	• [...***...]	Per Table 1	Per move
	Engineering Services — Process Engineering Support	[...***...]	per hour
	Tier 1 Minimum Financial Commitment	[...***...]	Quarterly
b)	**Tier 2 Pricing (Baseline Minimum Financial Commitment)**		
	• [...***...]	Per Table 1	Per move
	Engineering Services — Process Engineering Support	[...***...]	per hour
	Tier 2 Minimum Financial Commitment	[...***...]	Quarterly
c)	**Tier 3 Pricing**		
	• [...***...]	Per Table 1	Per move
	Engineering Services — Process Engineering Support	[...***...]	per hour
	Tier 3 Minimum Financial Commitment	[...***...]	Quarterly
d)	**Expedite Fees**		
	[...***...]	[...***...]	Per request
	[...***...]	[...***...]	CoO approval
	[...***...]	[...***...]	CoO approval

ADDITIONAL NOTES:

1. [...***...]
2. [...***...].
3. [...***...].
4. Wafers can be processed through any portion of the process Flow that is designated as “Fixed Flow”, at the Fixed Flow pricing per Table-1, provided minimum lot size criteria are met. These wafers can be staged for further development / small lot size processing through subsequent processes including TSV and bond. These “child” lots will be billed for all subsequent steps at the appropriate development pricing tier and minimum lot size. Fixed Flow is defined as any part of the process flow that is mutually agreed as not requiring engineering development or support to be processed in line.
5. Novati and Customer will mutually agree upon production FMEA criteria and risks, based upon completion of TDP (Technology Development Process) criteria to move from POC to a “validated” flow. Once established and agreed upon with risks effectively mitigated, Novati will commit to deliver wafers against those criteria, and wafers that fail to meet those criteria will be reimbursable or replaced at Novati expense. Prior to TDP completion and established FMEA criteria, reimbursable events will be limited to those in which a mis-process occurs at fault of Novati, or where a failed Novati tool qualification/spec causes a scrap event. In the event of Novati mis-process / tool-related event causing scrap, if a replacement lot is started it will be elevated to “Hot” status at no additional charge to customer, or “Rocket” status at […***…] up-charge. Customer may at their discretion apply this status to a lot already in line. If Customer requests expedited status prior to assignment of root cause, Customer agrees to bear potential expenses in the event root cause is determined not to be a Novati mis-process or

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tool-related issue. Expenses will be totalled and invoiced after the final failure analysis report has been presented to Customer.

6. The next lot to arrive at a step where the previous lot incurred a scrap event will be processed as follows: A single wafer will be sent ahead through the tool to verify correct operation before the rest of the lot is cleared to process. The lot will then be merged back into a single lot immediately after this operation. No min-lot or split-lot charge shall be assessed for this activity.
7. Novati shall furnish to Customer a list of current qualification/specs for each tool in Customer's process flow, and shall update Customer when specifications are revised.

7.0 TERMS:

1) *The Minimum Financial Commitment (MFC) for Fab Services and Engineering Services shall be per the selected Tier in Section 5. At the signing of contract unless otherwise specified, the Minimum Financial Commitment will be set at the Tier 1 Baseline. Novati will invoice Customer […***…] 15 days prior to the start of the fiscal quarter and each subsequent fiscal month thereafter. All prepayments shall be due NET15 days from invoice. Actual usage shall be "trued up" at the end of each Novati fiscal month for actual services provided and is due NET15 days from invoice. In the event the designated MFC is not fully consumed through no fault of Customer, up to […***…] of the MFC value can be carried forward to the next quarter. The carry-forward amount must be consumed in the subsequent quarter or it shall be forfeited. In the event that extended tool down events cause the MFC not to be fully consumed, the […***…] cap shall not apply, and the carry-forward period shall be extended to up to 6 months from the time the tool is re-qualified to meet specification.*

2) *Customer may change the election of the pricing tier on a quarterly basis by providing 2 weeks advanced written notice prior to each Novati fiscal quarter. If no written notice is received 2 weeks prior to the beginning of any quarter, the pricing tier will automatically be set to Tier 1.*

3) *The first and last billing cycle fees and service quantities shall be prorated to the actual start date and then continue in accordance with Novati's fiscal calendar such that all invoicing shall follow Novati fiscal month start and end dates.*

4) *Additional Activities, Engineering Hours, Additional Tool Training, access to additional equipment and resources, and other Extraordinary Expenses ('Additional Services") shall be made available at Novati's sole discretion. BioNano Genomics shall pay for all Additional Services per the terms of the Master Services Agreement.*

8.0 LICENSED TECHNOLOGY:

The Services listed above and Novati's process technology, including recipes and steps, used in the performance of services shall be provided and licensed to Customer under the terms, conditions and limitations of the Master Services Agreement, which shall override and supersede any terms and conditions in any customer provided documents.

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AMENDMENT 19

This Amendment 19, ("Amendment"), dated July 25 2016 ("Effective Date") is to the Master Services Agreement dated March 2, 2009 ("Agreement") between Novati Technologies, Inc. ("Novati"), and BioNano Genomics ("Customer"). The Agreement mandates that all changes must be in a writing signed by the parties. Except as provided below, all the provisions of the Agreement shall remain in effect and apply to the amended language. Accordingly, the parties agree to the following:

1) The parties agree to amend the Agreement to incorporate Exhibit A, describing development services, which will be provided by Novati for Customer starting on the Effective Date for the fees set forth therein.

2) The parties agree to amend the Agreement to extend the expiration date to March 31, 2017.

Effect of this Amendment: In the event of any conflict between the Agreement and this Amendment, this Amendment shall control. Except as amended or as otherwise set forth in this Amendment, the Agreement shall continue unchanged and in full force and effect in accordance with its terms.

LIST OF ATTACHMENTS: Following is a list of attachments to this Amendment, including all Schedules and Exhibits. Any future added attachment must include a dated Amendment or provision referencing the Agreement and must be executed by all parties.

Exhibit A – Development Services

With due authority from our respective companies, we hereby signify our consent to this Agreement by signing below,

Novati Technologies, Inc.

Signature: /s/ Rod Langley (on behalf of John Behnke)
Printed Name: John Behnke
Title: President
Date: 7-18-2016

Customer: **BioNano Genomics**

Signature: /s/ Erik Holmlin
Printed Name: Erik Holmlin
Title: Chief Executive Officer
Date: 7/14/16

[***AMEND462693-020*2*02568359515751844040831725346251634161885980608 6*1*7***]

Exhibit A
Commercial Quotation – Development Services

START DATE: 07-01-2016 **END DATE:** 03-31-2017

Novati proposes the date above on which Novati will begin providing the following services under the Master Services Agreement ("Start Date"). Project Duration is the period of time for the project described in this quotation.

1.0 DESCRIPTION OF SERVICES:

Novati shall provide development and pilot production services in support of BioNano Genomics' Alpha Chip requirements. Novati will start with semiconductor processes that exist or are being developed by BioNano Genomics, and will provide other support as described herein ("Services"). Novati shall use commercially reasonable efforts to perform the Services requested by BioNano Genomics, subject to the ability of Novati to perform these Services on Novati's existing equipment and using standard materials and process recipes that are compatible with the equipment and resources of Novati.

2.0 SUMMARY OF SERVICES THAT MAY BE PROVIDED:

- Fab Services
- Engineering Services

[***AMEND462693-020*2*025683595157518440408317253462516341618859806086*2*7***]

3.0 NOVATI SERVICE DEFINITIONS:

Fab Services:

1. […***…]
2. […***…]
3. […***…]
4. […***…]
5. […***…]
6. […***…]

* or as available per Novati's then-current standard operating schedule

Engineering Services: (Defined in the Agreement)

1. […***…]
2. […***…]

["**AMEND462693-020*2*025863585157515644043831725346251634161885980808*3*7**"]

4.0 ADDITIONAL SERVICES**:

Additional Training Services	[…***…]
Additional Cubicles & Lockable Office Space	[…***…]
Reticles	[…***…]
Analytical Services	[…***…]

** Additional Services subject to availability

5.0 TABLE-1–MOVE PRICING:

		Development (6-wfr min lot)				Fixed Flow (25-wfr min lot)	Fixed Flow (25-wfr min lot)
Tool Type /Area	**Category**	**Tier 0**	**Tier 1**	**Tier 2**	**Tier 3**		
[…***…]	[…***…]	[…***…]	[…***…]	[…***…]	[…***…]	[…***…]	[…***…]
[…***…]	[…***…]	[…***…]	[…***…]	[…***…]	[…***…]	[…***…]	[…***…]
[…***…]	[…***…]	[…***…]	[…***…]	[…***…]	[…***…]	[…***…]	[…***…]
[…***…]	[…***…]	[…***…]	[…***…]	[…***…]	[…***…]	[…***…]	[…***…]
[…***…]	[…***…]	[…***…]	[…***…]	[…***…]	[…***…]	[…***…]	[…***…]
[…***…]	[…***…]	[…***…]	[…***…]	[…***…]	[…***…]	[…***…]	[…***…]
[…***…]	[…***…]	[…***…]	[…***…]	[…***…]	[…***…]	[…***…]	[…***…]
[…***…]	[…***…]	[…***…]	[…***…]	[…***…]	[…***…]	[…***…]	[…***…]
[…***…]	[…***…]	[…***…]	[…***…]	[…***…]	[…***…]	[…***…]	[…***…]

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6.0 NOVATI SERVICE FEE SCHEDULE:

Item		Fees	Frequency
a)	**Tier 0 Pricing (no MFC)**	Per Table 1	Per move
b)	**Tier 1 Pricing**		
	• […***…]	Per Table 1	Per move
	Engineering Services — Process Engineering Support	[…***…]	per hour
	Tier 1 Minimum Financial Commitment	[…***…]	Quarterly
c)	**Tier 2 Pricing (Baseline Minimum Financial Commitment)**		
	• […***…]	Per Table 1	Per move
	Engineering Services — Process Engineering Support	[…***…]	per hour
	Tier 2 Minimum Financial Commitment	[…***…]	Quarterly
d)	**Tier 3 Pricing**		
	• […*…]**	Per Table 1	Per move
	Engineering Services — Process Engineering Support	[…***…]	per hour
	Tier 3 Minimum Financial Commitment	[…***…]	Quarterly
e)	**Expedite Fees**		
	[…***…]	[…***…]	Per request
	[…***…]	[…***…]	CoO approval
	[…***…]	[…***…]	CoO approval

["***AMEND462693-020*2*025683696157518440408317253462516341618859806086*5*7***]

ADDITIONAL NOTES:

1. Deep silicon etch will have a […***…] move multiplier applied. […***…].

2. […***…].

3. Wafers can be processed through any portion of the process flow that is designated as "Fixed Flow", at the Fixed Flow pricing per Table-1, provided minimum lot size criteria are met. These wafers can be staged for further development / small lot size processing through subsequent processes including TSV and bond. These "child" lots will be billed for all subsequent steps at the appropriate development pricing tier and minimum lot size. Fixed Flow is defined as any part of the process flow that is mutually agreed as not requiring engineering development or support to be processed in line.

4. The next lot to arrive at a step where the previous lot incurred a scrap event will be processed as follows: A single wafer will be sent ahead through the tool to verify correct operation before the rest of the lot is cleared to process. The lot will then be merged back into a single lot immediately after this operation. No min-lot or split-lot charge shall be assessed for this activity. In the event of a Novati mis-process / tool-related event causing scrap, if a replacement lot is started it will be elevated to "Hot" status at no additional charge to customer, or "Rocket" status at […***…] up-charge. Customer may at their discretion apply this status to a lot already in line. If Customer requests expedited status prior to assignment of root cause, Customer agrees to bear potential expenses in the event root cause is determined not to be a Novati mis-process or tool-related issue. Expenses will be totaled and invoiced after the final failure analysis report has been presented to Customer.

5. Novati shall furnish to Customer a list of current qualification/specs for each tool in Customer's process flow, and shall update Customer when specifications are revised.

7.0 TERMS:

1) *The Minimum Financial Commitment (MFC) for Fab Services and Engineering Services shall be per the selected Tier in Section 5. At the signing of contract unless otherwise specified, the Minimum Financial Commitment will be set at the Tier 1 Baseline. Novati will invoice Customer […***…] 15 days prior to the start of the fiscal quarter and each subsequent fiscal month thereafter. All prepayments shall be due NET15 days from invoice. Actual usage shall be "trued up" at the end of each Novati fiscal month for actual services provided and is due NET15 days from invoice. In the event the designated MFC is not fully consumed through no fault of Customer, up to […***…] of the MFC value can be carried forward to the next quarter. The carry-forward amount must be consumed in the subsequent quarter or it shall be forfeited. In the event that extended tool down events cause the MFC not to be fully consumed, the […***…] cap shall not apply, and the carry-forward period shall be extended to up to 6 months from the time the tool is re-qualified to meet specification.*

2) *Customer may change the election of the pricing tier on a quarterly basis by providing 2 weeks advanced written notice prior to each Novati fiscal quarter. If no written notice is received 2 weeks prior to the beginning of any quarter, the pricing tier will automatically be set to Tier 1.*

3) *The first and last billing cycle fees and service quantities shall be prorated to the actual start date and then continue in accordance with Novati's fiscal calendar such that all invoicing shall follow Novati fiscal month start and end dates.*

4) *Additional Activities, Engineering Hours, Additional Tool Training, access to additional equipment and resources, and other Extraordinary Expenses ('Additional Services") shall be made available at Novati's sole discretion. BioNano Genomics shall pay for all Additional Services per the terms of the Master Services Agreement.*

["***AMEND462693-020*2*0256835951575184404083172634626163418188509260860*6*7***]

5) This Agreement can be canceled by either party giving 90 days written notice in accordance with the terms of the MSA.

8.0 LICENSED TECHNOLOGY:

The Services listed above and Novati's process technology, including recipes and steps, used in the performance of services shall be provided and licensed to Customer under the terms, conditions and limitations of the Master Services Agreement, which shall override and supersede any terms and conditions in any customer provided documents.

AMENDMENT 20

This Amendment 20, ("Amendment"), dated August 1, 2016 ("Effective Date") is to the Master Services Agreement dated March 2, 2009 ("Agreement") between Novati Technologies, Inc. ("Novati"), and BioNano Genomics ("Customer"). The Agreement mandates that all changes must be in a writing signed by the parties. Except as provided below, all the provisions of the Agreement shall remain in effect and apply to the amended language. Accordingly, the parties agree to the following:

1) Novati agrees to provide the production services set forth in Exhibit A in accordance with the provisions of the Production Services Schedule both of which are incorporated into the Agreement by this Amendment.

2) The parties set July 31, 2017 expiration date of Amendment 20 of the Agreement.

Effect of this Amendment: In the event of any conflict between the Agreement and this Amendment, this Amendment shall control. Except as amended or as otherwise set forth in this Amendment, the Agreement shall continue unchanged and in full force and effect in accordance with its terms.

LIST OF ATTACHMENTS: Following is a list of attachments to this Amendment, including all Schedules and Exhibits. Any future added attachment must include a dated Amendment or provision referencing the Agreement and must be executed by all parties.

Exhibit A – Production Services
Production Service Schedule

With due authority from our respective companies, we hereby signify our consent to this Agreement by signing below,

Novati Technologies, Inc.

Signature: /s/ Rod Langley (on behalf of John Behnke)
Printed Name: John Behnke
Title: President
Date: 7/18/16

Customer: **BioNano Genomics**

Signature: /s/ Erik Holmlin
Printed Name: Erik Holmlin
Title: Chief Executive Officer
Date: 7/14/16

[***AMEND462693-021*2*168146138059316741953612557350632251541895635048*1*11***]

Exhibit A

Commercial Quotation – Production Services

START DATE: 08-01-2016 **END DATE:** 07-31-2017

Novati proposes the date above on which Novati will begin providing the following services under the Master Services Agreement ("Start Date"). Project Duration is the period of time for the project described in this quotation.

1.0 DESCRIPTION OF SERVICES:

Novati shall provide production services in support of BioNano Genomics' Alpha-9 Chip requirements. Novati will manage the production line to meet the committed production forecast as provided by BioNano Genomics.

2.0 SUMMARY OF SERVICES THAT MAY BE PROVIDED:

- Product Wafers

3.0 NOVATI SERVICE DEFINITIONS:

Fab Services:

1. […***…]
2. […***…]
3. […***…]
4. […***…]
5. […***…]
6. […***…]

* or as available per Novati's then-current standard operating schedule

[***AMEND462693-021*2*168146138059316741953612557350632251541895635048*2*11***]

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Engineering Services: (Defined in the Agreement)

1. Contracted engineering services may be available to Customer upon request as deemed necessary by Customer, subject to Novati approval.

2. Engineering support for production wafers shall be provided to perform the agreed production services for Customer in accordance with the terms of the Production Services Schedule. Any additional engineering support that is requested by Customer, subject to Novati approval, shall be charged engineering hourly rates per Section 6 in Exhibit A to this Amendment.

4.0 ADDITIONAL SERVICES:**

Additional Training Services	[…***…]
Additional Cubicles & Lockable Office Space	[…***…]
Reticles	[…***…]
Analytical Services	[…***…]

** Additional Services subject to availability

[***AMEND462693-021*2*168146138059316741953512557350632251541895635048*3*11***]

5.0 TABLE-2–PRODUCT WAFER PRICING:

WAFER PRICING TABLE 2.0			
[…***…]			
[…***…]	[…***…]	[…***…]	[…***…]
[…***…]	[…***…]	[…***…]	[…***…]
[…***…]	[…***…]	[…***…]	[…***…]
[…***…]	[…***…]	[…***…]	[…***…]
[…***…]	[…***…]	[…***…]	[…***…]
[…***…]			
[…***…]	[…***…]	[…***…]	[…***…]
[…***…]	[…***…]	[…***…]	[…***…]
[…***…]	[…***…]	[…***…]	[…***…]
[…***…]	[…***…]	[…***…]	[…***…]
[…***…]	[…***…]	[…***…]	[…***…]
[…***…]			
[…***…]	[…***…]	[…***…]	[…***…]
[…***…]	[…***…]	[…***…]	[…***…]
[…***…]	[…***…]	[…***…]	[…***…]
[…***…]	[…***…]	[…***…]	[…***…]

For all wafers, the […***…].

A Production Control and Inventory Management fee of […***…] of the price will be added to each lot shipped.

Note: Initial default contract value for the first three months is: […***…]. Customer is to specify in writing at time of execution of this Amendment if other values are required. Wafer volume and requirements for subsequent months can be adjusted based on Customers' written adjusted monthly forecast.

6.0 TERMS:

1) *Customer shall provide a rolling 12 month forecast for product wafers on a monthly basis. The immediate […***…] of said forecast shall be considered a binding Take-or-Pay commitment. The minimum monthly forecast shall be […***…]. Production deliveries will start in the third month after execution of this Amendment. Example: Amendment start date is August 1, 2016. The first three (3) months committed production forecast would be for November, December, January respectively. Unless approved by Customer in writing, Novati will limit actual lot sizes in WIP to no more than […***…].*

[***AMEND462693-021*2*1681461380593167419536125573506322515418956350 48*4*11***]

*2) Customer shall place purchase orders for wafers in minimum lot sizes and pricing indicated in Table 2 — Product Wafer Pricing — and in accordance with the rolling forecast provided by Customer. Novati shall deliver wafers per individual purchase order subject to the terms of the Agreement. Novati shall ship wafers within 4 weeks of order placement, and shall maintain any buffer inventory as necessary to meet this lead time commitment. Novati reserves the right, in its sole discretion, to decline purchase orders In excess of the committed forecast, or to require other than the committed lead time to fulfill such orders. For all orders for which Novati has a lead time of 4 weeks or longer, if Novati is responsible for delivery delays of more than seven (7) days after the committed delivery date, customer will receive a […***…] discount for each additional week of delay up to 3 weeks.*

*3) An Initial Deposit of 6 weeks of the agreed upon minimum product shipments […***…] shall be invoiced to customer and due upon execution of this Amendment, in order to reserve future capacity. Customer shall indicate the minimum monthly production quantity in writing to Novati at the time of execution of this Amendment. Novati shall build buffer inventory and maintain said inventory in the line in order to meet <4 week Cycle Time from order placement in support of Customer's committed product requirements.*

4) The initial term of this Exhibit A is one (1) year. Production services under this Exhibit A may be terminated on 90 days written notice. Work in progress and any buffer inventory held in the line at the time of notice of termination shall be used to fulfill the final three months of production forecast. Upon termination, in addition to any pending charges for services rendered and product deliveries, Customer will be charged liquidated damages to cover Novati's costs, including without limitation charges for the partially processed buffer inventory in the line at the time of notice. Buffer inventory and WIP covered in liquidated damages shall be no more than the # of wafers to satisfy the forecast for the 3 months following the termination date. For example, if the forecast for each of months 1, 2, 3 is 6 wafers per month at time of termination, Customer is liable for liquidated damages of the actual number of wafers in WIP and buffer inventory up to 18 wafers. The Initial Deposit shall be applied to the final invoice for services and liquidated damages, with any remaining balance being due from Customer within 30 days of the date of the final invoice. In the event of expiration, work may continue after the expiration date only if both parties explicitly allow this in writing.

*5) All product wafers shipped will conform to the specifications for […***…] associated with the selected wafer price and measured at the indicated operations outlined in Table 2. Additionally, all shipped wafers will have an average […***…]. These measurements will be made inline and In accordance with the following Novati specifications: […***…].*

6) A wafer that does not meet the above conditions will be classified as nonconforming material. Nonconformity will be determined by inline data. In cases of customer returns failure analysis techniques such as SEM and TEM can be used to verify nonconformity.

7) Product wafers shall be invoiced upon completion and arrival at Novati's shipping dock. All wafers are Ex-Works Novati and Customer shall directly arrange shipping and insurance. Payments shall be due NET-30 days from Invoice.

8) Borofloat glass lid wafers shall be procured by customer and drop-shipped to Novati in sufficient quantity and lead time as to support the production requirements. Novati will provide Customer with an update of their glass lid wafer Inventory and 3 month demand forecast within 2 weeks of the Customer submitting the monthly wafer forecast. Novati is not responsible for shortages resulting from incoming defective glass lid wafers. Customer is responsible for managing the right supply level of glass lid wafers at Novak including a buffer to account for incoming defective lids.

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7.0 LICENSED TECHNOLOGY:

The Services listed above and Novati's process technology, including recipes and steps, used in the performance of services shall be provided and licensed to Customer under the terms, conditions and limitations of the Master Services Agreement, which shall override and supersede any terms and conditions in any customer provided documents.

[***AMEND462693-021*2*16814613805931674195361255735063225154189563504 8*6*11***]

PRODUCTION SERVICE SCHEDULE

This Production Service Schedule (the "**Schedule**") is entered into effective as of August 1, 2016, ("Effective Date") between **NOVATI TECHNOLOGIES, INC.**, and BioNano Genomics, ("Customer") as an attachment to the Master Services Agreement ("Agreement"), between the parties, dated March 2, 2009. Capitalized terms used but not defined herein have the meanings ascribed to them in the Agreement. All terms and conditions in this Schedule are in addition to the terms and conditions set forth in the Agreement. In the event of any conflict between the provisions of this Schedule and the Agreement, the Agreement shall govern unless explicitly superseded in this Schedule.

Customer desires that Novati provide manufacturing services to produce certain agreed items for use in Customer's business or end product ("Production Services"). This Schedule shall apply only to such production services; other services provided by Novati shall be pursuant to other schedules for such services.

1. DEFINITIONS

1.1. Allowed Delivery Tolerance means the mutually agreed amount of deviation in the number of units of Product from the exact amount of units of Product Customer has released in a given Product Start Release that may be delivered and be considered to have to have fulfilled the Product Start Release order.

1.2. Critical Step Specification means a mutually agreed specification requested by Customer and agreed by Novati to be needed for the manufacturing of a Product. The critical step specification is based upon the FMEA approved by the parties and the SPC data available to substantiate the performance levels and expectations of customer technology.

1.3. Delivery Date means the date the Products desired by Customer for delivery to the Delivery Location, as specified on a Release, or as otherwise agreed to by the parties in writing.

1.4. Delivery Location means the location to which the Products are requested to be delivered, as specified in a Release or through other ordering mechanism.

1.5. Engineering Samples means finished substrate or the Product generated from a finished substrate delivered prior to completion of the Product Production Release Plan that may be provided to Customer's customer for evaluation purposes.

1.6. Excess In-Process Loss means any In-Process Loss during a Novati fiscal quarter in excess the amount allowed by the Mechanical Yield.

1.7. FMEA means Failure Mode Effect Analysis, and is a document used to describe process maturity at the critical steps within the product flow. The FMEA is a living document that will evolve through mutual agreement of the parties throughout the term of this Schedule.

1.8. In-Process Loss means any loss of partially completed Product substrates on a Production Line.

1.9. In-Process Loss Rate means the rate loss of partially completed Product substrates on a Production Line as defined by total number of Product substrates lost in a Novati fiscal quarter divided by the total number of Product substrates started in the same Novati Fiscal quarter.

1.10. Lead Time means the period of time, as may be specified by Novati, between the date a Release is received by Novati and the date Novati shall ship the Products to the Delivery Location.

1.11 Mechanical Yield means the allowable In-Process Loss Rate of partially completed Product substrates on a Production Line as mutually agreed in this Agreement.

1.12. Minimum Product Volume Commit means the minimum total amount of dollars of Product defined in the Agreement.

1.13. Production Line means the process flow sequence, route, recipes, equipment and specifications that have been utilized and mutually accepted as having had completed a Production Release Plan for one or more Products.

1.14. Product or Products mean finished substrate or substrates (usually wafers) requested of Novati by Customer.

1.15. Product Lot means a group of Product substrates started on the Production Line to be possessed together.

1.16. Production Release Plan means a plan that is mutually agreed between Novati and Customer defining the conditions required for release of a Product from development status to Production.

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1.17. Prototype or Prototype Product means any Product delivered prior to completion of the Production Release Plan.

1.18. Proven Product means a Product manufactured using a process that has verified functionality and yield and otherwise meets, and continues to meet, the Production Release Plan as demonstrated in one or more Production Release Lots.

1.19. Production Release Lot means a group of substrates that are processed together to validate that a Product can go into regular production pursuant to a Production Release Plan.

1.20. Product Start Release means a written order requesting and authorizing Novati to deliver a specified quantity of Products covered by a contractual commitment, on a specified Delivery Date.

1.21. SPC means Statistical Process Control and is a means for ensuring tools used in the product flow are maintained within an allowable specification range.

2. Customer Materials: Customer may be obligated to provide certain materials to Novati to enable it to manufacture Products, including but not limited to process flow, reticles/masks, Product reticle GDSII data, recipes, recipe characterization data, special equipment configurations, and non-Novati standard raw materials as specified in detail elsewhere in this Agreement.

2.1. If specific raw materials are required for the substrates to be processed for Customer, then it shall be mutually agreed who shall be responsible for procuring and setting stocking levels of such materials. If Novati purchases such materials, and they are such that they cannot be used by Novati for other customers, and if quantities of such materials are remaining after completion of orders or due to cancellations of orders, Customer agrees to pay Novati for such materials. Depending upon the nature of these materials and only if Customer pays for all packaging, transportation, and delivery charges, Novati may, in its sole discretion, determine whether such materials will be delivered to Customer.

2.2. In-Process Loss Claim Limitations: Unless mutually agreed in writing, Novati will not be liable for the costs of Customer supplier materials in the event of In-Process Loss.

3. Forecasts: Fifteen (15) days prior to the start of each month during the term of this Schedule, Customer shall provide a rolling forecast for the next 12 months of its desired production quantities. The forecast shall include the number of Products required each month for 12 months. The first 3 months of each 12 month forecast are firm contractual commitments such that Customer shall be obligated to pay each month to Novati the dollar commitment for each of' those 3 months notwithstanding any subsequent changes requested by Customer. The remaining 9 months of the forecast may be changed by Customer from the numbers for the corresponding months in previous monthly forecasts, provided however, that if any materials are procured by Novati solely for the services for Customer in anticipation of a forecast, Customer shall, if requested by Novati, reimburse Novati for such materials.

4. Periodic Management Business Review: Periodically depending on need, but at least semi-annually, the parties agree to meet to review mutually agreed key metrics for Production Line used for Customer's Product.

5. Product Scheduling: Consistent with previously provided forecasts, Customer shall provide Novati regularly, in a format to be mutually agreed, with an order detail tentatively titled "Product Start Release," setting forth the dates and quantities of Product it desires to be delivered. Product Releases will be, at a minimum, set by the Minimum Product Volume Commit. Novati shall review such submitted Product Start Release schedules and shall acknowledge in writing to Customer that all of the information is acceptable; provided, however, if portions of the Product Start Release schedule cannot be accommodated or met, Novati shall notify Customer and negotiate mutually acceptable changes.

6. Product Delivery: Novati will use commercially reasonable efforts to deliver the Novati-acknowledged volume of Product requested byCustomer within the mutually agreed Lead Time, subject to the Allowed Delivery Tolerance. Customer will be invoiced for the actual amount of Product delivered or for the charges associated with the Minimum Product Volume Commit, whichever is greater.

7. Expedited Product Schedules: Customer may request Delivery Dates with a Lead Time shorter than the normal Novati-defined Lead Time, which if accepted by Novati, may require additional fees. Customer acknowledges that Novati's obligations to its other customers may affect Novati's ability to agree to Customer's desired scheduling and agrees that Novati shall have sole discretion with respect to managing the scheduling of Novati resources.

8. Customer Cancellation Policies: In the event that Customer desires to cancel or delay all or portions of previously scheduled deliveries, Customer shall notify Novati in writing with specific details of its desired changes. Customer shall remain obligated to pay fees contractually committed, the Minimum Product Volume Commit, and charges owed by Customer under the terms of this Schedule, including without limitation material expenses due pursuant to Section 2.1. To the extent that minimum commitments are exceeded, cancellation of other orders shall incur a cancellation charge equal to fees incurred for actual processing performed prior to receipt of the cancellation notice.

9. Capacity Constraints and Allocation: At all times during the Agreement, Novati will allocate manufacturing capacity, components, raw

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materials and parts, for manufacture of Products on an equitable basis consistent with its capabilities and prior contractual commitments. If Customer's forecast exceeds Novati's then current ability to supply Customer's Product, Novati and Customer will negotiate in good faith the terms to, if feasible, add the necessary capacity to meet the forecast at Customer's cost. Customer acknowledges that clean room space, equipment availability, purchase lead time and installation lead time may limit Novati's ability to support Customer's forecast. Customer acknowledges that Novati's obligations to other customers may affect Novati's ability to agree to Customer's capacity requests.

10. Customer Equipment: In the event Customer desires to install equipment at Novati premises for use in processing Customer Products, the parties shall separately negotiate and agree to such installation terms and conditions, including but not limited to the cost, timing, and logistics of the installation, as well as related ongoing costs, maintenance fees, rights, and responsibilities, limitations of use, liabilities and responsibilities for such Customer equipment, Depending upon the volume of production, Customer may be required to pay an additional Equipment Hosting fee. At Customer's expense, Customer equipment must be promptly removed and the premises restored to pre-use condition by the effective date of the termination, expiration, or cancellation of this Agreement. Hosting fees shall apply from the date work begins to install Customer equipment and shall continue until all the equipment is full removed and the space is restored so that other usage of the space may occur. Fees for installation or removal of Customer equipment will be determined by quote from licensed subcontractors of Novati's choosing along with a commercially reasonable project management fee.

11. Warranty: For a period of one year from the date of shipment, Novati warrants that Products shall be processed in compliance with mutually agreed procedures, the FMEA, and Critical Step Specifications; free of any defect in materials or workmanship above levels demonstrated in the Production Release Plan; and that Product shall be processed in a commercially reasonable manner consistent with industry standards. Expressly excluded is any warranty that Products shall meet other specifications, goals or requirements of Customer unless mutually agreed. Also expressly excluded is any warranty of Product wafer level test yield, Product packaged unit electrical yield, Product package unit physical yield or Product reliability unless mutually agreed. **NOVATI HEREBY EXPRESSLY DISCLAIMS ALL OTHER WARRANTIES, EXPRESS OR IMPLIED, INCLUDING BUT NOT LIMITED TO IMPLIED WARRANTIES OF NON-INFRINGEMENT, MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE.**

12. Warranty Exclusions: The above warranty shall not apply to any Products which, by someone other than Novati, have been subject to (1) accident, abuse, misuse, neglect, improper installation or packaging, repair or alteration, (2) improper testing or use contrary to any instructions given by Novati, (3) placement in an unsuitable physical or operating environment or improper storage or maintenance improperly by Customer or the Customer's end customer, (4) or caused to fail solely or in part as a result of any component, material, product or service supplied by Customer; or (5) any Products with a defect solely or in part caused by the defective Customer proprietary design or other fault in any property provided by Customer. The above warranty is also not applicable to Prototype or Engineering Sample Product or Products that are not Proven Products.

13. Warranty Claim Limitations: Under no circumstances will Novati be liable for warranty compensation greater than the fees paid to Novati for the Product returned. Novati will at it sole option; 1) process replacement Product and deliver to Customer, or 2) pay Customer the fees paid by Customer to Novati for the Product or portion thereof which is the subject of the claim.

14. Shipment: Title to Products provided by Novati passes to Customer upon receipt by Customer or its carrier at Novati's shipping dock, EXW (Incoterms 2010); At Customer's request, Novati will arrange for transportation at Customer's expense in accordance with standard industry practices. Novati shall have no responsibility or liability for the actions of any carrier or for delivery problems to or from Novati. Novati will package substrates for shipment and storage in accordance with standard industry commercial practice at no additional cost to Customer, however, Customer may specify additional packaging instructions subject to agreement by Novati, with Customer paying for such additional packaging. Nan-substrate deliverables are shipped in a format deemed most appropriate by Novati.

15. Product Inspection Rights: Customer will be deemed to have waived its rejection rights for nonconformity unless Customer notifies Novati in writing of any nonconformity within thirty (30) days after receipt ("Inspection Period"). During the Inspection Period, Customer may reject and return to Novati any Products that do not conform to mutually agreed procedures. Customer's written notification must specifically identify how the nonconforming Products vary or do not conform. Customer will make transportation arrangements pursuant to standard industry practice, and Novati will reimburse Customer for reasonable return expenses unless Novati in good faith contests the validity of Customer's rejection. Customer's sole and exclusive remedies for Products that fail to conform, unless Novati in good faith contests the validity of Customer's rejection, shall be at Novati's sole discretion: (I) Novati will retain the non-conforming Products and will refund to Customer any amounts that Customer paid to Novati for such nonconforming Products; (2) Novati will rework the nonconforming Products once and will submit such reworked Products to Customer per the delivery dates agreed upon by the parties; or (3) Novati will replace the non-conforming Products; or (4) Customer accepts the wafers notwithstanding their nonconformity and pays Novati a mutually agreed upon percentage of the amount that Customer would have paid the Novati according to the order had such wafers conformed to the specifications. If the parties elect option two as a remedy and the Products do not meet specifications the second time they are delivered, Customer may reject and return them to Novati unless Novati in good faith contests the validity of Customer's rejection. If not contested, upon receipt Novati will

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retain the Products and Novati will refund any money Customer has paid for the non-conforming Products or replace the Products, at Novati's sole discretion.

16. New Product Introduction: Customer may request priority support for validation of a new Product on an existing Production Line or at Novati's sole option, for Prototype Product or Engineering Sample Product. Customer acknowledges that this support shall be subject to non-reoccurring engineering charges and expedite fees as defined in this Agreement.

17. Limitation on Experimentation and Development Holds: Customer may not plan nor execute experiments, nor development holds on Product Lots started on the Production Line. At customer request, limited by Customer otherwise meeting the Minimum Product Volume Commit, Customer may request Novati to convert in its entirety a Product Lot to development status. All previously completed steps as well as any yet to be completed steps will be invoiced to the Novati standard development terms defined in this Agreement or other applicable agreements between Customer and Novati. Any experimentation or development holds done on Product Lots by Customer without prior authorized by Novati will be subject, at Novati's sole discretion, to conversion to development status with the consequences noted above.

18. Limitations on Problem Lot Issues: If a Customer's Product Lot on a Production Line goes on Problem Lot hold three times as defined in Novati's standard operating procedure, after the 3rd hold, the Product Lot, at Novati sole option, may be scrapped at Novati's sole expense.

19. CHANGE PROCEDURES

19.1. Novati Requested Change Procedure: Where Novati wishes to make a change to the Production Line (a "Process Change") which potentially impacts form, fit, or function, Novati shall issue a process change notice (PCN), which PCN shall include sufficient details regarding the nature of the proposed change, the reason for the proposed change, details regarding its implementation, the impact of the change (including but not limited to scheduling and Fees) on any contractual commitment or releases, and the proposed implementation date of the engineering change.

19.2. Promptly after issuing the foregoing PCN, Novati shall, at its expense, provide Customer with a mutually agreed number of evaluation samples of the affected Product and other information requested by Customer to enable Customer to evaluate the change. Customer may, acting in its reasonable discretion, reject any Process Change Notification and shalt notify Novati in writing of such rejection within thirty (30) days of time from its receipt of such Product samples and other information. While Customer is considering a Process Change or if Customer rejects a Process Change, Novati shall continue to manufacture and supply the Product, in accordance with the terms of this Agreement, without the requested Process Change, however Novati may refuse to accept additional Product orders beyond the existing order at the time Novati delivers the PCN to Customer. Where Customer provides its written approval of the Process Change, Novati shall implement the change on a mutually agreed schedule.

20. Customer Requested Changes: Customer may, at Customer's expense, by written notice to Novati, amend Customer drawings or designs, Production Line details or the Specifications, at any time prior to the manufacture of the affected Products and provided Customer pays to Novati any reasonable non-recurring charges, if any, and/or revised Fees for such Products, as mutually agreed by the parties in writing, Novati shall implement such amendment within a period of time as mutually agreed by the parties upon validation through a Production Release Plan if necessary.

21. Additional Indemnity of Novati by Customer: Since the Products that are provided by Novati to Customer will by their nature, be further processed, transformed, tested, and integrated into Customer's products without the involvement or control of Novati, it is expressly agreed that Customer shall indemnify, defend, and held Novati harmless from all third party claims of death, personal injury, costs, or damages of any description, irrespective of any theory of liability including but not limited to negligence, strict or products liability, and whether or not third parties are customers of Customer, where such claims arise out of or are related to the Products provided to Customer by Novati pursuant to this Agreement. This indemnity is in addition to and is not in lieu of any other indemnity obligations in this Agreement and this indemnity shall be excluded from and not be subject to any limitation or cap on liability that may be elsewhere in this Agreement. The parties agree that this contractual indemnity shall apply notwithstanding any liability legally attributable to Novati and that this indemnity is intended to extend to all third party claims of any kind or character, whether fixed or contingent, known or unknown. The parties agree that this indemnity shall survive the completion, expiration and/or termination of the Agreement. The parties acknowledge that this indemnity was an essential element in this Agreement and that in the absence of this indemnity the pricing and other terms set forth in this Agreement would be substantially different.

22. Quality & Quality Assurance: Novati shall use commercially reasonable effort to manufacture the Products in accordance with the then-current, written manufacturing specifications, Novati's then-current Global Quality Management procedure, and any other mutually agreed quality requirements including, without limitation those in the FMEA.

23. CAR: Where a non-conformance is identified, Customer may issue a corrective action requests ("CAR") to Novati. Novati shall notify Customer as soon as non-conformance identified in a CAR is corrected. Customer will use a CAR process to notify Novati of defective Products

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(i.e., those not conforming to applicable specifications) or degradation of established quality requirements. Novati will initiate appropriate actions to minimize the possibility that additional defective Products will be delivered to Customer. Within a commercially reasonable amount of time of CAR notification, Novati will notify Customer in writing of its initial analysis on the cause for the defect and the interim actions being taken to continue delivery of defect-free Products conforming to applicable specifications while analysis continues to determine root cause and a final corrective action plan. Novati will deliver a formal written response to the CAR (or a request for an extension) to Customer within 30 (thirty) business days after notice of the CAR from Customer. CAR responses must include (a) a root cause or methodology to arrive at root cause, (b) a containment plan, (c) a corrective action implementation date, and (d) any follow-on preventive action plans. Upon Customer's request, Novati will use commercially reasonable efforts to provide such additional support as needed to achieve full corrective action. All costs incurred for such additional support and other correction action shall be borne by Novati provided that the defect is one for which Novati is responsible under the warranty terms under Section 1L The above remedy will be in addition to any other rights and remedies Customer may have under this Agreement.

24. Production Line Control: Novati will manage the control of the Product on the Production Line used for Customer's Product as defined in Novati standard operating procedures.

25. Data Retention: Product traceability information will be retained by Novati per Novati's record retention policy but is at a minimum for 2 years.

26. Attachments:

The Schedule includes the following attachments which are incorporated by this reference: the initial FMEA, the SPC controls, the measurement plan, and the full customer process flow with agreed to performance specifications. [*NOTE: This Schedule and the attachments are to be added to an existing Customer MSA by formal written amendment.]*

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AMENDMENT 21

This Amendment 21, ("Amendment"), dated March 31, 2017 ("Effective Date") is to the Master Services Agreement dated March 2, 2009 ("Agreement") between Novati Technologies, LLC ("Novati"), and BioNano Genomics ("Customer")• The Agreement mandates that all changes must be in a writing signed by the parties. Except as provided below, all the provisions of the Agreement shall remain in effect and apply to the amended language, Accordingly, the parties agree to the following:

1) Both parties agree to extend the expiration date of the Amendment 19 and the End Date of the Exhibit A, Commercial Quotation — Development Services from March 31, 2017 to March 31, 2018.

Effect of this Amendment: In the event of any conflict between the Agreement and this Amendment, this Amendment shall control. Except as amended or as otherwise set forth in this Amendment, the Agreement shall continue unchanged and in full force and effect in accordance with its terms.

LIST OF ATTACHMENTS: Following is a list of attachments to this Amendment, including all Schedules and Exhibits. Any future added attachment must include a dated Amendment or provision referencing the Agreement and must be executed by all parties.

None.

With due authority from our respective companies, we hereby signify our consent to this Agreement by signing below,

Novati Technologies, Inc.

Signature: /s/ John R. Behnke
Printed Name: John R. Behnke
Title: CEO and President
Date: 4-26-2017

Customer: **BioNano Genomics**

Signature: /s/ Erik Holmlin
Printed Name: Erik Holmlin
Title: CEO
Date: April 25, 2017

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AMENDMENT 22

This Amendment 22, ("Amendment"), dated March 31, 2018 ("Effective Date") is to the Master Services Agreement dated March 2, 2009 ("Agreement") between Novati Technologies, LLC ("Formerly Novati, now Skorpios"), and BioNano Genomics ("Customer")• The Agreement mandates that all changes must be in a writing signed by the parties. Except as provided below, all the provisions of the Agreement shall remain in effect and apply to the amended language, Accordingly, the parties agree to the following:

1) Both parties agree to extend the expiration date of the Amendment 19 and the End Date of the Exhibit A, Commercial Quotation — Development Services from March 31, 2018 to the earlier of March 31, 2019 or the execution of a […***…] between the parties for […***…].

Effect of this Amendment: In the event of any conflict between the Agreement and this Amendment, this Amendment shall control. Except as amended or as otherwise set forth in this Amendment, the Agreement shall continue unchanged and in full force and effect in accordance with its terms.

LIST OF ATTACHMENTS: Following is a list of attachments to this Amendment, including all Schedules and Exhibits. Any future added attachment must include a dated Amendment or provision referencing the Agreement and must be executed by all parties.

None.

With due authority from our respective companies, we hereby signify our consent to this Agreement by signing below,

Skorpios Technologies, Inc. (f/k/a
Novati Technologies, LLC)

Signature: /s/ John Hamma
Printed Name: John Hamma
Title: SVP Foundry Services
Date: March 31, 2018

Customer: **Bionano Genomics**

Signature: /s/ Erik Holmlin
Printed Name: Erik Holmlin
Title: CEO
Date: March 31, 2018

Exhibit 10.24

*****Text Omitted and Filed Separately with the Securities and Exchange Commission. Confidential Treatment Requested Under 17 C.F.R. Sections 200.80(b)(4) and 230.406**

MANUFACTURING SERVICES AGREEMENT

This AGREEMENT is entered into by **Paramit Corporation,** a California corporation (referred to in this agreement as "Paramit"), and the following party: **BioNano Genomics** (referred to in this agreement as "Customer").

Customer represents that it is a:

☒ Corporation ☐ Limited Liability Company ☐ Other:

Formed under the laws of:

☐ California ☒ Delaware ☐ Other:

1. RECITALS AND DEFINITIONS:

(a) From time to time, Paramit will quote a price to Customer for goods that Customer wants manufactured. Such quote is not a contractual offer or a contract, and such quote does not obligate Paramit to enter into any contract with Customer. When Customer wishes to engage Paramit to manufacture the goods based on Paramit's quote, Customer will issue its purchase order to Paramit.

(b) "Particular Purchase Order Terms" means the following terms in Customer's purchase order: the identification of the goods to be manufactured, Customer's specifications, the price per item of such goods, the quantity of goods that Paramit is to manufacture, the date or dates of shipment, and the "ship to" address. In the case of a purchase order for NREs, the term "Particular Purchase Order Terms" means the following terms in the Customer's purchase order: the identification of the NREs and the charge for the NREs.

(c) The issuance of a purchase order by Customer is an offer to enter into a contract between Customer and Paramit for the manufacture and sale of goods on the terms of this agreement and the Particular Purchase Order Terms. Paramit may accept Customer's purchase order only by: (1) beginning manufacture of goods for Customer, which includes ordering materials, whether or not notice of acceptance is sent by Paramit, or (2) a written notice of acceptance signed by the program manager assigned to Customer by Paramit, whether or not Paramit begins manufacture. If Paramit accepts Customer's purchase order, the contract between Customer and Paramit for the manufacture of goods consists of the terms of this agreement as supplemented by the Particular Purchase Order Terms contained in that purchase order. Agreed pricing is deemed to be fixed and determined as of the date of the purchase order. Any adjustments to pricing due to engineering changes and or material costs will be amortized over future shipments of product provided Customer issues updated purchase orders in a timely manner to eliminate further price delta. No retro-active adjustments will be made to Products already shipped and invoiced. The terms and conditions of Customer's purchase order other than the Particular Purchase Order Terms are not part of any contract between Paramit and Customer.

(d) If more than one product is to be manufactured by Paramit for Customer, there is a separate contract between Paramit and Customer for each such product. The terms of each contract consist of the terms of this agreement as supplemented by the Particular Purchase Order Terms for that product set forth in a purchase order accepted by Paramit. For example, if Customer issues a purchase order for product A and another one for product 8 and Paramit accepts each purchase order, there are two separate contracts: one for product A on the terms of this

agreement as supplemented by the Particular Purchase Order Terms set forth in a purchase order accepted by Paramit for product A, and one for product B on the terms of this agreement as supplemented by the Particular Purchase Order Terms set forth in a purchase order accepted by Paramit for product B. If Customer issues a revised purchase order for a product, or if Customer issues a purchase order for NRE's associated with a product, and Paramit accepts the purchase order, that purchase order is an amendment to the contract for that product to the extent of the Particular Purchase Order Terms contained in that purchase order.

(e) The term "product" means the goods identified in a purchase order from Customer that has been accepted by Paramit.

(f) The term "Customer's Specifications" means Customer's specifications that are in effect at the time of Paramit's commencement of manufacture of a product and that have been accepted by Paramit. If Customer provides specifications to Paramit for packaging the product and Paramit agrees to provide packaging in accordance with such specifications, "Customer's Specifications" includes such packaging specifications.

(g) The term "inventory" refers to work in process (if any) and to finished goods (if any) but not to materials.

(h) The term "materials" refers to goods of the type listed on Customer's bill of materials. By way of example, materials include resistors, capacitors, coils, integrated circuits, BGA's, FPGA's, power supplies, printed circuit boards, sheet metal, plastics, cases, fasteners, labels, cabling, connectors, grommets, and customer-specified packaging.

(i) The term "NREs" means non-recurring expenses associated with a product, and include tooling, stencils, test fixtures, and test programs.

(j) As used in this agreement, the word "include" and its variants are used to illustrate and not to limit. Thus, the word "including" means "including (but not limited to),"

2. BASIC AGREEMENT.

(a) Paramit agrees to manufacture and sell, and Customer agrees to buy and pay for, the product on the terms set forth in this agreement and the Particular Purchase Order Terms for the product.

(b) Subject to the limitations set forth in this agreement, Paramit warrants to Customer that: (1) product will be manufactured in accordance with Customer's Specifications. (2) product will be manufactured in accordance with IPC-A-610, Acceptability of Electronic Assemblies, Class 3 standards in effect at the time of manufacture unless otherwise specified in Customer's specifications.

(c) This agreement does not obligate Customer to issue any purchase orders to Paramit. Paramit is not required to accept any purchase order from Customer. This agreement applies only to the extent Customer issues purchase orders that Paramit accepts.

3. PRODUCT ACCEPTANCE.

(a) During the acceptance period for a product, Customer may inspect and test the product with the same identical test that is provided to Paramit for manufacture of product and may reject any

product found not to conform to Customer's specifications or to be defective in materials or workmanship. The acceptance period for a product is a period of […***…], beginning with receipt of the product by Customer. Products not rejected during the acceptance period are accepted; however, should failure(s) occur after acceptance but during the warranty period, product will be covered with warranty remedies outlined in this Agreement.

(b) To reject a product, Customer must give to Paramit written notice during the acceptance period in accordance with Exhibit A, REPAIR/ UPGRADE TERMS AND CONDITIONS. The notice must specify the nonconformity or defect. Customer shall obtain a return material authorization (RMA) number from Paramit, properly pack the product for shipping, display the RMA number on the shipping container, and ship the nonconforming or defective product to Paramit, which Customer may do freight collect. Paramit will promptly repair or replace rejected product, at Paramit's option, and will deliver the repaired or replaced product freight pre-paid. If Paramit is unable to make the repair or replacement within a commercially reasonable period of time, Paramit will refund the price paid for such product or cancel the obligation to pay for such product.

(c) The provisions of this paragraph apply to the repaired or replaced product (for which there will be a like acceptance period and a like procedure for defects). Thus, if a product is rejected because of a defect and Paramit provides a replacement product, the acceptance period for the replacement product will start with Customer's receipt of the replacement product.

(d) If Customer rejects product and returns it to Paramit under this section, but the product conforms to Customer's Specifications and there is no defect, Customer will bear all the risk and expense associated with the return, including shipping expense both ways, plus Paramit's customary charges for testing.

4. REPAIR AND REPLACEMENT AFTER ACCEPTANCE.

(a) If any product has a defect in workmanship that manifests itself after Paramit's shipment of the product and before the first anniversary of the date of such shipment, Paramit will repair or replace the product as defined in Exhibit A, and Paramit will pay for the shipping to return the product to Paramit and to re-send the repaired or replaced product to Customer. If Paramit is unable to repair or replace such product within a commercially reasonable period of time, Paramit will refund the price paid for such product. Paramit's obligation to repair or replace the product (or to refund the price) is conditioned on Customer's making a claim in writing to Paramit no later than the first anniversary of the date of the shipment of the product. Paramit has no obligation with respect to a defect in workmanship that manifests itself after the first anniversary of the date of Paramit's shipment of the product. The obligations set forth in this paragraph are Paramit's sole and exclusive obligations with respect to a defect in workmanship.

(b) Defects in materials will be covered by their respective manufacturers' warranties. Customer will pay for shipping the product to Paramit and back to Customer. If Paramit is unable to repair or replace such product within a commercially reasonable period of time, Paramit will refund the price paid for such product. Paramit's obligation to repair or replace (or to refund the price) is conditioned on Customer's making a claim in writing to Paramit no later than […***…] after the defect in materials first manifests itself or […***…] after the date of shipment, whichever comes first. Paramit has no obligation with respect to a defect in materials that manifest itself after the expiration of the component manufacturer warranty period. The foregoing warranty does not apply

to materials supplied to Paramit by or at the direction of Customer. The obligations set forth in this paragraph are Paramit's sole and exclusive obligations with respect to a defect in materials. Upon request, Paramit will assign to Customer rights under warranties made by suppliers of materials that are used.in the product.

(c) Customer may, at its option, issue a written Corrective Action Request (CAR) to Paramit. If Customer issues a CAR, Paramit shall acknowledge receipt of the CAR no later than the close of business the next business day. Paramit's response to a CAR shall be organized in a mutually agreeable format. Within […***…] from the receipt of a CAR, Paramit shall develop and submit to Customer a plan to identify and solve the root cause for nonconformity to Customer's specifications or for product defects.

(d) Any item under warranty is covered in accordance with section 4; Customer shall not reverse or short pay invoices for returned items, as this will create accounting issues.

(e) Customer to notify Paramit in advance of returning any products that may have been contaminated with hazardous materials. Customer to decontaminate all internal & external sections of products destined to return to Paramit, including tubes, waste tanks and other similar hazardous material pathways and remove all fluid and solid substances, as well as disposable parts from the device prior to return to Paramit. Customer to provide product identification information such as device serial number at the time of requesting RMA number.

(1) Customer shall not return any instruments to Paramit that may be contaminated with viable biological agents, harmful quantities of hazardous chemicals, or radioactive materials. Customer understands and agrees that decontamination is critical to issues of health and safety. Customer represents and warrants to Paramit to perform and complete all decontamination requirements prior to returning any such product to Paramit.

(2) Customer hereby assumes all responsibility and liability for, and shall defend and indemnify Paramit against injury or damage incurred by Paramit and its employees, contractors, and/or agents that result directly or indirectly from the Customer's breach of this representation and warranty.

(3) Customer accepts that Paramit Corporation has no obligation to repair, service, or transport any product if it is determined that the product is contaminated.

(4) Customer shall comply with all applicable laws and regulations when returning any product to Paramit under this Agreement.

5. ADDITIONAL WARRANTY MATIERS.

(a) Subject to the limitations set forth in this agreement, Paramit warrants to Customer that:

(1) Title to each product will be good and transfer of title to Customer will be rightful. The foregoing warranty does not apply to materials supplied to Paramit by, or at the direction of, the Customer.

(2) Each product will be delivered free from any security interest or other encumbrance created by Paramit. The foregoing warranty does not apply to any security interest in favor of Paramit to secure an obligation of Customer to Paramit.

(3) Paramit will not infringe any patent, copyright, trade secret, trade-mark, maskwork, or other intellectual property right of a third party in manufacturing the product. The foregoing warranty does not apply to any claim that is based, in whole or in part, on Paramit's compliance with Customer's Specifications.

(b) Any warranty by Paramit against defects (whether set forth in this section, another section, or implied by law) and any obligation by Paramit to repair or replace product (or to refund the purchase price) does not apply to the following:

(1) Defects resulting from compliance with Customer's Specifications.

(2) Defects resulting from use of Customer-provided test equipment or Customer-provided test software.

(3) Any product that has been misused, damaged, or altered after shipment or that is damaged in shipping. Misuse includes improperly handling static-sensitive electronic devices or an attempt by Customer or a third party to repair the product.

(4) Materials consigned, supplied by, or purchased at the direction of Customer.

(c) Paramit has no responsibility if Customer's specifications fail to comply with any governmental regulation or industrial specification, or if the product manufactured to Customer's specifications fails to meet the requirements of Customer's customer or the end user.

(d) THE WARRANTIES MADE BY PARAMIT IN THIS AGREEMENT ARE THE SOLE AND EXCLUSIVE WARRANTIES OF PARAMIT. PARAMIT DISCLAIMS ALL OTHER WARRANTIES, EXPRESS OR IMPLIED, INCLUDING ANY WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. PARAMIT HAS NO LIABILITY TO CUSTOMER FOR ANY ACTIVE OR PASSIVE NEGLIGENCE ON PARAMIT'S PART IN THE MANUFACTURE OF PRODUCTS OR THE PROVISION OF SERVICES RELATING TO PRODUCTS.

6. CUSTOMER'S OPTION TO CANCEL OR MODIFY ORDER.

(a) On the terms set forth in this section and by giving Paramit more than […***…] written notice, Customer may cancel a purchase order for product or reduce the number of units of product in a purchase order. Other than for PCBA's, Customer may not cancel any deliveries scheduled for the […***…] period following Customer's giving such written notice to Paramit.

(b) A reduction in the number of units of product in a purchase order is a modification of the purchase order. Customer may modify a purchase order other than by reducing the number of units of product only if Paramit accepts the modification. An engineering change order issued by Customer and accepted by Paramit is a modification of the purchase order for the product.

(c) If Paramit receives notice of cancellation or modification of a purchase order before Paramit orders any materials or incurs any expense for NRE's, Customer may cancel or modify its purchase order without liability or charge.

(d) If Customer cancels or modifies a purchase order after Paramit orders any materials or incurs any expense for NRE's:

(1) Some or all the materials on hand or on order may thereby become Excess Materials. Customer will purchase all Excess Materials as set forth in section 7 of this agreement.

(2) Inventory of product on hand (including work in process) may become excess inventory. Customer will purchase all excess inventory in accordance with section 8 of this agreement.

(3) Customer will pay Paramit for that portion of the expense of the NRE's that has been incurred at the time Paramit receives notice of cancellation or modification.

(4) In the case of a complete cancellation of an order or in the case of a reduction in the number of units of product, Customer will pay Paramit a cancellation fee equal to […***…] of the price set forth in the purchase order for the units of the product that have been cancelled. Pursuant to section 9, the cancellation fee may be reduced or waived if the purchase order is a Blanket PO.

(e) If Customer cancels or modifies a purchase order and there is work in process, Customer should specify in the notice of cancellation or modification whether Paramit should complete work in process or stop work. If Customer fails to so specify, Paramit may complete work in process or stop work as Paramit sees fit.

(f) Customer has no liability to Paramit for cancelling or modifying a purchase order beyond what is set forth in this section.

7. LIABILITY FOR EXCESS MATERIALS.

(a) Customer acknowledges that the cost of materials ordered or purchased by Paramit, but not used or consumed in the manufacture of product, is to be borne by Customer. Customer acknowledges that such cost has not been included in Paramit's quote to Customer and is not reflected in the price of the product.

(b) Once a month, Paramit will review Customer's purchase orders and the materials on hand and on order that Paramit has allocated to manufacturing the product. If Paramit determines that it will not use or consume such materials for product that will be shipped within […***…] of Paramit's review, those materials that Paramit determines that it will not so use or consume are referred to in this agreement as "Excess Materials." Paramit's determination of excess materials made in good faith is conclusive and binding on Customer. Customer will purchase excess materials from Paramit on request.

(c) Customer acknowledges that Paramit may order or purchase more materials to manufacture the product than will be used or consumed in the manufacture of the product, which can result in excess materials that Customer must purchase. For example, Paramit may have ordered more materials than are required to manufacture the product because of:

(1) Minimum order quantity or the package size for the materials (e.g., a package contains 12 parts and an order for 100 products requires 9 packages of parts).

(2) Parts come on reels or tapes (which are entirely non-returnable once the reel or tape has been broken).

(3) Safety stock required by Customer.

(4) Customer's engineering change order, order reduction, or order cancellation may make materials obsolete, which will immediately result in such materials becoming excess materials.

(d) The term "Materials Cost" means the amount paid or payable (including freight, insurance, and sales or use tax) by Paramit to its suppliers for materials used or to be used for the product. Materials ordered pursuant to orders that are non-cancelable are part of excess materials. The term "Materials Cost" also includes restocking fees, freight, cancellation fees, and other charges by third parties associated with Paramit's returning materials or cancelling orders for materials as well as any third-party fees or charges associated with disposing of materials that Paramit disposes on behalf of Customer.

(e) When Customer is obligated to purchase excess materials, Customer will pay Pramit an amount equal to the materials cost for such excess materials plus an amount equal to […***…] of such materials cost ("Excess Materials Purchase Price").

(f) Supplier will use commercially reasonable efforts to mitigate Customer's liability for excess materials to the extent allowed by suppliers or vendors but any imposed limitations on such mitigations will not reduce Customer's liability for excess materials that have resulted from quantity reductions or cancellation. Where feasible, Paramit will:

(1) Reallocate materials that are part of excess materials to other Paramit jobs that, in Paramit's sole discretion, could use such materials. In that event, Customer will have no liability to Paramit for the materials so reallocated. Customer acknowledges that materials that are custom-made for Customer will not be reallocated to other Paramit jobs and will constitute excess materials.

(2) Return materials that are part of excess materials to Paramit's suppliers to the extent permitted by the suppliers.

(3) Cancel orders for materials that are part of excess materials to the extent that orders are cancelable. Customer acknowledges that orders for materials that are custom for Customer are non-cancelable and such orders will be part of excess materials. Customer acknowledges that orders for materials that are not custom for Customer may none the less be non-cancelable and in that case such orders will be part of excess materials.

(g) Within […***…] of Paramit's requesting Customer to purchase the excess materials and notifying Customer of the nature of the excess materials and the excess materials purchase price, Customer will issue its purchase order to purchase the excess materials for the excess materials purchase price. Payment terms are […***…].

(h) After the Customer has paid the excess materials purchase price, then, if Customer so requests, Paramit will deliver the excess materials to Customer at Customer's expense. If Customer does not wish to take delivery of the excess materials, or if Customer fails to pay in a timely manner the excess materials purchase price, Paramit will store the excess materials for a period not to exceed […***…] from the date payment of the excess materials purchase price was due. All risk of loss to excess materials, whether shipped or stored by Paramit, will be borne by Customer. If Paramit notifies Customer to pick up excess materials being stored by Paramit and Customer fails to do so within […***…] of such notification, Paramit is permitted to destroy or otherwise dispose of the excess materials, but any such destruction or disposition shall have no effect on Customer's liability for the excess materials purchase price or entitle Customer to any refund. Customer will pay Paramit a storage fee equal to […***…] of the excess materials purchase price for each month (or part thereof) that Paramit stores the excess materials after the date payment of the excess materials purchase price was due.

8. LIABILITY FOR EXCESS INVENTORY.

(a) Customer acknowledges that Paramit's pricing of the product is based on shipping product promptly after manufacture and being paid in a timely manner.

(b) Once a month, Paramit will review Customer's purchase orders and the product inventory (both finished goods and work in process) that Paramit has on hand. If Paramit determines that Paramit has product inventory on hand that Paramit will not ship within […***…] of Paramit's review, that portion of the product inventory on hand that Paramit determines that it will not so ship is referred to in this agreement as "Excess Inventory." Customer acknowledges that Customer's modification or cancellation of its purchase order may result in part or all the product inventory on hand not being shipped within […***…] of such modification or cancellation and thereby becoming excess inventory that Customer must purchase. Paramit's determination of excess inventory made in good faith is conclusive and binding on Customer. Customer will purchase excess inventory from Paramit on request.

(c) The term "excess inventory purchase price" means, with respect to excess inventory product that is finished goods, the price for the product set forth in the purchase order. The term "excess inventory purchase price" means, with respect to excess inventory product that is work in process, the price for the product set forth in the purchase order less the value of uncompleted work. The value of uncompleted work is the value of the test labor and assembly labor that have not been expended on the work in process. Paramit's determination made in good faith of the value of uncompleted work is conclusive and binding on Customer.

(d) Within […***…] of Paramit's requesting Customer to purchase the excess inventory and notifying Customer of the nature of the excess inventory and the excess inventory purchase price, Customer will issue its purchase order to purchase the excess inventory from Paramit for the excess inventory purchase price. Payment terms are […***…].

(e) After Customer has paid the excess inventory purchase price, then, if Customer so requests, Paramit will deliver the excess inventory to Customer at Customer's expense. If Customer does not wish to take delivery of the excess inventory, or if Customer fails to pay timely the excess inventory purchase price, Paramit will store the excess inventory for a period not to exceed […***…] from the date the excess inventory purchase price was due. All risk of loss to excess inventory, whether shipped or stored by Paramit, will be borne by Customer. If Paramit notifies Customer to pick up excess inventory being stored by Paramit and Customer fails to do so within […***…] of such notification, Paramit is permitted to destroy or otherwise dispose of the excess inventory, but any such destruction or disposition shall have no effect on Customer's liability for the excess inventory purchase price or entitle Customer to any refund. Customer will pay Paramit a storage fee equal to […***…] of the excess inventory purchase price for each month (or part thereof) that Paramit stores the excess inventory after the date the excess inventory purchase price was due.

9. BLANKET P.O.

Blanket PO means a purchase order that has rolling […***…] demand of product(s) and spare parts (if applicable). Such demand will indicate monthly quantities of required products to be shipped to Customer. As first month demand expires, Customer will add new demand to the […***…] of rolling demand window and update Blanket PO accordingly. Customer will issue "Blanket

PO" to Paramit. Paramit will provide Blanket PO demand to suppliers to minimize risk factors but will procure materials per lead time and minimum order quantity (MOQ).

10. ORDER FLEXIBILITY

(a) Paramit welcomes increases in orders and or requests for earlier deliveries. Paramit will make reasonable efforts to accommodate such changes. Paramit will promptly investigate lead times, component availability, and possible expediting fees imposed by vendors (or other third parties) and will advise Customer of feasible delivery dates and increased costs, if any. The parties will negotiate an agreement for the increased number of units of product or accelerated delivery dates based on then prevailing market conditions, including lead times, component availability, and expediting fees. In negotiating such an agreement, Paramit will not seek to increase the price of the product except to pass through to Customer increases in materials costs, including any expediting fees and overtime charges for after hours or weekend work requests.

(b) Customer may defer delivery of product as follows but will accept material liability for parts that are purchased but cannot be cancelled or rescheduled:

Number of days prior to delivery date scheduled in the PO	% of quantities allowed to push out	Days allowed to push out
[…***…]	[…***…]	[…***…]
[…***…]	[…***…]	[…***…]
[…***…]	[…***…]	[…***…]
[…***…]	[…***…]	[…***…]

If delivery of units of product is deferred as permitted in this subsection, no further deferral of delivery of those units of product is permitted, but Customer may defer delivery of other units of product whose delivery has not been previously deferred.

(c) In the event that any build schedule for issued Purchase Orders are placed on hold by Customer, exceeding […***…], (a) Paramit will invoice overhead and profit portion of product price for the quantities of products put on hold. The invoice amount will be […***…] for affected quantities. This amount will be credited back to Customer upon resumption of product shipment; (b) Paramit will charge Customer a fee of […***…] per month to maintain an engaged customer focus team (CFT), supporting any required data analysis, failure analysis, design of experiments, change implementation, collaboration with suppliers and or Customer's engineering and quality; such CFT engagement fee is NRE and will not be credited back to Customer, once production resumes.

(d) If, after Paramit orders any materials or incurs any expense for NRE's, Customer reduces the number of units of product being purchased pursuant to a Blanket PO (or cancels the Blanket PO), the cancellation fee will be as set forth below (instead of the amount set forth in section 6(d)(4) of this agreement):

Number of days prior to delivery date scheduled in the Blanket PO	Cancellation fee
[…***…]	[…***…]
[…***…]	[…***…]
[…***…]	[…***…]
[…***…]	[…***…]

The cancellation fee is equal to […***…] set in the foregoing table […***…]. The calculation of the cancellation fee is based on the […***…]. The cancellation fee does not apply if the order is being cancelled or reduced by reason of being superseded by a new purchase order accepted by Paramit that does not result in excess materials or excess inventory. In addition to the cancellation fee, Customer is liable and will pay Paramit for any excess materials and excess inventory resulting from quantity reduction or cancellation; except for the cancellation fee, the Customer's liability for excess materials and excess inventory is calculated as set forth in sections 6, 7, and 8 of this agreement.

11. CONFIDENTIAL INFORMATION.

If Customer provides proprietary information to Paramit and designates in writing that the information is to be treated confidentially, Paramit will treat the information with the same care as it treats its own proprietary information of a similar nature, and Paramit will take commercially reasonable precautions to prevent unauthorized disclosure, including, when Paramit has agreed in another writing to do so, requiring written nondisclosure agreements of its employees and limiting access to the information to those employees with a need to know the information. This paragraph does not apply to information that Customer agrees may be released or to information that is published by Customer or others, or to information that is or becomes generally known to the public or within an industry through no fault of Paramit, or to information that Paramit can show was known by Paramit at the time of receipt, is independent developed by Paramit, or is provided to Paramit by a third party who has a right to provide such information. Paramit is permitted to comply with legal process that requires Paramit to disclose proprietary information. Paramit shall notify Customer promptly of the service of legal process, supplying Customer with a copy of the legal process.

(a) Similarly, Customer shall take commercially reasonable precautions to prevent disclosure of any information pertaining to Paramit's Intellectual Property (IP) and proprietary information, which is defined as any proprietary information, knowledge and know how that is conceived, created, written, put to practice, designed and developed by Paramit and, constructed through hardware and software, including data collection, extraction, manipulation, compilation, presentation and reporting tools; know how such as automated, computerized, audio-visual instruction, assembly, verification and validation develop in connection with manufacturing, such as […***…] and […***…].

12. INSURANCE.

Paramit agrees to maintain in effect the following types of insurance while manufacturing the product and while in possession of product inventory:

(a) Commercial general liability insurance with policy limits of $[…***…] for each occurrence and $[…***…] in the aggregate.

(b) Automobile liability with policy limits of $[…***…] for combined single limit.

(c) Workers' compensation insurance as required by law. Paramit will provide evidence of insurance on request.

13. PAYMENT TERMS.

(a) Payment terms are […***…]. The price of the product is F.O.B. Paramit's shipping dock (net of sales and use taxes, if any). All prices are in U.S. Dollars. Paramit will submit invoices to Customer upon shipment of the product. Each invoice will, at a minimum, refer to Customer's purchase order number, part number, unit price, and total price. If Customer does not object to an invoice within […***…] from the date of the invoice, it is deemed correct. Customer will pay Paramit in full no later than […***…] from the date of Paramit's invoice to Customer. If any sales or use tax applies to the sale or other disposition of product or materials or inventory, Customer will pay the tax. Customer acknowledges that sales tax may be incurred by scrapping materials or inventory.

(b) Customer agrees to […***…] to cover liability for excess materials and excess inventory based on reports from Paramit. Determination of actual excess amount, invoicing and payments for such excess materials shall be performed in accordance with section 7 and 8 of this Agreement.

(c) If Customer does not wish to take delivery of product, and if Paramit agrees, in its sole discretion, to bill and hold, Paramit will transfer the product to an area on Paramit's premises that is segregated from Paramit's manufacturing inventory. Upon such transfer, Customer will be liable to pay for the product as though it were delivered to Customer. Paramit will store the product for a period not to exceed […***…] from the date the product would otherwise have been shipped. All risk of loss to such product will be borne by Customer. Customer will sign an acknowledgment in a form requested by Paramit that title to the product passes to Customer, risk of loss to the product passes to Customer, and Customer is liable for the purchase price notwithstanding that delivery has not been made to Customer's location.

(d) If Customer fails to pay an invoice within […***…] after payment is first due, Paramit may suspend work on the product for which payment is overdue. If Customer fails to pay an invoice within […***…] after payment is first due, Paramit may suspend work on all contracts with Customer and Customer shall be in breach of this agreement. Any sum owing to Paramit by Customer will bear interest at the rate of […***…] per month, compounded monthly, from the date due until paid. A breach of this agreement by Customer is a breach by Customer of each other agreement with Paramit.

(e) In the event of Customer's breach, Paramit is entitled to all remedies allowed by this agreement or by law. Among other things, Paramit may cancel all further obligations to Customer to manufacture or sell the product or to provide services.

14. ENGINEERING CHANGE ORDER (ECO) MANAGEMENT

To eliminate potential ambiguity, facilitating clear and effective ECO management, Paramit and Customer agree to the following steps:

(1) Customer provides complete engineering ECO package to Paramit.

(2) Paramit will review materials on hand, inventory, WIP, FGI, orders with suppliers, shipment schedules and provide impact analysis, which will also include any required WIP rework charges, if any.

(3) Customer accepts outcome of ECO impact analysis in writing, prior to ECO implementation.

(4) Upon receipt of written approval from Customer, Paramit will proceed with ECO implementation.

(5) Customer will provide updated product purchase order(s), reflecting new revision within […***…].

(6) Customer will issue PO for obsoleted components and required rework (if any) within a week of ECO impact analysis acceptance.

15. THIRD-PARTY PURCHASE ORDERS.

Customer may wish to designate a third party to purchase the product and to have such third party purchase the product directly from Paramit. Paramit will not accept a purchase order for product from a third party unless Customer makes a written request and by doing so, Customer accepts financial responsibility for the third party's obligations to Paramit.

16. GRANT OF MANUFACTURING RIGHTS.

(a) The grant of rights in this section only applies to the manufacture, use, and sale of product for which:

(1) The Customer has submitted a purchase order that has been accepted by Paramit or

(2) A third party has submitted a purchase order that has been accepted by Paramit at Customer's written request.

If the product, or any part thereof, is protected by patent owned and controlled by Customer, Customer grants Paramit the right to make, use, and sell any product protected by such a patent only to the extent necessary for Paramit to perform its obligations under this Agreement. If the product, or any part thereof, is protected by copyright, Customer grants Paramit the right to reproduce the copyrighted work, to prepare derivative copies based on the copyrighted work, to distribute copies of the copyrighted work, and to perform or display the copyrighted work only to the extent necessary for Paramit to perform its obligations under this Agreement. If the product or any part thereof, is protected by trademark, trade secret, or other intellectual property rights, Customer grants Paramit the right to make, use, and sell product that uses such intellectual property rights only to the extent necessary for Paramit to perform its obligations under this

Agreement. The grant of manufacturing rights will also extend to parts or components of the product that Paramit should order through sub-tier vendors, such as FAB, cable assemblies, sheet metals, plastics and other required custom parts.

(b) If Customer fails to pay Paramit as required by this agreement and Paramit is holding inventory of product, Paramit may use the rights granted in this section to complete work in process and to sell product to third parties.

(c) Customer represents and warrants that Customer has the right, power, and authority to grant such rights to Paramit.

17. LIMITATION ON LIABILITY.

In no event, whether as a result of breach of contract, breach of warranty, tort (including active or passive negligence), strict liability, product liability, or otherwise, shall Paramit be liable to Customer for any consequential or punitive damages of any kind, including loss of profits, loss of use, or interruption of business, whether or not Paramit was advised of the possibility of such damages. In no event shall Paramit's liability to the Customer, its successors or assigns under this agreement exceed Paramit's cost of materials for the specific quantity of Product(s) subject to the claims for liability hereunder. The statute of limitations for an action by Customer for breach of warranty or for other claim with respect to product is shortened to two years from the date of shipment of the product (i.e., an action must be filed before the second anniversary of the date of shipment).

18. INDEMNIFICATION.

Customer agrees to defend and indemnify Paramit and its employees against any liability (including attorney's fees, interest, and penalties), and to hold Paramit and its employees harmless against any loss or expense (including attorney's fees, interest, and penalties), arising out of a claim of a third party that is based on Paramit's compliance with Customer's specifications. The foregoing indemnification obligation applies to, among other things, any claim that the product infringes a patent, copyright, trade secret, trademark, maskwork, or other intellectual property right of.a third party, any claim that the manufacture, shipment, or use of the product violates any law, including a statute or regulation, and any claim that the product is unsafe or unreasonably dangerous or negligently caused personal injury or property damage.

19. FORCE MAJEURE.

A party to this agreement is excused from liability for non-performance or for delay in performance if such non-performance or delay is caused by a force beyond the reasonable control of the party and if such party is unable to overcome the effect of the force on non-performance or delay by the exercise of due diligence at reasonable cost. Such a force includes acts of God (including floods, tornadoes, windstorms, lightning, epidemics, earthquakes, and landslides), fires or explosions (whether or not caused by negligence of an employee of a party), strikes affecting the party or labor disputes affecting third parties (such as suppliers or freight companies), acts of war, terrorist acts, insurrection or civil disturbance, and governmental acts (such as seizures, quarantines, or

embargoes). The foregoing applies whether the force affects a party to this agreement or a third party (such as a supplier or freight carrier). Financial inability of a party to perform, no matter what the cause of such inability, is not excused by this paragraph. A party claiming excuse under this paragraph shall promptly notify the other party of the force causing non-performance or delay and the probable duration.

20. MISCELLANEOUS.

(a) This agreement, including any exhibits to this agreement that are identified on the signature page to this agreement, along with the particular purchase order terms set forth in a purchase order accepted by Paramit, constitutes the final and complete expression of the agreement of the parties with respect to its subject matter. There are no promises, restrictions, representations, warranties, arrangements, or understandings other than those expressly set forth in this agreement. This agreement supersedes all terms on any purchase order related to the product concurrently or hereafter accepted by Paramit (including those for NRE's or for purchase of excess materials or excess inventory) except the particular purchase order terms. This agreement supersedes any prior negotiations, understandings, quotations, or agreements, whether written or oral, between the parties with respect to its subject matter and may not be contradicted by evidence of any prior or contemporaneous statements or agreements.

(b) This agreement may be amended only by a writing signed by the parties to this agreement.

(c) There are no conditions to the effectiveness of this agreement that are not expressed on the face of this agreement.

(d) The parties acknowledge that they have independently negotiated the provisions of this agreement, that they have relied upon their own counsel as to matters of law, and that neither party has relied on the other party with regard to such matters. This agreement shall be construed as a whole, according to its fair meaning, and without consideration as to which party drafted this agreement or any part of it. Civil Code §1654 shall not be applied to construe this agreement, and in the event of a dispute, no provision of this agreement shall be construed in favor of or against any party by reason of such party's contribution to the drafting of this agreement.

(e) Unless this agreement expressly provides otherwise, a reference in this agreement to "days" is a reference to calendar days and a reference in this agreement to a number of days is a reference to that number of consecutive calendar days. A "business day" is any day that is not a Saturday, Sunday, or other optional bank holiday listed in California Civil Code §7.1 except Good Friday. If the time for any act to be performed under this agreement falls on a day that is not a business day, the time for performing such act is extended to 5:00 P.M. of the first day following such time that is a business day.

(f) This agreement shall be governed by, and construed in accordance with, California law applicable to transactions taking place entirely within California and affecting solely California residents whether or not any part of this agreement is to be performed outside California and whether or not any party to this agreement is not a California resident.

(g) The parties may execute this agreement by signing one copy of this agreement or by signing duplicate copies of this agreement, and in the latter case, all of the signed copies will collectively constitute one and the same agreement, and each signed copy will be deemed an original. The parties may execute this agreement by one or more parties signing one counterpart of this

agreement and one or more parties signing one or more other counterparts of this agreement, and the signed counterparts will collectively constitute one and the same agreement, and each signed counterpart will be deemed an original. Delivery by a party of the signature page to a counterpart of this agreement that has been signed by the party is the same as the party's delivery of a signed counterpart of this agreement. In proving this agreement when it has been executed in counterparts, a party must prove only that the party to be charged has signed a counterpart of the agreement. Delivery by facsimile transmission or by electronic transmission of an image of a signed counterpart of this agreement or an image of a signed signature page to this agreement is the same as delivery by hand of an identical document bearing an original ink signature.

(h) The captions of the sections and other headings contained in this agreement are for convenient reference only, and the words contained in such captions or headings do not control or affect the meaning of the provisions that follow.

(i) A waiver of any term or condition of this agreement in one or more instances shall not be construed as a general waiver by the party waiving the condition, who shall be free to insist on future compliance with such term or condition. A waiver of any provision of this agreement must be in writing and signed by the party to be charged with the waiver.

(j) Nothing in this agreement constitutes a partnership or joint venture between the parties hereto or constitutes any party the agent or employee of the other party for any purpose whatsoever. Neither party has authority to contract in the name of the other or otherwise to act to bind the other for any purpose.

(k) Except as this agreement may expressly provide otherwise, there are no third party beneficiaries of this agreement. The parties to this agreement may freely modify or rescind this agreement by an agreement signed by both parties without consent from any other person and without regard to the effect on any other party.

(I) In the event of any litigation by the parties to this agreement concerning this agreement or transactions under this agreement, the prevailing party shall be awarded all costs of litigation, including attorney's fees and charges for the preparation and trial of the action and for any appeals, expert witness fees, trial and appellate court costs, and deposition and trial transcript expense.

(m) Cost of materials and components are based on quote(s) provided to Customer and after acceptance via issuing PO for product(s), such materials costs will be entered into Paramit system as "standard cost". Subsequently, if any new part is added to the Bill of Material (BOM), Paramit will have to quote it by employing provided quantity usage at the time. Similarly, Paramit will purchase materials from Customer based on established "standard cost" and not necessarily the cost Customer might have paid for at higher volume than purchase orders placed with Paramit.

(n) Paramit may purchase Customer owned Materials/ Excess Materials, solely based on demand consumption rate of issued POs to Paramit and will pay Customer accordingly. Paramit would transfer Customer's usable, non-obsolete Materials / Excess Materials to a consigned warehouse, designated to Customer at Paramit; the consigned warehouse is netable against Materials Requirement Planning (MRP) and will prompt Paramit to use such Materials/ Excess Materials for any new demand. Paramit system will record transaction usage; Purchase Orders will be issued to Customer monthly.

(o) Customer to place spare orders at the same time as ordering products to prevent Price Purchase Variance (PPV) and shipment delays due to lead time issues. In the absence of a

spares forecasting process, both parties agree to develop such process. Paramit shall not be expected to sell Components that are designated for the manufacture of the products; as such requests may adversely affect product delivery dates and prevent Paramit from realizing planned revenue.

(p) For efforts leading to cost reductions, Paramit will […***…] after the implementation dates; Paramit and Customer will […***…]. Customer will receive […***…] thereafter. For savings to be realized, prior inventory purchased at higher price must be either used up or paid for by the Customer.

(q) Paramit takes Customer business seriously and allocates best resources to drive Customer initiatives; Customer and its agents shall not approach any Paramit personnel for recruitment, unless he/she had no longer been working for Paramit for […***…].

(r) Customer shall identify any hazardous materials on their BOMs or inform Paramit of such items, so that Paramit can take necessary measures to ensure the safety of personnel that will come in contact with such materials. Hazardous materials are materials that are radioactive, flammable, explosive, corrosive, oxidizing, asphyxiating, bio-hazardous, toxic, pathogenic, reagent, or allergenic as it pertains to state and local regulations, referencing CFR49 172.101 and CFR49 171.8.

IN WITNESS WHEREOF, the parties have signed and delivered the foregoing manufacturing service agreement between Paramit and Customer.

Paramit Corporation (*company name*)	**BioNano Genomics Inc.** (*company name*)
Billoo Rataul (*print name of signature*)	**Joel R. Jung** (*print name of signature*)
Chief Executive Officer (*title of signatory*)	**Chief Financial Officer** (*title of signatory*)
/s/ Billoo S. Rataul (*Signature*)	*/s/ Joel R. Jung* (*Signature*)
February 18, 2015 (*date*)	Feb 18, 2015 (*date*)

Exhibits: A - REPAIR / UPGRADE TERMS AND CONDITIONS

Exhibits: A

REPAIR/ UPGRADE TERMS AND CONDITIONS

1. Customer will request RMA number via email or phone prior to sending any products to Paramit.
2. Customer will provide product part number, revision and detailed return reason of non conformance or defect for each unit.
3. Paramit will issue RMA number same day if request is received prior to 2:00; requests after 2:00 will be processed the next business day.
4. Warranty/ Out of Warranty
    (a) If product is returned due to manufacturing process defects or workmanship within […***…] of date of shipment, product will be repaired at no charge.
    (b) If product is returned for repair due to defective part that has no pass-through warranty from its manufacturer, Customer will be charged for the replacement part and associated labor. In case any part is covered under manufacturer's pass-through warranty, Customer will not be charged for such item; Paramit will work with supplier to activate warranty on behalf of the Customer. Paramit will buy parts per availability & lead time.
    (c) If product is returned for repair after expiration of warranty date, Customer will be charges for parts and labor.
    (d) If a product is returned to Paramit and is processed/ tested but no problem found (NPF), Customer will be charged for processing & testing.
    (e) For non warranty repair, Customer will issue PO at […***…]
        i. Paramit will provide estimated quote prior to repair
        ii. After repair is performed, Paramit will provide final repair charges
        iii. Customer will update […***…] PO per final repair/ upgrade charges prior to shipment.
        iv. Paramit will first try to validate failure; then, debug up to […***…]; any additional work beyond […***…] will require Customer's approval.
5. For Upgrade work, Customer will provide Acceptable Ship List (ASL). The ASL should clearly indicate allowable revision and or version for each product to ship.
6. For incoming products that are at lower revision, Paramit will upgrade to the most current revision if no specific direction is provided by the Customer. For upgrade instructions, there are two options:
    (a) Customer will provide upgrade instruction
    (b) Paramit could create upgrade instruction at a rate of […***…] / hr, as a onetime NRE charge but will require Customer to provide copies of all necessary ECO's. Once

such instruction is created, it can be used for all subsequent incoming products that are at that revision.

7. For cosmetics, Paramit will inspect and assess condition of the product based on either cosmetic specifications provided by Customer or IPC standard. Paramit's manufacturing engineer will review and create required documents/ re-work instruction.

8. For high volumes of greater than […***…], flat fee charges could be established for products that require the same tests/ upgrades.

9. For PCBAs, if the repair cost will be greater than […***…] value of the board, Paramit will contact Customer to obtain authorization prior to performing any additional work. For systems, Paramit will seek Customer approval, if the repair cost is to exceed the mutually established cost threshold.

10. Repair turnaround time is […***…] from the day the product is received, provided the required components are available at Paramit and product will not exhibit multiple failures; otherwise, the component lead time will be added to the turnaround time and more time may be needed to root cause and repair the multiple failures. In such event, Paramit will inform Customer of delivery date.

Quote Details

Activity	Cost
Test / debug rate	[…***…]
Labor rate	[…***…]
Evaluation Fee	[…***…]
Validate Failure	[…***…]
Repair	[…***…]
Final Test	[…***…]
Final WA	[…***…]
Standard turnaround time	[…***…]

Expedite Charge

3 day turn	[…***…]
4 day turn	[…***…]
5 day turn	[…***…]

* Requires Customer authorization if more debug time is required.

Exhibit 10.25

*****Text Omitted and Filed Separately**
with the Securities and Exchange Commission
Confidential Treatment Requested
Under 17 C.F.R. Sections 200.80(b)(4)
and 230.406

LICENSE AGREEMENT
BETWEEN PRINCETON UNIVERSITY AND
BIONANOMATRIX LLC

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LICENSE AGREEMENT
BETWEEN PRINCETON UNIVERSITY AND
BIONANOMATRIX LLC

THIS LICENSE AGREEMENT (this "Agreement") is made as of the 7th day of January, 2004 (the "Effective Date") by and between the Trustees of PRINCETON UNIVERSITY, a not-for-profit corporation duly organized and existing under the laws of the State of New Jersey, U.S.A. ("Princeton"), and BIONANOMATRIX LLC, a limited liability company duly organized and existing under the laws of the State of Delaware ("BioNanomatrix").

BACKGROUND

WHEREAS, certain inventions disclosed under […***…], generally characterized as […***…], […***…], […***…], and […***…] (collectively, the "Inventions") were made in the course of research at Princeton by the inventors listed on Exhibit A (the "Inventors");

WHEREAS, BioNanomatrix wishes to obtain certain rights from Princeton for the commercial development, manufacture, use and sale of the Inventions;

WHEREAS, Princeton is willing to grant certain rights and licenses with respect to the Inventions in accordance with the terms and conditions of this Agreement; and

WHEREAS, Princeton is desirous that the Inventions be developed and utilized to the fullest extent so that the benefits can be enjoyed by the general public.

NOW, THEREFORE, in consideration of the premises and mutual covenants contained herein, and intending to be legally bound hereby, the parties hereto agree as follows:

1. Definitions.

1.1 "Affiliate" means (i) any corporation or business entity that directly or indirectly controls, is controlled by, or is under common control with BioNanomatrix to the extent of at least 50% of the outstanding stock or other measure of voting rights with respect to the management of the corporation or business entity and (ii) any joint venture in which BioNanomatrix or an Affiliate participates that markets Licensed Products or Services.

1.2 "BioNanomatrix Improvement" shall mean any modification, enhancement or other improvement developed solely by BioNanomatrix, its employees, consultants or […***…], unless (a) all or part of the cost thereof is paid from Princeton funds or from funds administered by Princeton, (b) such modification, enhancement or improvement is made as a direct result of Princeton duties, or (c)

*****Confidential Treatment Requested**

such modification, enhancement or improvement has been developed in whole or in part through the utilization of Princeton resources (except as otherwise set forth in a written agreement between BioNanomatrix and Princeton or one of its facilities relating to the use of Princeton resources) in which case, such modification, enhancement or improvement shall be considered a Joint Improvement.

1.3 "Federal Government Interest" shall mean the rights of the United States Government and agencies thereof under Public Laws 96-517, 97-256 and 98-620, codified at 35 U.S.C. §§200-212, and any regulations issued thereunder, as such statute or regulations may be amended from time to time hereafter.

1.4 "Field of Use" shall mean all fields of use except for any claimed methods of creating or fabricating nano or microstructures by means of […***…].

1.5 "Inventions" shall mean the inventions covered by claims of the Princeton Patent Rights that are owned or controlled by Princeton and are listed on Exhibit A, and that are contained within the Field of Use.

1.6 "Joint Improvement" shall mean any modification, enhancement or other improvement relating to the Inventions developed jointly by both Princeton and BioNanomatrix inventors, as determined by U.S. patent law.

1.7 "Licensed Method" shall mean any process or method that is covered by the Princeton Patent Rights whose use or practice would constitute, but for the license granted to BioNanomatrix pursuant to this Agreement, an infringement of a Valid Claim of the Princeton Patent Rights.

1.8 "Licensed Product" shall mean any material or product or kit, or any process, or procedure that (1) would constitute, but for the license granted to BioNanomatrix pursuant to this Agreement, an infringement of a Valid Claim of the Princeton Patent Rights or (2) is developed, made, sold, registered, or practiced using Licensed Method or which may be used to practice the Licensed Method, in whole or in part.

1.9 "Net Sales" shall mean the total of […***…].

1.10 "Princeton Improvement" shall mean any modification, enhancement or other improvement to the Inventions developed solely by Princeton.

1.11 "Princeton Patent Rights" shall mean all rights embodied in PCT patent applications bearing serial nos. […***…], and U.S. patent

application bearing serial no. […***…], corresponding U.S. and foreign patent applications or issued patents, including any provisionals, divisionals, continuations, reissues and extensions derived therefrom, such as patent term restorations, supplementary protection certificates, etc., to the foregoing that may be filed by or granted to Princeton during the term of this Agreement, to the fullest extent that Princeton currently has, or in the future is adjudicated by a court of competent jurisdiction to have, rights in the aforementioned PCT and U.S. patent applications.

1.12 "Services" means the use of the Licensed Product or Licensed Method to provide a service to an independent third party.

1.13 "Service Income" means the total of […***…].

1.14 "Sublicensee Income" means all […***…]; provided, that, Sublicensee Income shall not include: […***…].

1.15 "Territory" shall mean all countries of the world.

1.16 "Valid Claim" shall mean (i) a claim of an issued and unexpired patent included within the Princeton Patent Rights which has not been held invalid in a final decision of a court of competent jurisdiction from which no appeal may be taken, and which has not been disclaimed or admitted to be invalid or unenforceable through reissue or otherwise, or (ii) a claim of a pending patent application within the Princeton Patent Rights and for which not more than five (5) years has elapsed from the filing date to which the claim is entitled.

2. Grant of License.

2.1 Grant of License. Subject to Section 12.1 and the other limitations set forth in this Agreement and subject to the Federal Government Interest, if any, Princeton hereby grants to BioNanomatrix in the Territory a worldwide, exclusive right and license in the Field of Use under the Princeton Patent Rights to make, have made, use, have used, reproduce, sublicense, create and implement improvements, distribute, import, export, market, promote, offer to sell, sell, have sold, rent, and lease Licensed Products and Services, including, without limitation, the right to make, have made, further develop; improve, use, sell and distribute the Licensed Products and Services for all commercial, military and other applications and to practice the Licensed Method. For purposes of clarification, nothing contained in this Agreement shall prevent BioNanomatrix from utilizing any intellectual property of third parties, or any intellectual property developed by BioNanomatrix after the date hereof, relating to […***…], alone or in combination with the intellectual property rights granted under this Agreement.

It being expressly understood and acknowledged by BioNanomatrix that in so utilizing such intellectual property, it may be necessary to acquire rights to other Princeton patents or claims, including but not limited to those claiming […***…], that are not licensed herein. No implied license to such other Princeton patents, or claims, including but not limited to those claiming […***…], is implied, or conferred in this Section 2.1.

2.2 Limitation. Princeton agrees not to license, assign or otherwise transfer any portion of the Inventions in the Field of Use, except that Princeton retains the rights to use the Inventions for educational and internal research and development activities throughout Princeton, including the right to develop Princeton Improvements to the Inventions and apply for government grants relating thereto. For the avoidance of doubt, noting contained herein shall prevent Princeton from licensing to any third party any Princeton Patent Rights outside of the Field of Use.

2.3 Covenant not to Sue. BioNanomatrix hereby grants, and will cause its Affiliates, licensees and sub-licensees to grant, a limited covenant not to sue under the Princeton Patent Rights to one Princeton designee. The scope of the covenant not to sue granted under the Princeton Patent Rights shall be limited to the use, manufacture, sell or offer for sale of […***…] machines, parts and accessories, and improvements to any of the preceding, that are covered by a Valid Claim of the Princeton Patent Rights. The parties agree that the initial Princeton designee shall be the […***…]. Princeton reserves the right to change the Princeton designee from time to time.

2.4 Notice Provision. Provided BioNanomatrix is in compliance with all of the terms under this Agreement and where Princeton is legally able, for a period of […***…] from the Effective Date, Princeton shall make a good faith effort to disclose to BioNanomatrix on a non-exclusive basis, non-confidential information of any Princeton Improvements to the Inventions within the Field of Use, made to Princeton within a reasonable time after it has been disclosed to Princeton.

3. Sublicensing.

3.1 Sublicense Grant. Princeton grants to BioNanomatrix the right to grant sublicenses to third parties and Affiliates under the licenses granted in Sections 2.1 and 2.2. To the extent applicable, such sublicenses shall include all of the rights of and obligations due to Princeton (and, if applicable, to the United States Government) that are contained in this Agreement.

3.2 Notice. Within […***…] after execution thereof, BioNanomatrix shall provide Princeton with a copy of each sublicense issued hereunder, subject to any confidentiality obligations.

3.3 Continuation of Sublicenses. Upon termination of this Agreement for any reason and within […***…] of such termination, any sublicensee not then in default shall have the right to request in writing that its sublicense be assigned to Princeton. Such assignment shall be subject to Princeton's approval, such approval not to be unreasonably withheld. Additionally, Princeton shall in good-faith consider any reasonable request by a sublicensee for a modification of its obligations under the sublicense

4. Ownership. Subject to Section 12.1, Princeton shall have and retain all right, title and interest to the Inventions, subject to the license rights and Federal Government Interest set forth in Section 2.

4.1 Princeton Improvements. Princeton Improvements shall be owned by Princeton.

4.2 Joint Improvements. Joint Improvements shall be owned jointly by Princeton and BioNanomatrix and […***…].

4.3 BioNanomatrix Improvements. BioNanomatrix Improvements shall be owned by BioNanomatrix.

5. Due Diligence.

5.1 Commercially Reasonable Efforts. BioNanomatrix shall use commercially reasonable efforts to develop, test, obtain regulatory approval, manufacture, market and sell Licensed Products and shall earnestly and diligently endeavor to market the same within a reasonable time after execution of this Agreement and in quantities sufficient to meet the market demands therefore.

5.2 Judgment. BioNanomatrix shall be entitled to exercise prudent and reasonable business judgment in meeting its diligence obligations hereunder.

5.3 Governmental Approvals. BioNanomatrix shall use commercially reasonable efforts to obtain all necessary governmental approvals for the manufacture, use and sale of Licensed Products or Services.

5.4 Milestones.

(a) BioNanomatrix shall raise at least […***…] on or before […***…].

(b) BioNanomatrix shall have raised at least […***…] prior to […***…].

(c) BioNanomatrix shall prepare a full business plan suitable for distribution to additional investors by […***…].

(d) BioNanomatrix shall develop a […***…] incorporating at least a portion of the Princeton Patent Rights by […***…].

(e) BioNanomatrix shall identify a […***…] by […***…].

(f) BioNanomatrix shall achieve a first commercial sale of Licensed Products or Licensed Methods by […***…].

(g) BioNanomatrix shall achieve total sales of […***…] of at least […***…] during the calendar year ending […***…].

6. Payment Terms.

6.1 License Payment. BioNanomatrix agrees to pay to Princeton a license fee of […***…] (the "License Fee"). The License Fee shall be payable by BioNanomatrix in […***…]. In the event this Agreement is terminated by BioNanomatrix for any reason before […***…], then BioNanomatrix shall not be obligated to […***…]. The License Fee is […***…]. After payment of these amounts, there shall be no further payment obligations of BioNanomatrix except as set for the Sections 6.2 through 6.8.

6.2 License Maintenance Fee. BioNanomatrix agrees to pay to Princeton a license maintenance fee of […***…] beginning three years after the Effective Date, and continuing annually on the anniversary of the Effective Date each subsequent year (the "License Maintenance Fee"); provided that, beginning with the first commercial sale of a Licensed Product or Service, the License Maintenance Fee payable on any due date shall be reduced by the amount of any earned royalty paid to Princeton on sales of Licensed Product or Services during the preceding 12 month period. The License Maintenance Fee is […***…].

6.3 Sublicense Income. BioNanomatrix shall pay to Princeton […***…] of all Sublicense Income, to be paid in accordance with the schedule and conditions in Sections 6.5, 6.6(b), 6.7 and 6.8.

6.4 Royalties on Licensed Products. BioNanomatrix shall pay to Princeton a royalty of […***…] of Net Sales of Licensed Products, during the term of this Agreement. Sales among BioNanomatrix, its Affiliates and its sublicensees for ultimate third party use shall be disregarded for purposes of computing royalties. Royalties shall be payable only upon sales

or transfers between unrelated third parties and shall be based on arms length consideration. Notwithstanding anything to the contrary contained herein, in the event that a Licensed Product is also covered by valid claim of a patent right or is also developed, made, sold, registered or practiced using a method licensed from Princeton pursuant to a separate agreement, then BioNanomatrix shall only be required to pay to Princeton […***…].

6.5 Royalties for Services. BioNanomatrix shall pay to Princeton a royalty of […***…] of Service Income, during the term of this Agreement. Sales among BioNanomatrix, its Affiliates and its sublicensees for ultimate third party use shall be disregarded for purposes of computing royalties. Royalties shall be payable only upon sales or transfers between unrelated third parties and shall be based on arms length consideration. Notwithstanding anything to the contrary contained herein, in the event that a Service is also covered by valid claim of a patent right or is also developed, made, sold, registered or practiced using a method licensed from Princeton pursuant to a separate agreement, then BioNanomatrix shall only be required to pay to Princeton […***…].

6.6 Third Party Payments.

(a) If BioNanomatrix, in order to make, use, sell or otherwise dispose of Licensed Products or Services in any jurisdiction, reasonably determines that it must make payments ("Third Party Payments") to one or more independent third parties to obtain license or similar rights to make, use, sell or otherwise dispose of Licensed Products or Services in said jurisdiction, BioNanomatrix may reduce the future royalties due Princeton pursuant to Section 6.4 or 6.5 by the amount of […***…].

(b) In the event that any patent or any claim thereof included within the Princeton Patent Rights shall be held invalid in a final decision by a court of competent jurisdiction and last resort in any country and from which no appeal has or can be taken, all obligation to make Payments based on such patent or claim shall cease as of the date of such final decision with respect to such country. BioNanomatrix shall not, however, be relieved from paying any royalties that accrued before such claim was asserted or that are based on another patent or claim not involved in such decision.

6.7 Sales to the United States Government. If a license to the Invention has been granted to the United States Government, no royalties shall be payable hereunder on Licensed Products or Services sold to the United States Government. BioNanomatrix and its sublicensees shall […***…].

6.8 Payment.

(a) After […***…], the royalties payable to Princeton shall be made by BioNanomatrix to Princeton within […***…] during the term of this Agreement. After termination or expiration of this Agreement, a final payment shall be made by BioNanomatrix covering the whole or partial calendar quarter. Each quarterly payment shall be accompanied by a written statement of royalties as described in Section 6.9 hereunder.

(b) All payments shall be payable in United States Dollars in Princeton, New Jersey. When Licensed Products or Services are sold for monies other than United States Dollars, such amounts shall first be determined in the foreign currency of the country in which such Licensed Products or Services were sold and then converted into equivalent United States Dollars. The exchange rate will be the United States Dollar buying rate quoted in the Wall Street Journal on the last day of the applicable reporting period.

(c) In the event any amounts due Princeton hereunder, including […***…], are not received when due, BioNanomatrix shall pay to Princeton interest charges at a rate of […***…] per annum. Such interest shall be calculated from the date payment was due until actually received by Princeton.

6.9 Written Statement. Along with each remittance of payments to Princeton, BioNanomatrix shall include a report covering BioNanomatrix's most recently completed calendar quarter and will show the payments in U.S. Dollars with respect to Net Sales and sublicensing revenue. If no sales of Licensed Products or Services have been made during any reporting period, a statement to this effect shall be made by BioNanomatrix.

6.10 Books and Records; Audits. BioNanomatrix agrees to maintain and retain, in accordance with generally accepted accounting practices, complete and accurate records showing all transactions and information relating to this Agreement for a period of three years from the date of entry to which they pertain. Upon the written request of Princeton and not more than once in each calendar year, BioNanomatrix shall permit an independent certified public accounting firm (other than on a contingency fee basis) selected by Princeton and acceptable to BioNanomatrix (which acceptance by BioNanomatrix shall not be unreasonably withheld), to have access during normal business hours to such records of BioNanomatrix as may be reasonably necessary to verify BioNanomatrix's compliance with the payment terms of Section 6. The accounting firm shall enter into an acceptable and customary confidentiality agreement with BioNanomatrix obligating the accounting firm to retain in confidence all information of BioNanomatrix which it obtains in performing such audits hereunder, and such audit shall be subject to BioNanomatrix's third party confidentiality obligations. Any audit under this Section 6.10 shall be at the expense of Princeton, provided, however, if such audit reveals an underpayment by BioNanomatrix of more than […***…], the cost of such audit shall be paid by BioNanomatrix.

6.11 Taxes. BioNanomatrix shall be responsible for any and all taxes, fees, or other charges imposed by the government of any country outside the United States on the remittance

of royalty income for sales occurring in any such country other than income taxes due from Princeton. BioNanomatrix shall also be responsible for all bank transfer charges.

6.12 Reports. Beginning […***…], and annually thereafter, BioNanomatrix shall submit to Princeton a progress report covering BioNanomatrix's activities related to the development of all Licensed Products and Services. Such reports shall include sufficient information to enable Princeton to determine BioNanomatrix's progress in fulfilling its obligations under Section 5 hereunder.

7. Confidentiality.

7.1 Confidential Information. The parties understand and agree that in the performance of this Agreement each party may have access to proprietary or confidential data or information of the other party, including, but not limited to, trade secrets, intellectual property, services and/or the business, finances, or affairs of either party ("Confidential Information"). Confidential Information may be communicated orally, visually, in writing or in any other recorded or tangible form. All data and information shall be considered to be Confidential Information hereunder (i) if either party has marked them as such, (ii) if either party, orally or in writing, has advised the other party of their confidential nature, or (iii) if, due to their character or nature, a reasonable person in a like position and under like circumstances would treat them as confidential.

7.2 Disclosure of Confidential Information. During the term of this Agreement, either party may disclose certain Confidential Information (the "Disclosing Party") to the other party (the "Receiving Party") solely to permit the performance of obligations under this Agreement. The Receiving Party shall refrain from using, exploiting, or copying any and all Confidential Information for any purposes or activities other than those specifically authorized in this Agreement. The Receiving Party shall not disclose any Confidential Information to any third party, except to its employees, agents, representatives or sub-distributors as necessary for the performance of its obligations under this Agreement. Each party shall implement effective security procedures in order to avoid disclosure or misappropriation of the other party's Confidential Information. Each employee, agent or representative who will have access to any Confidential Information shall execute a reasonable nondisclosure agreement which prohibits the unauthorized use or disclosure of any of the Disclosing Party's Confidential Information. The Receiving Party shall immediately notify the Disclosing Party of any unauthorized disclosure or use of any Confidential Information by the Disclosing Party that comes to Receiving Party's attention and shall take all action that the Disclosing Party reasonably requests to prevent any further unauthorized use or disclosure thereof.

7.3 Exceptions. The provisions of this Section 7 will not apply, or will cease to apply, to Confidential Information supplied by the Disclosing Party that (i) was in the Receiving Party's possession prior to receipt from the Disclosing Party as shown by files existing at the time of disclosure, (ii) has come into the public domain other than through a breach of confidentiality by the Receiving Party, (iii) was developed independently by employees of the Receiving Party or by persons who have not had access to the Disclosing Party's Confidential Information, (iv) was or is lawfully obtained, directly or indirectly, by the Receiving Party from a third party under no obligation of confidentiality, or (v) is required to be disclosed pursuant to

any statutory or regulatory provision or court order; provided, however, that the Receiving Party provides notice thereof to the Disclosing Party, together with the statutory or regulatory provision, or court order, on which such disclosure is based, as soon as practicable prior to such disclosure so that the Disclosing Party has the opportunity to obtain a protective order or take other protective measures as it may deem necessary with respect to such information.

7.4 Survival. The obligations of the parties under this Section 7 shall remain in effect for five (5) years from the date of termination or expiration of this Agreement.

8. Use of Names.

8.1 Use of Names. Nothing contained in this Agreement shall be construed as granting any right to the parties to use in advertising, publicity or other promotional activities any name, trade name, trademark or other designation of the other party (including contraction, abbreviation or simulation of any of the foregoing). Unless required by law, the use by one party of the other party's name is expressly prohibited, and such party shall not use such names of the other party with such party's prior written consent.

9. Patent Prosecution and Maintenance.

9.1 Patent Filings for Inventions. Princeton shall diligently prosecute and maintain all United States and foreign patents comprising Princeton Patent Rights using counsel designated by BioNanomatrix, subject to Princeton's approval, not to be unreasonably withheld. Patent counsel shall take instructions only from Princeton, unless given permission by Princeton to take advice from BioNanomatrix; provided, however, that BioNanomatrix shall not be prohibited from contacting such patent counsel to participate in and provide comments on the filing, prosecution and maintenance of patents under Princeton Patent Rights. Princeton shall promptly deliver to BioNanomatrix, or have patent counsel deliver to BioNanomatrix, any communications with the applicable patent office, including without limitation, copies of all office actions and drafts of all proposed responses and any patentability search reports made by patent counsel, including patents located, a copy of each patent application, and each patent that issues thereon. It is the intent of the parties that all materials shall be provided to BioNanomatrix with appropriate lead time for BioNanomatrix to review and comment upon such materials prior to their submission to the applicable patent office.

9.2 Amendments. Princeton shall give due consideration to amending any patent application to include claims reasonably requested by BioNanomatrix to protect the Licensed Products and Services contemplated to be sold under this Agreement.

9.3 BioNanomatrix Improvements. At BioNanomatrix's cost and expense, BioNanomatrix shall file and prosecute on its own behalf any applications for patent rights relating to any BioNanomatrix Improvements after the Effective Date, and any patents issued on the BioNanomatrix Improvements shall be owned by BioNanomatrix and shall be in BioNanomatrix's name.

9.4 Initial Costs. BioNanomatrix shall pay Princeton […***…] relating to costs of preparing, filing, prosecuting and maintaining,

the patent applications contained in the Princeton Patent Rights, including interferences and oppositions, and all corresponding foreign patent applications and patents incurred prior to the Effective Date (the "Initial Costs"). Such amount for the Initial Costs shall be due within […***…] of the Effective Date. Costs of preparing, filing, prosecuting, and maintaining all United States patent applications and/or patents, including interferences and oppositions, and all corresponding foreign patent applications and patents contained in the Princeton Patent Rights incurred after the Effective Date ("Future Costs") shall be paid by BioNanomatrix within […***…] of receipt of the invoice for such Future Costs. Failure to pay these bills in a timely manner is grounds for terminating the Agreement. After BioNanomatrix has been notified two times of failure to pay bills in a timely manner, Princeton may terminate the Agreement upon written notice to BioNanomatrix.

9.5 Foreign Applications. Princeton shall, at the request of BioNanomatrix, file, prosecute and maintain patent applications and patents covered by Princeton Patent Rights in foreign countries if available. BioNanomatrix consents to the filing of all PCT and foreign patent applications that have already been filed as of the Effective Date. If Princeton desires to file a patent application in any country or countries in which BioNanomatrix has not elected to secure patent rights, Princeton shall notify BioNanomatrix of Princeton's intention to file such application. BioNanomatrix shall have […***…] from the receipt of such notice to notify Princeton of BioNanomatrix's desire to have such patent application filed at BioNanomatrix's expense. If Princeton does not receive notice from BioNanomatrix within such 15-day period, Princeton may file such applications, at Princeton's sole cost and expense and the resultant patent applications, and resulting patents, shall not be subject to the license agreement.

9.6 Discontinuance. BioNanomatrix's obligation to pay Future Costs shall continue for so long as this Agreement remains in effect, provided, however, that BioNanomatrix may terminate its obligations with respect to any given patent application or patent upon three months' written notice to Princeton. Princeton shall use reasonable efforts to curtail Future Costs when such a notice is received from BioNanomatrix. BioNanomatrix shall promptly pay Future Costs that cannot be so curtailed. Commencing on the effective date of such notice, Princeton may continue prosecution and/or maintenance of such application(s) or patent(s) at its sole discretion and expense, and BioNanomatrix shall have no further right or licenses thereunder.

9.7 Recordation. If either Princeton or BioNanomatrix so requests in writing, the parties will promptly file and record with the United States Patent Office, and with any other applicable patent office or authority, a copy or memorandum of this Agreement and any other agreement granting BioNanomatrix rights in the Invention.

9.8 Cooperation. Each party shall cooperate with the other party to execute all lawful papers and instruments and to make all rightful oaths and declarations as may be necessary in the preparation and prosecution of all such patents and other applications and protections referred to in this Article.

10. Patent Marking.

10.1 Patent Marking. BioNanomatrix shall mark all Licensed Products made, used, sold or otherwise disposed of under the terms of this Agreement, or their containers, in accordance with the applicable patent marking laws.

11. Patent Infringement.

11.1 Infringement of Invention.

(a) In the event that Princeton or BioNanomatrix becomes aware of infringement of the Princeton Patent Rights, that party shall notify the other party in writing within thirty (30) days of becoming aware of such infringement. Any Licensee of the Princeton Patent Rights in other Fields of Use (a "Third-Party Licensee") will also be notified in writing by Princeton, subject to the exception set forth in Section 11.1(b) of this Agreement. However, in no event will the Third-Party Licensee be notified of any infringement prior to BioNanomatrix being notified of such infringement. Both parties agree that during the period after notification of infringement and prior to a decision to commence any legal action against the infringement, neither party will notify the infringing entity or person of the infringement of any of Princeton Patent Rights without first obtaining consent of the other party, which consent shall not be unreasonably denied. Both parties shall use commercially reasonable efforts in cooperation with each other to attempt to terminate such infringement without litigation. If Princeton is initially made aware of any infringement of the Princeton Patent Rights by a Third-Party Licensee and Princeton notifies BioNanomatrix of such infringement, BioNanomatrix agrees it will not notify the infringing entity or person of the infringement of any of Princeton Patent Rights and will use commercially reasonable efforts in cooperation with Princeton and any Third-Party Licensee to attempt to terminate such infringement without litigation.

(b) In the event that the Third-Party Licensee is the infringer or is materially involved in the infringement of the Princeton Patent Rights, Princeton shall not notify the Third-Party Licensee of the infringement without first obtaining consent of BioNanomatrix, which consent shall not be unreasonably denied. Furthermore, notwithstanding Section 11.1(c) of this Agreement, the Third-Party Licensee shall not be allowed to join Princeton or BioNanomatrix in any legal action taken against any infringement of the Princeton Patent Rights when the Third-Party Licensee is the infringer or is materially involved in the infringement of the Princeton Patent Rights.

(c) BioNanomatrix may request that Princeton take legal action against any infringement of Princeton Patent Rights, including, but not limited to, the filing of a temporary restraining order, a preliminary injunction and/or suit. In the event BioNanomatrix request the filing of a temporary restraining order and/or preliminary injunction, Princeton will make commercially reasonable efforts to evaluate such request within twenty (20) days of receipt. Such request shall be made in writing and shall include reasonable evidence of such infringement and damages to BioNanomatrix. If the infringing activity has not been abated within one hundred (100) days following the date of such request, Princeton shall have the right to

(i) commence suit on its own account; or
(ii) refuse to participate in such suit;

and Princeton shall give notice of its election in writing to BioNanomatrix by the end of the one-hundredth (100th) day after receiving notice of such request to take legal action from BioNanomatrix. If and only if Princeton elects not to commence suit for such infringement, BioNanomatrix may thereafter, but shall not be obligated to, bring suit for such infringement if the infringement occurred during a period and in a jurisdiction and in a Field of Use where BioNanomatrix had exclusive rights under this Agreement. In the event BioNanomatrix elects to bring suit in accordance with this paragraph, the parties also acknowledge and agree that any Third- Party Licensee may also join in such a suit at its own expense, subject to the exception set forth in Section 11.1(b) of this Agreement, if the infringement occurred during a period and in a jurisdiction where the Third-Party Licensee had exclusive rights in the Princeton Patent Rights in other Fields of Use under a License Agreement with Princeton. Furthermore, in the event BioNanomatrix elects to bring suit in accordance with this paragraph, Princeton may thereafter join such suit at its own expense.

(d) Such legal action as is decided upon shall be at the expense of the party on account of whom suit is brought and all recoveries recovered thereby shall belong to such party, provided, however, that recoveries from legal actions brought jointly by Princeton and BioNanomatrix, or where any Third-Party Licensee is a party to the suit, shall be shared equally, after paying the reasonable legal expenses of the parties to the suit. The net recoveries shall be divided on a *pro-rata* basis among BioNanomatrix, Princeton and any Third-Party Licensee of the Princeton Patent Rights in other fields of use, after reimbursing the participating parties for their own respective reasonable out-of-pocket expenses, reasonable costs and reasonable legal feesIn the event that the suit is settled prior to a court determination or binding arbitration, Princeton, BioNanomatrix and any Third-Party Licensee shall divide the net recoveries equally, after reimbursing the participating parties for their own respective reasonable out-of-pocket expenses, reasonable costs and reasonable legal fees.

(e) Each party agrees to cooperate with the other in litigation proceedings instituted hereunder but at the expense of the party or parties bringing the litigation proceedings, on account of whom suit is brought. In the absence of a written agreement to the contrary, such litigation proceedings instituted hereunder shall be controlled by the party initiating the litigation proceeding. Each party may be represented by counsel of its choice at its own expense.

11.2 Infringement of Third Party Rights. BioNanomatrix shall have the right, but not the obligation, to defend against any claim, complaint, suit, proceeding or cause of action, brought against BioNanomatrix, which claims that use of the Inventions infringes any intellectual property right of any third party. Princeton agrees to (i) notify BioNanomatrix promptly in writing of any such claim, (ii) permit BioNanomatrix to defend, compromise or settle such claim solely at BioNanomatrix's discretion, and (iii) provide BioNanomatrix with reasonably available information and assistance regarding such claim. BioNanomatrix agrees to notify Princeton of any claim and reasonably update Princeton regarding the status of any such claim.

11.3 Cooperation. Each party agrees to cooperate with the other in litigation proceedings instituted hereunder but at the expense of the party on account of whom suit is brought. Such litigation shall be controlled by the party bringing the suit. Each party may be represented by counsel of its choice.

12. Limited Warranty.

12.1 Princeton Representations and Warranties. BioNanomatrix hereby acknowledges that the Princeton Patent Rights are currently the subject of litigation between third parties. BioNanomatrix further acknowledges that a third party may be the sole owner or the joint owner of all or certain portions of the Princeton Patent Rights and that Princeton may not have the right or ability to grant to BioNanomatrix an exclusive right and license in the Field of Use under the Princeton Patent Rights. In the event it is determined that Princeton has no right or ability to grant to BioNanomatrix an exclusive right and license in the Field of Use under the Princeton Patent Rights, BioNanomatrix's sole remedy against Princeton is the return by Princeton and any and all consideration, including, but not limited to, Initial Costs, Future Costs and the payments specified in Sections 5.1 and 5.2, received from BioNanomatrix for the grant of the license herein. BioNanomatrix waives any and all other damage claims against Princeton, its trustees, officers, agents and employees. Subject to foregoing, Princeton hereby represents and warrants to BioNanomatrix that:

(a) Princeton has the right to grant the licenses granted to BioNanomatrix under this Agreement;

(b) upon execution and delivery of this Agreement, BioNanomatrix shall have the exclusive right and license, except as set forth herein, to make, have made, use, sell, import and offer to sell the Inventions and the Licensed Products and Services under all of the Patent Rights;

(c) Princeton is the sole owner of the Inventions by assignment from the Inventors of their entire right, title and interest in the Inventions; and

(d) as of the Effective Date there are no known or pending claims or actions in which Princeton is a named party regarding the Inventions..

12.2 Disclaimer of Warranties. EXCEPT AS SET FORTH IN SECTION 12.1, THIS LICENSE AND THE ASSOCIATED INVENTIONS ARE PROVIDED WITHOUT WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE OR ANY OTHER WARRANTY, EXPRESS OR IMPLIED. PRINCETON MAKES NO REPRESENTATION OR WARRANTY THAT A LICENSED PRODUCT OR LICENSED METHOD WILL NOT INFRINGE ANY PATENT OR OTHER PROPRIETARY RIGHT.

12.3 Limitation of Liability. EXCEPT AS PROVIDED FOR IN SECTION 14.1, IN NO EVENT WILL EITHER PARTY BE LIABLE TO THE OTHER FOR ANY INCIDENTAL, SPECIAL OR CONSEQUENTIAL DAMAGES RESULTING FROM EXERCISE OF THIS LICENSE OR MANUFACTURE, SALE, OR USE OF THE INVENTIONS OR LICENSED PRODUCTS OR LICENSED METHOD.

12.4 Further Disclaimer of Warranties. Nothing in this Agreement shall be construed as:

(a) a warranty or representation by Princeton as to the scope of any Princeton Patent Rights; or

(b) a warranty or representation that anything made, used, sold or otherwise disposed of under any license granted in this Agreement is or will be free from infringement of patents or other intellectual property of third parties; or

(c) an obligation to bring or prosecute actions or suits against third parties except as provided in Section 11; or

(d) conferring by implication, estoppel or otherwise any license or rights under any patents or other intellectual property of Princeton other than Princeton Patent Rights as defined herein, regardless of whether such patents are dominant or subordinate to Princeton Patent Rights; or

(e) an obligation to furnish any know-how not provided in the Princeton Patent Rights; it being understood that BioNanomatrix may use, in the Field of Use on a nonexclusive basis, all know-how owned or controlled by Princeton within the Princeton Patent Rights and within the Field of Use and possessed by its consultants and employees currently or previously employed by Princeton that is not covered by any other Princeton patent rights or to which Princeton does not owe a third party an exclusive right to use.

13. Term and Termination.

13.1 Term. Unless otherwise terminated by operation of law or by acts of the parties in accordance with the provisions of this Agreement, this Agreement shall be in full force and effect from the Effective Date and shall remain in effect in each country of the Territory until the later of (a) the last sale of a Licensed Product or Service or (b) the expiration of all of the Princeton Patent Rights.

13.2 Termination by BioNanomatrix. BioNanomatrix may terminate this Agreement at any time upon sixty (60) days written notice to Princeton.

13.3 Termination by Princeton. The failure by BioNanomatrix to comply with any of the material obligations contained in this Agreement shall entitle Princeton to give written notice to BioNanomatrix to have the default cured. If such default is not cured within sixty (60) days after the receipt of such notice, or diligent steps are not taken to cure if by its nature such default could not be cured within sixty (60) days, Princeton shall be entitled, without prejudice to any of its other rights conferred on it by this Agreement, and in addition to any other remedies that may be available to it, to terminate this Agreement.

13.4 Survival of Obligations. The termination or expiration of this Agreement shall not relieve the parties of any obligations accruing prior to such termination, and any such termination shall be without prejudice to the rights of either party against the other. The provisions of Sections 4, 6.10, 7, 8, 12, 13, 14 and 15 shall survive any termination of this Agreement.

13.5 Section 365(n). BioNanomatrix and Princeton acknowledge that the rights granted to BioNanomatrix under this Agreement shall be considered “rights to intellectual property” under Section 365(n) of the United States Bankruptcy Act.

14. Indemnification; Insurance.

14.1 Indemnification by BioNanomatrix. BioNanomatrix will indemnify and hold harmless Princeton, its trustees, officers, agents and employees (collectively, the "Indemnified Parties"), from and against any and all liability, loss, damage, action, claim or expense suffered or incurred by the Indemnified Parties (including reasonable attorneys' fees) (individually, a "Liability" and collectively, the "Liabilities") which result from or arise out of the development, use, manufacture, promotion, sale, distribution or other disposition of any Licensed Products or Services by BioNanomatrix, its Affiliates, assignees, vendors or other third parties, including all claims for personal injury, including death, or property damage arising from any of the foregoing, except to the extent such claims result from the willful misconduct of the Indemnified Parties. This indemnification shall include, but not be limited to, any and all claims relating to products liability and any and all claims or suits for which either party is found to have been wholly or partially negligent.

14.2 Insurance. Before the first commercial sale of a Licensed Product or Service and thereafter, BioNanomatrix will maintain general liability insurance covering all claims, including products liability, which policy shall i) be in such form and amount of coverage and written by such company as is reasonable and customary in the industry but in no case less than $1,000,000 per occurrence, ii) provide that such policy is primary and not excess or contributory with regard to other insurance Princeton may have, iii) provide at least thirty (30) days' notice to Princeton of cancellation, and iv) include Princeton and Princeton's directors, officers and employees, as additional named insureds. BioNanomatrix will furnish Princeton, upon request, written confirmation issued by the insurer or any independent insurance agent confirming that insurance is maintained in accordance with the above requirements.

15. Miscellaneous Provisions.

15.1 Assignment. No rights under this Agreement may be assigned by either party without the express consent of the other; provided, however, BioNanomatrix may, upon prior notice to Princeton, sublicense, assign or otherwise transfer this Agreement, without Princeton's consent, to (i) a purchaser of all or substantially all of BioNanomatrix's stock or assets or the line of business to which the agreement relates, provided that such purchaser, agrees in writing to be bound by the terms of this Agreement.

15.2 Export Controls. It is understood that Princeton is subject to United States laws and regulations controlling the export of technical data, computer software, laboratory prototypes and other commodities (including the Arms Export Control Act, as amended, and the Export Administration Act of 1979), and that its obligations hereunder are contingent on compliance with applicable United States export laws and regulations. The transfer of certain technical data and commodities may require a license from the cognizant agency of the United States Government and/or written assurances by BioNanomatrix that BioNanomatrix shall not export data or commodities to certain foreign countries without prior approval of such agency. Princeton neither represents that a license shall not be required nor that, if required, it shall be issued.

15.3 Payment, Notices and Other Communications. Any notice or payment required to be given to either party shall be deemed to have been properly given and to be effective (a) on the date of delivery if delivered in person, (b) five (5) business days after mailing if mailed by first-class certified mail, postage paid and deposited in the United States mail, or (c) the next business day if sent by recognized overnight courier, to the respective addresses given below, or to such other address as it shall designate by written notice given to the other party.

In the case of Princeton:

Office of Technology Licensing & Intellectual Property
Princeton University
4 New South Building, P.O. Box 36
Princeton, New Jersey 08544
Fax: (609) 258-1159
Phone: (609) 258-1570

In case of BioNanomatrix:

Han Cao, Ph.D.
1131 Great Road (PO Box 75)
Blawenburg, NJ 08504

With a copy to

Unus LLC
2800 Highland Court South
Birmingham, Alabama 35205
Fax: (205) 933-9668
Phone: (205) 933-9137

or to such other address or addresses as may from time to time be given in writing by either party to the other pursuant to the terms hereof.

15.4 Governing Law. This Agreement shall be construed, governed, interpreted and applied in accordance with the laws of the State of New Jersey, without giving effect to its choice of law provisions; except, however, that questions affecting the construction and effect of any patent shall be determined by the law of the country in which the patent was granted.

15.5 Entire Agreement. This Agreement and its Exhibits constitute and contain the entire understanding and agreement of the parties respecting the subject matter of this Agreement and cancels and supersedes any all prior negotiations, correspondence, understandings and agreements between the parties, whether oral or written, regarding such subject matter.

15.6 Further Actions. Each Party agrees to execute, acknowledge and deliver such further instruments and to do all such other acts as may be necessary or appropriate in order to carry out the purposes and intent of this Agreement.

15.7 Severability. If any provision of this Agreement becomes or is declared by a court of competent jurisdiction to be illegal, unenforceable or void, this Agreement shall continue in full force and effect without said provision, so long as the Agreement, taking into account said voided provision(s), continues to provide the parties with the same practical economic benefits as the Agreement containing said voided provision(s) did on the date of this Agreement. If, after taking into account said voided provision(s), the parties are unable to realize the practical economic benefit contemplated on the Effective Date, the parties shall negotiate in good faith to amend this Agreement to reestablish the practical economic benefit provided the parties on the Effective Date.

15.8 No Waiver. The failure of either party to assert a right hereunder or to insist upon compliance with any term or condition of this Agreement shall not constitute a waiver of that right or excuse a similar subsequent failure to perform any such term or condition by the other party.

15.9 Binding Effect. This Agreement shall be binding upon and inure to the benefit of the parties hereto and their respective heirs, successors and assigns, except that Princeton shall not have the right to delegate its obligations hereunder or to assign its rights hereunder or any interest herein without the prior written consent of BioNanomatrix.

15.10 Amendment. No amendment or modification hereof shall be valid or binding upon the parties unless made in writing and signed on behalf of each party.

15.11 Headings. The captions to the sections in this Agreement are not a part of this Agreement, and are included merely for convenience of reference only and shall not affect its meaning or interpretation.

15.12 Force Majeure. The failure of a party to perform any obligation under this Agreement by reason of acts of God, acts of governments, riots, wars, strikes, accidents or deficiencies in materials or transportation or other causes of a similar magnitude beyond its control shall not be deemed to be a breach of this Agreement.

15.13 Relationship of the Parties. Nothing contained in this Agreement is intended nor is to be construed so as to constitute Princeton or BioNanomatrix as partners or joint venturers with respect to any of the transactions or business activities described in this Agreement or to be undertaken by BioNanomatrix. Neither party shall have any express or implied right or authority to assume or create any obligations on behalf of or in the name of the other party or to bind the other party to any other contract, agreement, or undertaking with any third party.

Counterparts. This Agreement may be executed in any number of counterparts, all of which taken together shall constitute one and the same instrument, and any of the parties hereto may execute this Agreement by signing any such counterpart.

[SIGNATURE PAGE FOLLOWS]

IN WITNESS WHEREOF, the parties hereto have hereunto set their hands and seals and duly executed this License Agreement as of the Effective Date.

THE TRUSTEES OF PRINCETON UNIVERSITY

By: /s/ Michelle D. Christy
Name: Michelle D. Christy
Title: Director, Office of Research and Project Administration

BIONANOMATRIX LLC

By: /s/ Han Cao
Name: Dr. Han Cao, PhD.
Title: CEO

READ AND UNDERSTOOD

By: /s/ […***…]
Name: […***…]
Title: Inventor

*****Confidential Treatment Requested**

EXHIBIT A

Inventions and Inventors

Inventions:

[…***…], generally characterized as […***…], […***…], […***…], and […***…], respectively.

Inventors:

[…***…]
[…***…]
[…***…]
[…***…]
[…***…]

*****Confidential Treatment Requested**

Exhibit 10.26

*****Text Omitted and Filed Separately with the Securities and Exchange Commission Confidential Treatment Requested Under 17 C.F.R. Sections 200.80(b)(4) and 230.406**

First Amendment to License Agreement

AMENDMENT dated as of December 17, 2004, to the License Agreement with an Effective Date of January 7th, 2004 between PRINCETON UNIVERSITY, a not-for-profit corporation duly organized and existing under the laws of the State of New Jersey and having a principal place of business at 4 New South Building, Princeton, New Jersey 08544-0036, United States of America, ("PRINCETON") and BIONANOMATRIX LLC, a limited liability company duly organized and existing under the laws of the State of Delaware (hereinafter referred to as "Licensee").

W I T N E S S E T H

WHEREAS, the Parties have entered into the Agreement and would like to amend the Agreement;

WHEREAS, the Parties now seek to amend the terms of the Agreement as set forth herein.

NOW THEREFORE, in consideration of the premises and the mutual covenants contained herein, the Parties agree to as follows:

1. Section 6.1 shall be shall be deleted in its entirety and replaced with the following language:

License Payment. BioNanomatrix agrees to pay to Princeton a license fee of […***…] (the "License Fee"). The License Fee shall be payable by BioNanomatrix in […***…]. In the event this Agreement is terminated by BioNanomatrix for any reason before the second anniversary of the Effective Date of this Agreement, then BioNanomatrix shall not be obligated to make […***…]. The License Fee is […***…]. After payment of these amounts, there shall be no further payment obligations of BioNanomatrix except as set for the Sections 6.2 through 6.8.

2. Section 5.4 (b) shall be shall be deleted in its entirety and replaced with the following language:

Bionanomatrix shall have raised at least […***…] prior to […***…].

BIONANOMATRIX LLC

/s/ Michael T. Boyce-Jacino	Michael T. Boyce-Jacino	12/23/04
By	Print Name	Date

PRINCETON UNIVERSITY

/s/ Michelle D. Christy	Michelle D. Christy	1/5/2005
By	Print Name	Date

*****Confidential Treatment Requested**

Exhibit 10.27

*****Text Omitted and Filed Separately**
with the Securities and Exchange Commission
Confidential Treatment Requested
Under 17 C.F.R. Sections 200.80(b)(4)
and 230.406

Second Amendment to License Agreement

AMENDMENT dated as of February 25, 2010, to the License Agreement ("Agreement") with an Effective Date of January 7th, 2004 between PRINCETON UNIVERSITY, a not-for-profit corporation duly organized and existing under the laws of the State of New Jersey and having a principal place of business at 4 New South Building, Princeton, New Jersey 08544-0036, United States of America, ("PRINCETON") and BIONANOMATRIX, LLC., a limited liability corporation duly organized and existing under the laws of the State of Delaware (hereinafter referred to as "BioNanomatrix").

W I T N ES S E T H

WHEREAS, the Parties have entered into the Agreement and would like to amend the Agreement;

WHEREAS, the Parties now seek to amend the terms of the Agreement as set forth herein.

NOW THEREFORE, in consideration of the premises and the mutual covenants contained herein, the Parties agree to as follows:

1. The License Agreement shall be amended to name Bionanomatrix, Inc., as successor in interest to and assignee of all assets of Bionanomatrix LLC, with a principal place of business at 3701 Market Street, 4th Floor, Philadelphia, PA 19104, as the Licensee and to omit Bionanomatrix LLC as a party to the License Agreement. Bionanomatrix, Inc. will assume all responsibilities, obligations, benefits and liabilities of Bionanomatrix LLC under the License Agreement.

2. Section 5.4(f) shall be shall be deleted in its entirety and replaced with the following language:

   BioNanomatrix shall achieve a first commercial sale of Licensed Products or Licensed Methods by […***…].

3. Section 5.4(g) shall be shall be deleted in its entirety and replaced with the following language:

   BioNanomatrix shall achieve total sales of Licensed Products and Licensed Methods of at least […***…].

4. The "BACKGROUND" Section shall be amended to include the following Princeton file #: […***…].

5. The "Princeton Patent Rights" Section, Paragraph 1.11, shall be amended to include United States patent #[…***…].

6. The first sentence of the "Grant of License", Section 2.1, shall be deleted in its entirety and replaced with the following language:

Grant of License. Subject to Section 12.1 and the other limitations set forth in this Agreement and subject to the Federal Government Interest, if any, Princeton hereby. grants to BioNanomatrix in the Territory a worldwide, right and license in the Field of Use under the Princeton Patent Rights to make, have made, use, have used, reproduce, sublicense, create and implement improvements, distribute, import, export, market, promote, offer to sell, sell, have sold, rent, and lease Licensed Products and Services, including, without limitation, the right to make, have made, further develop, improve, use, sell and distribute the Licensed Products and Services for all commercial, military and other applications and to practice the Licensed Method.

Said right and license shall be exclusive for all of the Princeton Patent Rights EXCEPT for US patent #[…***…], for which Princeton grants a non-exclusive right and license only.

7. The "Limitation" Section, Paragraph 2.2, shall be amended to add the following sentence:

Princeton also retains the right to license United States patent # […***…] and Princeton file #: […***…], […***…] commercially and perform commercial research and any other business or non-business function for all field(s) of use, and to publish the results thereof.

8. The "Sublicensing" Section, Paragraph 3., shall be amended to add the following subsection:

3.4 Sublicensing of Non-Exclusive Rights. Notwithstanding the foregoing, BioNanomatrix shall have no right to sublicense the non-exclusive patents rights of Princeton file #: […***…], […***…], United States patent # […***…].

9. The "Patent Infringement" Section, Paragraph 11, shall be amended to include a new Section 11.4 as follows:

11.4 No Action Under Non-Exclusive Rights. Notwithstanding any of the foregoing, BioNanomatrix shall have no right to bring any infringement action for any alleged infringement of United States patent # […***…], or of Princeton file #: […***…], […***…].

BIONANOMATRIX LLC (successor by conversion to BioNanomatrix, LLC)

/s/ Edward L. Erickson	Edward L. Erickson, CEO	02/25/2010
By	Print Name	Date

PRINCETON UNIVERSITY

/s/ John F. Ritter	John F. Ritter	3/2/10
By	Print Name	Date

Exhibit 10.28

Third Amendment to License Agreement

AMENDMENT dated as of October 17, 2011, to the License Agreement with an Effective Date of January 7th, 2004 between PRINCETON UNIVERSITY, a not-for-profit corporation duly organized and existing under the laws of the State of New Jersey and having a principal place of business at 4 New South Building, Princeton, New Jersey 08544-0036, United States of America, ("PRINCETON") and BIONANOMATRIX, Inc, a corporation duly organized and existing under the laws of the State of Delaware (hereinafter referred to as "Licensee").

W I T N E S S E T H

WHEREAS, the Parties have entered into the Agreement and would like to amend the Agreement;

WHEREAS, the Parties now seek to amend the terms of the Agreement as set forth herein.

NOW THEREFORE, in consideration of the premises and the mutual covenants contained herein, the Parties agree to as follows:

The License Agreement shall be amended to name BioNano Genomics, Inc. with a principal place of business as 3545 John Hopkins Court, Suite 160, San Diego, CA 92121 as the Licensee and to omit BIONANOMATRIX, Inc., as a party to the License Agreement. BioNano Genomics, Inc. will assume all responsibilities, obligations, benefits and liabilities of BIONANOMATRIX, Inc., under the License Agreement.

BioNano Genomics, Inc.

/s/ R. Erik Holmlin	R. Erik Holmlin	Oct 17, 2011
By	Print Name	Date

BIONANOMATRIX, Inc.

/s/ R. Erik Holmlin	R. Erik Holmlin	Oct 17, 2011
By	Print Name	Date

PRINCETON UNIVERSITY

/s/ John F. Ritter	John F. Ritter	10/20/11
By	Print Name	Date

Exhibit 10.29

*****Text Omitted and Filed Separately**
with the Securities and Exchange Commission
Confidential Treatment Requested
Under 17 C.F.R. Sections 200.80(b)(4)
and 230.406

Fourth Amendment to License Agreement

AMENDMENT dated as of February 9th, 2012, to the License Agreement ("Agreement") with an Effective Date of January 7th, 2004 between PRINCETON UNIVERSITY, a not-for- profit corporation duly organized and existing under the laws of the State of New Jersey and having a principal place of business at 4 New South Building, Princeton, New Jersey 08544-0036, United States of America, ("PRINCETON") and BIONANO GENOMICS, INC., a corporation duly organized and existing under the laws of the State of Delaware (hereinafter referred to as "BioNano Genomics").

WITNESSETH

WHEREAS, the Parties have entered into the Agreement and would like to amend the Agreement;

WHEREAS, the Parties now seek to amend the terms of the Agreement as set forth herein.

NOW THEREFORE, in consideration of the premises and the mutual covenants contained herein, the Parties agree to as follows:

1. Section 5.4(g) shall be shall be deleted in its entirety and replaced with the following language:

   BioNano Genomics shall achieve total sales of […***…] of at least […***…] during the […***…].

BIONANO GENOMICS, INC.		PRINCETON UNIVERSITY	
Signature:	/s/ R. Erik Holmlin	Signature:	/s/ John F. Ritter
Name:	R. Erik Holmlin	Name:	John F. Ritter, Director
Title:	CEO	Title:	Office of Technology Licensing and Intellectual Property
Date:	Feb 10, 2012	Date:	2/9/12

*****Confidential Treatment Requested**

Exhibit 10.30

*****Text Omitted and Filed Separately**
with the Securities and Exchange Commission
Confidential Treatment Requested
Under 17 C.F.R. Sections 200.80(b)(4)
and 230.406

AGREEMENT

AUGUST 2, 2016

This Agreement (the **"Agreement"**) is effective as of the last date of signature found below (the **"Effective Date"**) and is made by and between BioNano Genomics, Inc., a California corporation having a place of business at 9640 Towne Centre Drive, Ste. 100, San Diego, California 92121, (**"BioNano"**) and Berry Genomics Co., Ltd., a Chinese corporation having a place of business at Building 9, Courtyard 6, East Jingshun Road, Chaoyang District, Beijing 100015, People's Republic of China (**"Berry"**). BioNano and Berry may also individually be referred to herein as a **"Party"** and collectively as the **"Parties"**.

WITNESSETH:

WHEREAS, Berry desires to manufacture and commercialize in-vitro diagnostic system using components supplied by BioNano in the Territory (as defined herein);

WHEREAS, Berry will purchase from BioNano and BioNano will supply certain components for both the kits and instrument;

WHEREAS, Berry will take such components and manufacture the finished kits and instruments at its sole cost;

WHEREAS, Berry will obtain all necessary regulatory approvals in China to manufacture and sell the kits and instruments at its sole cost;

WHEREAS, BioNano will provide certain training to enable Berry's after-sales installation and support for the instrument.

NOW, THEREFORE, for and in consideration of the premises and the mutual covenants contained herein, and other good and valuable consideration, the receipt and sufficiency of which are hereby acknowledged, the Parties hereto do hereby agree as follows:

Article I.
Definitions

The following capitalized terms shall have the respective meanings set forth below:

"Affiliate" means, with respect to any Person, any other Person that, directly or indirectly, through one or more intermediaries' controls, is controlled by, or is under common control with, such Person. For purposes of this definition, "control" means the possession, direct or indirect, of the power to direct or cause the direction of the management and policies of a Person, whether through ownership of voting securities or general partnership or managing member interests, by contract or otherwise. Without limiting the generality of the foregoing, a Person shall be deemed to control any other Person in which it owns, directly or indirectly, a majority of the ownership interests.

"**Authorized Third Party**" means a third party, other than an Affiliate of BioNano, that BioNano authorizes in writing for Berry to purchase BioNano Components from.

"**Berry Components**" means those components of the IVD Kit(s) that are sourced by or supplied by Berry, which are not supplied by BioNano or Authorized Third Party. For the avoidance of doubt, the BioNano Kit Components, including any associated documents, information, protocols, and methods of use, are not within the definition of Berry Components.

"BioNano Intellectual Property Rights" means any and all Intellectual Property Rights owned by BioNano or its Affiliates or licensed to BioNano or its Affiliates and sublicensable by BioNano to Berry.

"**BioNano Patents**" means all BioNano patents and patent applications in the Territory to the extent pertaining to or covering aspects or features of the BioNano Components (or use thereof), IVD Kits and IVD Instrument (or use thereof) without regard to (i.e., not particular to) any specific filed(s) of use or specific application(s). The BioNano Patents are set forth on Exhibit F.

"BioNano Components" means those components that BioNano supplies to Berry under this Agreement for use in the IVD Kit(s) and the IVD Instrument. The BioNano Components are set forth on Exhibit A. BioNano Components for the IVD Kit are referred to as "BioNano Kit Components" and BioNano Components for the IVD Instrument are referred to as "BioNano Instrument Components."

"**Core IP**" means any and all BioNano Intellectual Property Rights to the extent pertaining to or covering aspects or features of the BioNano Components(or use thereof), IVD Kits and IVD Instrument (or use thereof) without regard to (i.e., not particular to) any specific field(s) of use or specific application(s). For clarity, Core IP includes BioNano Patents, but excludes any trademark, service mark, trade dress, brand names, marks, or logos.

"CFDA" means the China Food and Drug Administration (including the affiliated centers, such as the Center for Drug Evaluation, Center for Medical Device Evaluation, and the National Institutes for Food and Drug Control under it), any local Food and Drug Administration or any successor governmental authority having substantially the same function.

"**Clinical Partner**" means Berry's collaboration partners, which Berry receives clinical samples from or provides clinical testing on site, including but not limited to the following: clinical laboratories, hospitals, clinics, etc.

"Intellectual Property Right(s)" means all rights in patent, copyrights (including rights in computer software), know-how, trademark, service mark and trade dress rights and other industrial or intellectual property rights under the Laws of any jurisdiction, whether registered or not and including all applications or rights to apply therefor and registrations thereto.

"**Instrument Manufacturing Instructions**" means a written document executed by the authorized representatives of BioNano and Berry that details how the BioNano Instrument Components will be assembled into the finished IVD Instrument, including by way of example, shipping, storage, and handling requirements, as well as testing to be conducted prior to shipment of IVD Kits to Berry's customers.

"**Instrument Specifications"** means the performance specifications for the IVD Instrument as set forth in Exhibit C.

"**IVD Certified Labs**" means medical laboratories or medical institutions approved by the National Health and Family Planning Commission of the PRC to undertake clinical use of genetic sequencing products or technologies under the applicable regulations.

"**IVD Instrument**" means a complete diagnostic Berry-branded or Berry and BioNano co- branded instrument comprised of the BioNano Instrument Components supplied to Berry by BioNano under this Agreement.

"**IVD System**" means a complete system comprised of the IVD Instruments and the IVD Kits, including, for clarity, (i) algorithms, (ii) protocols, (iii) firmware, (iv) chips, (v) reagents, or (vi) other related items therein.

"**IVD Kit**" means a complete diagnostic test for use with the IVD Instrument, which test comprises at least (i) Berry Components that are test-specific elements supplied by Berry (e.g., primers, enzymes); (ii) BioNano Kit Components supplied to Berry by BioNano under this Agreement; and (iii) analysis/interpretation software developed by Berry that will accept IVD Instrument standard output files and operate with the IVD Instrument.

"**Kit Specifications**" means the performance specifications for the IVD Kit.

"**Kit Manufacturing Instructions**" means a written document executed by authorized representatives of BioNano and Berry that details how BioNano Kit Components will be assembled into finished IVD Kits, including by way of example, [**…*****…**].

"**Law**" means all statutes, statutory instruments, regulations, ordinances, or legislation to which a Party is subject; common law and the law of equity as applicable to the Parties; binding court orders, judgments or decrees; industry code of practice, guidance, policy or standards enforceable by law; and applicable, directions, policies, guidance, rules or orders made or given by a governmental or regulatory authority.

"[**…*****…**]" means [**…*****…**].

"Other IP" means any and all Intellectual Property Rights of third parties to the extent pertaining to or covering aspects or features of the BioNano Components (or use thereof) or the IVD Instrument/Kit (or use thereof) with regard to any specific field(s) of use or specific application(s).

"**Patent Rights**" means any and all patents, patent applications, provisional applications, certificates of invention, applications for certificate of invention or priority patent filings, including any patents issuing on any such patent application or any certificate of invention issuing on any such application for certificate of invention, and including any substitutions, extensions or supplementary protection certificates, patents of addition, reissues, reexaminations, extensions, restorations, confirmations, registrations, revalidations, revivals, revisions, renewals, divisions, continuations, continuation-in-parts or requests for continued examination of any of the foregoing.

"Person" means any individual or corporation, association, partnership, limited liability company, joint venture, joint stock or other company, business trust, trust, organization, university, college, governmental authority or other entity of any kind.

"Regulatory Approval" means all approvals, licenses and consents, clearances, and registrations from applicable governmental authorities and healthcare institution authorities (including without limitation independent ethics committees) required in connection with the importation, clinical studies, registration, manufacture, distribution, promotion and advertising, including Sale, of the IVD System, IVD Kit and IVD Instrument in the Territory in the Fields of Use.

"**Sell**" "**Sale**" "**Sold**" means to sell, lease, loan, transfer, or otherwise dispose of.

"**Service Contract**" means the maintenance and service support that Berry may purchase from BioNano for IVD Instruments and IVD Kits at its sole discretion upon the expiration of the **[…***…]** warranty.

"Specifications" means BioNano's written specifications for the BioNano Components in effect on the date the BioNano Components are shipped from BioNano to Berry.

"Term" is defined in Section 9.01.

"Territory" means the People's Republic of China, excluding, for purposes of this Agreement only, the Hong Kong and Macau Special Administrative Regions and Taiwan.

Article II.
Responsibilities of the Parties

2.01 Berry Responsibilities. Subject to the terms and conditions of this Agreement, Berry and Affiliate of Berry, under their own names, at their sole cost and expense, shall:

(a) manufacture and test the IVD Instrument in accordance with the Instrument Manufacturing Instructions;

(b) manufacture and test the IVD Kits in accordance with the Kit Manufacturing Instructions;

(c) market and Sell IVD Instruments in the Territory that have been manufactured and tested in accordance with the Instrument Manufacturing Instructions in the Territory;

(d) market and Sell IVD Kits in the Territory that have been manufactured and tested in accordance with the Kit Manufacturing Instructions in the Territory;

(e) for the purpose of the above (a) – (d), seek and obtain Regulatory Approvals for the IVD Kits and IVD Instrument and maintain such Regulatory Approvals thereafter during the Term;

(f) purchase the BioNano Components from BioNano as set forth in Exhibit A and terms and conditions of this Agreement;

(g) provide technical support for the IVD Kits and IVD Instrument as set forth in Exhibit B; and

(h) pay for BioNano's **[…***…]** costs incurred in providing IVD Instrument training to Berry personnel.

2.02 BioNano Responsibilities. Subject to the terms and conditions of this Agreement, BioNano shall:

(a) provide the necessary support and documentation for the BioNano Components for each submission to a Regulatory Authority;

(b) manufacture and supply the BioNano Components to Berry that meet the Instrument Specifications and Kit Specifications [**…***…] in accordance with the terms and conditions of this Agreement;

(c) provide trainings to Berry so that Berry can perform IVD Instrument and IVD Kit manufacturing, installation, service and support and effectively use BioNano Components;

(d) provide, to the extent permitted by all applicable Laws, installation, technical, warranty, and maintenance support for the IVD Kits and IVD Instrument, as applicable, as set forth in Exhibit B;

(e) assist Berry to manufacture, as applicable, the IVD Kits and IVD Instrument by using the BioNano Components;

(f) develop or co-develop with Berry the Kit Component(s) and/or Instrument Component(s) to meet the Specifications for the Clinical Use; and

(g) provide the maintenance and service support if Berry purchase such service from BioNano upon the expiration of the **[…***…]** warranty.

Article III.
Regulatory Approval and Regulatory Documents

3.01 Regulatory Approval. Berry is entitled to obtain the Regulatory Approvals on its behalf under Berry's name and brand collectively or respectively for the IVD System, IVD Instrument, and IVD Kit. Berry will act at its sole discretion in performing its relevant obligations for Regulatory Approvals.

3.02 Regulatory Documents. Berry agrees that it will prepare any and all documents, materials, and information necessary to seek, obtain, and maintain the Regulatory Approvals. BioNano agrees to provide all necessary documents, information and material timely and assist and/or participate in obtaining the necessary Regulatory Approvals, at Berry's cost and expense.

Article IV.
Fields of Use; Sales and Marketing

4.01 Fields of Use. Berry is entitled to develop and offer Berry-branded IVD System for [**…*****…**] in the following defined fields ("**Clinical Use**" or "**Fields of Use**"), with the potential to expand to other fields upon mutual agreement of both parties in the future.

(a) [**…*****…**] in both prenatal and postnatal patients;

(b) [**…*****…**];

(c) [**…*****…**] for In Vitro Fertility (IVF) centers and hospitals.

4.02 Sale for Clinical Use. Subject to the terms and conditions of this Agreement, including without limitation, the limited scope of rights conferred upon Berry under Section 7.01 and the Trademark License attached as Exhibit E, BioNano agrees that Berry may Sell IVD Kits and IVD Instruments for Clinical Use in the Territory in the Fields of Use, [**…*****…**]. The Parties agree that Berry is entitled to place instruments at Clinical Partner sites in the Territory at Berry's sole cost.

4.03 Sale for Research Use. BioNano agrees that Berry may Sell and distribute the IVD Kits and IVD Instruments to IVD Certified Labs in the Territory for research use ("**Research Use**"), and use the IVD Kits and IVD Instruments for internal research ("**Internal Use**").

4.04 Distributors. In the event that Berry Sells through distributors, Berry agrees that it will only Sell IVD Kits and IVD Instruments through distributors that are qualified and otherwise permitted by Law to market and Sell in-vitro diagnostic medical devices.

4.05 Forward Information. BioNano and its distributors (if any) should forward the information to Berry if it receives any inquiry regarding the purchase of IVD Kits and IVD Instruments from potential customers.

4.06 Product Manuals and Marketing Collateral. Berry agrees [**…*****…**] to develop labeling, package inserts, user manuals/guides, and all marketing collateral, including websites (collectively **"Collateral**"), for the IVD Kits and IVD Instruments.

4.07 [**…*****…**]. [**…*****…**]

*****Confidential Treatment Requested**

4.08 Instrument Specifications. The Instrument Specifications are set forth in Exhibit C, which may be amended or updated by both Parties in writing.

4.09 IVD Kit Specifications. Berry agrees that it will develop Kit Specifications similar to the Instrument Specifications and provide BioNano with an English and Chinese version of the same upon request.

4.10 Affiliate of Berry. Subject to the terms and conditions of this Agreement, BioNano agree that Berry may use its Affiliate to manufacture and Sell the IVD Kit and IVD Instrument on behalf of Berry.

Article V.
Branding and Trademarks

5.01 Branding. The Parties agree that Berry will be entitled to manufacture the IVD Instruments and IVD Kits under Berry's brand names, marks, logo, trademarks and trade dress. Berry agrees that it will market and Sell the IVD Kits and IVD Instruments in compliance with the Branding Requirements set forth in Exhibit D.

5.02 Berry Trademarks. BioNano recognizes the exclusive ownership by Berry of any proprietary Berry marks, logo, trademarks or trade dress furnished by Berry (e.g. the name "Berry") for use in connection with Berry's commercialization of the IVD Instrument and IVD Kits. BioNano shall not, either during the Term, or at any time thereafter, register, use or challenge or assist others to challenge the trademark, the Berry marks, logo and trade dress furnished by Berry or attempt to obtain any right in or to any such name, logo, trademarks or trade dress confusingly similar for the marketing of the IVD Instrument and IVD Kits.

5.03 BioNano Trademarks. In the event the Parties mutually agree to any co-branding, they shall enter into a Trademark License in the form attached as Exhibit E, which sets forth the terms and conditions under which Berry may use certain trademarks of BioNano in connection with the marketing and Sale of the IVD Kits and IVD Instruments under this Agreement.

Article VI.
Ordering, Delivery and Payment

6.01 Component Pricing. The price for BioNano Components is set forth in Exhibit A.

6.02 BioNano Components. Subject to the terms and conditions of this Agreement, Berry shall not purchase products or materials from a third party (other than an Authorized Third Party) that would replace or be a substitute for the BioNano Components. For the avoidance of doubt, any BioNano Components purchased from an Authorized Third Party are subject to the terms and conditions of this Agreement.

6.03 Ordering and Forecast.

(a) **Ordering; Acceptance; Cancellation**. Berry shall order BioNano Components using written Purchase Orders submitted under and in accordance with this Agreement. Purchase Orders shall state, at a minimum, the BioNano part number, the BioNano provided quote number (or other reference provided by BioNano), the quantity ordered, price, requested delivery date, and address for delivery, and shall reference this Agreement. All Purchase Orders shall be sent to the attention of BioNano Customer Solutions or to any other person or department designated by BioNano in writing. Acceptance of a Purchase Order occurs when BioNano provides Berry a sales order confirmation ("**Sales Order Confirmation**"). BioNano shall provide Berry a Sales Order Confirmation within [**…***…**] upon receipt of a Purchase Order. Purchase Orders submitted in accordance with this Agreement will not be unreasonably rejected by BioNano. BioNano shall provide justifications in writing for any rejection of Purchase Orders. All Purchase Orders accepted by BioNano may not be modified without the prior written consent of Berry.

(b) **Shipment.** BioNano will ship BioNano Components to Berry. Certain BioNano Instrument Components and Kit Components may be shipped directly from BioNano's OEM manufacturers to Berry.

(c) **Ship Date.** BioNano will provide Berry with estimated ship dates within [**…***…**] after a Sales Order Confirmation is issued.

(d) **Ship Date Changes**. The latest ship date allowed for any Component under a Purchase Order is the date that is [**…***…**] after a Sales Order Confirmation is issued. Subject to the terms and conditions of this Agreement, BioNano will use reasonable efforts to accommodate Berry's requests to bring forward the ship dates for BioNano Components on a Purchase Order accepted by BioNano.

(e) **[…***…]**. Berry shall, no later than the [**…***…**].

(f) **Ship Schedule**. Each Purchase Order for BioNano Components must include a ship schedule, subject to BioNano's confirmation, that details the quantity of and type of BioNano Components that Berry requires in each calendar month that is covered by the Purchase Order.

6.04 Shipping; Title, Risk of Loss. Unless otherwise agreed upon in writing, all BioNano Components shall be delivered ExWorks (Incoterms 2010) at BioNano's shipping address and title and risk of loss shall transfer to Berry upon delivery at such address. For clarity, BioNano will be solely responsible for all formalities with the U.S. government to ensure the delivery, including but not limited to handling all filings related to export and Customs clearance.

6.05 Substantial Conformance. Shipments of BioNano Components from BioNano which do not conform to the warranty set forth in Section 8.03, may be rejected by Berry within the time frames set forth in this Section 6.05. Berry will inspect all BioNano Components immediately upon receipt from BioNano. All BioNano Components shall be deemed accepted by Berry [**…***…**] after receipt, unless rejected in accordance with this Section 6.05. To reject a BioNano Component, Berry shall give notice to BioNano not more than [**…***…**] after receipt by Berry of a particular BioNano

Component, stating the reasons for rejection. BioNano shall arrange for the pick-up of the rejected BioNano Component by BioNano's shipping/transportation company [**…***…], which cost shall be [**…***…] if the rejected BioNano Component is not a Qualifying Rejected Component. In the event the rejected BioNano Component fails to conform to the warranty set forth in Section 8.03 (each being a "**Qualifying Rejected Component**"), BioNano shall, at BioNano's election, either issue Berry a credit [**…***…] for each Qualifying Rejected Component or promptly replace the Qualifying Rejected Component with conforming BioNano Component. If the Parties disagree whether a particular BioNano Component is a Qualifying Rejected Component, the Parties shall submit a sample of such BioNano Component to a mutually agreed independent laboratory for testing using the method set forth in the Specifications for such BioNano Component. The conclusion of such independent laboratory shall be binding upon the Parties, and the Party against whom the independent laboratory rules shall bear the cost of such testing.

6.06 Late Delivery. If BioNano fails to meet the delivery date for the products or material under a Purchase Order, BioNano shall immediately notify Berry in writing and include the reasons therefore. If the failure is caused by BioNano (including BioNano's suppliers, OEM and Authorized Third Party), BioNano shall take any and all commercially reasonable actions necessary to fill Berry's requirements as rapidly as possible, at BioNano's expense.

6.07 Invoice. All invoices shall be sent to Berry's accounts payable department, or any other address designated by Berry in writing. Invoices will be sent to Berry within [**…***…] of shipment of the BioNano Components.

6.08 Currency of Payments. All payments required under this Agreement shall be paid in United States Dollars.

6.09 Payments. Berry agrees to pay for BioNano Components supplied and any amounts payable arising under this Agreement in accordance with the terms and conditions of this Agreement. All payments are due within [**…***…] of the date on the invoice. Without limiting any remedies available to BioNano, any amounts not paid when due under this Agreement will accrue interest at the rate of [**…***…]% per [**…***…], or the maximum amount allowed by Law, if lower.

6.10 Taxes. All prices and other amounts payable to BioNano hereunder are exclusive of and are payable without withholding or deduction for taxes, GST, VAT, customs duties, tariffs, charges or otherwise as required by Law from time to time upon the Sale of the BioNano Components or provision of services, all of which will be added to the purchase price or subsequently invoiced to Berry to gross up any payment in respect of which withholding or deduction is required to be made.

6.11 Minimum Purchase. Berry agrees to place Purchase Orders for and take delivery of a quantity of BioNano Instrument Components that is equal to five fully manufactured and ready to ship IVD Instruments within 12 months after the Effective Date per the following schedule: one unit of Irys V3 beta version ordered by September 30, 2016 and delivered by October 15, 2016; one unit of Irys V3 beta version ordered by November 30, 2016 and delivered by December 15, 2016; one unit of Irys V3 (fully released version) delivered by March 31, 2017 and two units of Irys V3 (fully released version) delivered by June 30, 2017. For the avoidance of doubt, the two units of Irys V2 that have been already purchased by Berry (order placed on June 23, 2016) are not included in the above schedule. Berry agrees to also place Purchase Orders for and take delivery of a quantity of BioNano Instrument Components that is [**…***…]

[**…*****…**] and the Instrument Specifications set forth in Exhibit C are met. Berry's obligations under this Section 6.11 cease if this Agreement is terminated pursuant to Section 9.02.

Article VII.
Intellectual Property and Compliance

7.01 Grant of License. As of the Effective Date, BioNano hereby grants to Berry and its Affiliates, and Berry and its Affiliates hereby accepts, an irrevocable, exclusive, sublicensable, fully paid-up, royalty-free, license during the Term under the Core IP in the Territory in the Fields of Use solely to seek and obtain CFDA registration, manufacture, market, distribute and have distributed, Sell and have Sold, offer for Sale and have offered for Sale IVD Kits and IVD Instruments For the avoidance of doubt, the license granted in this Article 7.01 shall be at the exclusion of all others, including BioNano as the licensor.

7.02 IVD System Improvements.

(a) Subject to the terms and conditions of this Agreement, to the extent permitted by PRC law, BioNano shall be the sole owner of all IVD System Improvements and Berry hereby assigns to BioNano any and all rights that Berry may have in the IVD System Improvements, provided that BioNano agrees to grant Berry an irrevocable, nonexclusive, sublicensable, fully paid-up, royalty-free license during the Term in the Fields of Use in the Territory a) to use, reproduce, distribute, modify, and prepare derivative works of, such IVD System Improvements solely to the extent necessary exploit the license granted Section 7.01, and b) to use, make, have made, offer for sale, sell, distribute and import products and services that incorporate, embody, or practice the methods of, such IVD System Improvements, solely to the extent necessary exploit the license granted Section 7.01. Berry shall promptly disclose to BioNano any such IVD System Improvements that arise under this Agreement. Berry shall, at the request of BioNano, assist BioNano to obtain, maintain and protect its ownership interests in the IVD System Improvements, the costs of which shall be afforded by BioNano.

(b) In the event that such IVD System Improvements are not permitted by the PRC laws to be transferred to and owned by BioNano as provided in Section 7.02(a), then: (i) Berry unconditionally and irrevocably waives the enforcement of any rights in such IVD System Improvements and all claims and causes of action of any kind against BioNano with respect to the rights; and (ii) to the extent Berry cannot (as a matter of law) make such waiver, Berry unconditionally grants to BioNano an exclusive, perpetual, irrevocable, worldwide, royalty free license, with the right to sublicense through multiple levels of sublicensees, under any and all such rights: (x) to reproduce, create derivative works of, distribute, publicly perform, publicly display, digitally transmit, and otherwise use IVD System Improvements in any medium or format, whether now known or hereafter discovered; (y) to use, make, have made, sell, offer to sell, import, and otherwise exploit any product or service based on, embodying, incorporating, or derived from IVD System Improvements; and (z) to exercise any and all other present or future rights in IVD System Improvements.

(c) As used herein, "**IVD System Improvements**" shall mean all Patent Rights that are [**…*****…**] and any improvements

thereto. For the avoidance of doubt, any improvement that is non-related with [**…*****…**] shall not be included in the IVD System Improvements.

7.03 Other Improvements. Among the Parties, Berry shall be the sole and exclusive owner of all rights, titles and interests in and to any and all Intellectual Property Rights, excluding IVD System Improvements, that are developed, directly or indirectly, by or on behalf of Berry, independently or with or through others at any time, throughout the Term.

7.04 Other IP. Berry agrees that (i) it may require Other IP to manufacture, distribute, market and Sell or otherwise exploit the IVD Kit and the IVD Instrument using BioNano Components in the Territory, and (ii) Berry is solely responsible to obtain the rights to any and all such Other IP. BioNano will assist Berry in identifying and approaching the sources of such Other IP if BioNano is aware of such information or upon request from Berry.

7.05 No Implied Licenses. No right or license under any Intellectual Property Rights of a Party is granted or shall be granted by implication to the other Party. All such rights or licenses are or shall be granted only as expressly provided in the terms of this Agreement,

7.06 IP Enforcement.

(a) BioNano, on behalf of itself and its Affiliates (and their respective successors and assigns), shall have the first right, but not obligation, to take any measures it deems appropriate to enforce BioNano Intellectual Property Rights. In the event of any third party infringes, misuses, misappropriates, or violates BioNano Intellectual Property Rights in the Territory in the Fields of Use, Berry shall serve a written notice to BioNano. If BioNano elects not to take action with respect to enforcement actions to cease such infringement, misuse, misappropriation or violation, BioNano shall so inform Berry within [**…*****…**] upon receiving Berry's notice, and Berry shall have the right, but not the obligation, to initiate actions to cease such infringement, misuse, misappropriation or violation. BioNano agrees to provide reasonable assistance related to such enforcement actions as Berry may request at the cost and expenses of Berry. Berry may not offer or provide or sublicense to any third party in settlement or compromise of any such enforcement action any intellectual property right belonging to or controlled by BioNano without the express written consent of BioNano.

(b) Among the Parties, enforcing Party shall bear the costs and expenses and retain all recovery and income (including damages, licensing fees, royalties, settlement payments and other payments) received as a result of any enforcement action.

7.07 IP Representations and Warranties by BioNano. BioNano hereby represents and warrants as of the Effective Date to Berry that:

(a) To its best knowledge, BioNano does not infringe any Intellectual Property Rights of any third parties (especially third parties in the Territory);

(b) BioNano has not received any written claim alleging that any of BioNano's activities relating to IVD Instrument and IVD Kits infringe, any Intellectual Property rights of any third parties; and

(c) The deliverable materials and documents under Section 7.08 will be provided on an "as is" basis. Any error or omission in such materials and documents – if any – shall be corrected by BioNano in the shortest possible time.

7.08 BioNano Patents. Regarding the BioNano Patents, BioNano will either file national entries based upon existing PCT applications designating the Territory, or file PCT applications and subsequent national entries designating the Territory, as applicable, either in its own name or together with Berry; provided, however, that if BioNano determines to abandon or not to file any such entries or applications it shall provide reasonable prior notice of the same to Berry and Berry shall have the right to make or maintain such filings at Berry's sole cost and expense by providing reasonable notice thereof to BioNano.

7.09 BioNano will provide with Berry in a timely manner all the information, materials, and documents regarding to, including without limitation, Intellectual Property Rights and Confidential Information in BioNano's possession as of the date of this Agreement that is necessary for Berry's licensed activities under Section 7.01 within the Territory. Within [**…*****…**] after the Effective Date, BioNano shall provide a checklist of such deliverable information, materials, and documents, which shall be attached hereto as Exhibit G.

7.10 Compliance with Laws.

(a) Berry shall comply with applicable law pertaining to the manufacture, use, import, export, transport, handling, storage, distribution, sales, and marketing, of the IVD Kits and IVD Instrument.

(b) In conformity with the applicable Chinese anti-bribery laws and regulations, the United States Foreign Corrupt Practices Act ("**FCPA**") and BioNano's established corporate policies regarding foreign business practices, Berry and its directors, officers, employees and agents shall not directly or indirectly make an offer, payment, promise to pay, or authorize payment, or offer a gift, promise to give, or authorize the giving of anything of value to any governments, government officials, political parties, political party officials (or relatives or associates of such officials) or healthcare professionals for the purpose of influencing an act or decision of an official of any government or government instrumentality or a healthcare professional, including, without limitation, within the Territory or the United States Government (including a decision not to act) or inducing such a person to use his influence to affect any governmental act or decision or act or decision of a healthcare institute in order to assist Berry, directly or indirectly, in obtaining, retaining or directing any such business.

(c) Berry will comply with all BioNano's reasonable requests in order to ensure compliance with the FCPA. Berry shall ensure that its employees and agents understand their obligations under the FCPA, and shall take such measures as may be necessary to ensure that its employees and agents comply with its requirements. Berry's efforts in this regard shall include, at a minimum, providing formal training to its employees and agents regarding the FCPA. Upon BioNano's request, Berry shall provide to BioNano written confirmation that it has conducted such training.

(d) BioNano is committed to conducting its business in accordance with BioNano's Anti-Corruption Policy. Berry shall comply with BioNano's Anti-Corruption Policy. Such obligations include, among others, prohibitions on receiving inappropriate gifts, payments or other compensation, and the obligation to report relationships or transactions that could be expected to give rise to a conflict of interest. Berry acknowledges that BioNano has provided Berry with a copy of BioNano's Anti-Corruption Policy and that BioNano may from time to time provide Berry with revisions to the same.

Article VIII.
Indemnification, Warranty and Limitation of Liability

8.01 Infringement Indemnification.

(a) **Indemnification by BioNano.** Subject to these terms and conditions,

(i) BioNano shall defend, indemnify and hold harmless Berry and Affiliates of Berry, and its officers, directors, representatives and employees, successors and assigns (each an "**Berry Indemnitee**"), against any and all claims, liabilities, damages, fines, penalties, causes of action, and losses of any and every kind (**"Claim"**), including without limitation, claims relating to or arising out of personal injury or death, and claims arising out of infringement of a third party's Intellectual Property Rights, in connection with any demands, investigations, lawsuits and other legal actions of third parties to the extent a Claim results from, relates to, or arises out of (i) any breach of, or inaccuracy in, any representation or warranty made by BioNano in this Agreement, (ii) any fault, negligence or intentional misconduct of BioNano, or its Affiliate, in performing or failing to perform under this Agreement, or (iii) any Claim of infringement of a third party's Intellectual Property Rights (a "BioNano Infringement Claim"); except in each case, to the extent such Claims result from the material breach of this Agreement by Berry or the negligence or willful misconduct of any Berry Indemnitee.

(ii) If the BioNano Components or any part thereof becomes, or in Berry's opinion may become, the subject of an BioNano Infringement Claim, upon Berry's requirement, BioNano shall (A) procure for Berry the right to continue using the BioNano Components, (B) modify or replace the BioNano Components with a substantially equivalent non-infringing substitute, or (C) require the return of the BioNano Components then in Berry's possession and terminate the rights, license, and any other permissions provided to Berry with respect the BioNano Components and refund Berry the price paid by Berry for the returned BioNano Components at the time of such return.

(b) **Indemnification by Berry.** Berry shall defend, indemnify and hold harmless BioNano and Affiliates of BioNano, and its officers, directors, representatives and employees, successors and assigns (each an "**BioNano Indemnitee**"), for any Claims in connection with any demands, investigations, lawsuits and other legal actions of third parties to the extent arising from: (A) any breach of, or inaccuracy in, any representation or warranty made by Berry in this Agreement, and (B) any gross negligence or intentional misconduct of Berry, or its Affiliate, in performing or failing to perform under this Agreement; except in each case, to the extent such Claims result from the material breach by BioNano of any covenant, representation, warranty or other agreement made by Berry in this Agreement, or the negligence or willful misconduct of any BioNano Indemnitee.

8.02 Indemnity Procedure. The Parties' indemnification obligations under this Article VIII are subject to the Party seeking indemnification (i) notifying the other, indemnifying Party promptly in writing of the claim, (ii) giving indemnifying Party exclusive control and authority over the defense of such claim, (iii) not admitting infringement of any Intellectual Property Right without prior written consent of the indemnifying Party, (iv) not entering into any settlement or compromise of any such action without the indemnifying Party's prior written consent, and (v) providing all reasonable assistance to the indemnifying Party that the indemnifying Party requests and ensuring that its officers, directors, representatives and employees and other indemnitees likewise provide assistance (provided that indemnifying Party reimburses the indemnified Party(ies) for its/their reasonable out-of-pocket expenses incurred in providing such assistance). An indemnifying Party will not enter into or otherwise consent to an adverse judgment or order, or make any admission as to liability or fault that would adversely affect the indemnified party, or settle a dispute without the prior written consent of the indemnified Party, which consent not to be unreasonably withheld, conditioned, or delayed.

8.03 Product Warranty.

(a) **BioNano Kit Components**. To the extent permitted by PRC laws and regulations, BioNano warrants that the BioNano Kit Components will conform to their Specifications until the later of (i) [**…*****…**] from the date of shipment from BioNano, and (ii) any expiration date or the end of the shelf life pre-printed on such BioNano Kit Components by BioNano, but in no event later than [**…*****…**] from the date of shipment.

(b) **BioNano Instrument Components**. To the extent permitted by PRC laws and regulations, BioNano warrants that the BioNano Instrument Components will conform to their Instrument Specifications until [**…*****…**] from the date of shipment from BioNano. Berry, at its sole discretion, may determine to purchase Service Contract from BioNano upon expiration of such [**…*****…**] warranty, and instruct BioNano relevant personnel to provide maintenance and service support to the customers of Berry.

(c) **Limitations**. To the extent permitted by PRC laws and regulations, the warranties in Section 8.03(a) and 8.03(b) do not apply to the extent a non-conformance is due to (i) abuse, misuse, neglect, negligence, accident, improper storage, handling or use contrary to the Specifications or Instrument Specifications, (ii) unauthorized alterations, (iii) Force Majeure events, or (iv) failure to manufacture the IVD Kit or IVD Instrument in accordance with the Kit Manufacturing Instructions and Instrument Manufacturing Instructions, respectively.

(d) **Remedy**. Berry's exclusive remedy under the warranty in Section 8.03(a) and 8.03(b) is that BioNano will, at BioNano's option, replace or repair non-conforming BioNano Components that BioNano confirms is covered by this warranty. Replaced BioNano Components come with a new warranty.

(e) **Procedure**. In order to be eligible for replacement under this warranty Berry must (i) promptly contact (orally or by written notice) BioNano's support department to report the non-conformance within [**…*****…**] after it becomes aware of the non-conformance, (ii) cooperate with BioNano in confirming or diagnosing the non-conformance, and (iii) destroy or return the BioNano Components, transportation charges assumed by BioNano following BioNano's instructions.

(f) **Warranty Provided to Berry's End-Customers**.

1) **IVD Kit**. To the extent permitted by PRC laws and regulations, Berry may determine the terms of the warranty it provides for the IVD Kit in its discretion; provided that, such warranty does not exceed the warranty on the BioNano Kit Components provided by BioNano to Berry.

2) **IVD Instrument**. To the extent permitted by PRC laws and regulations, Berry agrees that it will only convey the following warranty to end-customers of the IVD Instrument.

"**Warranty**. Berry will only warrant that the IVD Instrument will conform to the Instrument Specifications for a period of [**…*****…**] beginning on the date the IVD Instrument is installed at the end-user customer's site or [**…*****…**] after the date the IVD Instrument is delivered to the end-customer site, whichever occurs first.

Procedure for Warranty Coverage. In order to be eligible for repair or replacement under this warranty, the end-customer must (i) promptly contact (orally or by written notice) the designated support contact to report the non-conformance, (ii) cooperate in confirming or diagnosing the non-conformance, and (iii) return the IVD Instrument, transportation charges prepaid following Berry's instructions or, if agreed by Berry and end-user customer, grant Berry's authorized repair personnel access to the IVD Instrument in order to confirm the non-conformance and make repairs.

Sole Remedy under Warranty. Berry will, at its option, repair or replace non-conforming IVD Instrument that it confirms is covered by this warranty. IVD Instruments may be repaired or replaced with functionally equivalent, reconditioned, or new IVD Instruments or components (if only a component of IVD Instrument is non-conforming). If the IVD Instrument is replaced in its entirety, the warranty period for the replacement is [**…*****…**] from the date of shipment or the remaining period on the original IVD Instrument warranty, whichever ends later. If only a component is being repaired or replaced, the warranty period for such component is [**…*****…**] from the date of shipment or the remaining period on the original IVD Instrument warranty, whichever ends later. The preceding states Berry's sole remedy and Seller's sole obligations under the warranty provided hereunder."

8.04 Berry Warranty. Berry warrants that it will perform the necessary manufacturing, marketing and tests in compliance with the applicable PRC laws and regulations, and that the IVD Instruments and IVD Kits will be manufactured under appropriate design control and regulations for good manufacturing practices.

8.05 Warranty Disclaimer. EXCEPT AS EXPRESSLY PROVIDED IN THIS AGREEMENT, NO WARRANTIES, EXPRESS OR IMPLIED, ARE GIVEN BY EITHER PARTY, INCLUDING WITHOUT LIMITATION, ANY IMPLIED WARRANTY OF MERCHANTABILITY OR FITNESS FOR ANY PURPOSE.

8.06 Limitation on Liabilities. EXCEPT FOR DAMAGES RESULTING FROM A BREACH OF A PARTY'S OBLIGATIONS UNDER ARTICLE 10, OR A PARTY'S INDEMNIFICATION OBLIGATIONS UNDER THIS ARTICLE 8, NEITHER PARTY WILL BE LIABLE WITH RESPECT TO ANY SUBJECT MATTER OF THIS AGREEMENT UNDER ANY CONTRACT, NEGLIGENCE, STRICT LIABILITY, OR OTHER LEGAL OR EQUITABLE THEORY FOR ANY INCIDENTAL OR CONSEQUENTIAL DAMAGES, OR LOST PROFITS.

Article IX.
Term and Termination

9.01 Term. The term of this Agreement shall begin on the Effective Date and shall continue for three (3) years (the **"Term")**, with option to renew for two (2) years by either Party**.** If either Party desires to continue this Agreement beyond the Term it shall notify in writing the other Party of such desire at least 90 days before the end of the Term and the Parties will discuss such renewal. Notwithstanding the preceding two sentences, BioNano and Berry agree to in good faith negotiate the terms of a new supply agreement or amendment to this Agreement in the event that this Agreement expires after the renewed Term.

9.02 Early Termination. Without limiting any other rights of termination expressly provided in this Agreement or under Law, this Agreement may be terminated early as follows:

(a) **Breach of Provision.** If a Party materially breaches this Agreement and fails to cure such breach within 30 days after receiving written notice of the breach from the other Party, or if a breach is not curable, then the non-breaching Party shall have the right to terminate this Agreement with immediate effect by providing written notice of termination to the other Party.

(b) **Bankruptcy and Insolvency.** A Party may terminate this Agreement, effective immediately upon written notice, if the other Party becomes the subject of a voluntary or involuntary petition in bankruptcy, for winding up of that Party, or any proceeding relating to insolvency, receivership, administrative receivership, administration liquidation or company voluntary arrangement or scheme of arrangement with its creditors that is not dismissed or set aside within 60 days. In the event of any insolvency proceeding commenced by or against Berry, BioNano shall be entitled to cancel any Purchase Order then outstanding and not accept any further Purchase Order until bankruptcy or insolvency proceeding is resolved. In the event of any insolvency proceeding commenced by or against BioNano, Berry shall be entitled to cancel any Purchase Order then outstanding.

(c) **Termination for Failure to Purchase.** BioNano shall have the right to terminate this Agreement immediately upon written notice to Berry if Berry fails to achieve the purchase of the quantity of BioNano Instrument Components as set forth in Section 6.11, unless such failure is caused by the BioNano's breach of its supply obligations hereunder.

(d) **Termination for Infringement of Intellectual Property Rights in China**. Berry shall have the right to terminate this Agreement upon written notice to BioNano if a court of competent jurisdiction makes a final determination that in the course of its performance under this Agreement BioNano infringes the Intellectual Property Rights of a third party in China.

9.03 Effects of Termination on Inventory. In the event this Agreement is terminated early pursuant to Section 9.02(c), and Berry has inventory of BioNano Components, finished IVD Kits, or IVD Instruments, BioNano and Berry will negotiate in good faith the terms of an exchange or credit program. In addition, Berry shall have the right following expiration or termination of this Agreement, to manufacture in the Territory and Sell IVD Kits and IVD Instruments in accordance with the terms and conditions in the Agreement in order to dispose of Berry's inventory of BioNano Components, IVD Kits and IVD Instruments remaining un-Sold at the time of termination or expiration of this Agreement.

9.04 Survival Obligations. All payment obligations, Article I, Article VIII, Article X, and Article XI in their entirety, and Section 4.10, Sections 6.04, 6.09, 6.11, Sections 7.01, 7.02, 7.03, 7.04 and 7.05, 7.06, Sections 8.05, 8.06, the last sentence of Section 9.01, Sections 9.03 and 9.04, the entirety of Article XII, except for Sections 12.03 and 12.09, shall survive the termination or expiration of this Agreement for any reason. Termination or expiration of this Agreement shall not relieve the Parties of any liability or obligation which accrued hereunder prior to the effective date of such termination or expiration nor preclude either Party from pursuing all rights and remedies it may have hereunder or at law or in equity with respect to any breach of this Agreement, nor prejudice either Party's right to obtain performance of any obligation.

Article X.
Protection of Confidential Information

10.01 Confidentiality. The Parties acknowledge that a Party (the **"Recipient Party"**) may have access to information ("**Confidential Information**") of the other Party (the **"Disclosing Party"**) in connection with this Agreement.

(a) BioNano and Berry agree that in order for BioNano's information to be protected as Confidential Information, BioNano must disclose it with a confidential or other similar proprietary legend and in the case of orally or visually disclosed information, BioNano shall notify Berry of its confidential nature at the time of disclosure [**…*****…**] to Berry within [**…*****…**] [**…*****…**].

(b) BioNano and Berry agree that all information of Berry and its Affiliates, in any form, including without limitation, information in written, oral, or visual form, that BioNano has access to under or in connection with this Agreement is protected as Confidential Information even if it is not marked with a confidential or other similar proprietary legend. BioNano acknowledges that access to Berry's information may come from third parties, including without limitation, Authorized Third Parties. Accordingly, all such information is to be protected as Berry Confidential Information under this Agreement. BioNano and Berry further agree that all information in any way related to the subject matter of this Agreement that was disclosed to BioNano by Berry or a Berry Affiliate or by BioNano to Berry on or after March 12, 2016 is subject to the confidentiality provisions of this Agreement.

(c) Berry and BioNano agree that all information of BioNano and its Affiliates, in any form, including without limitation, information in written, oral, or visual form, that Berry has access to under or in connection with this Agreement is protected as Confidential Information even if it is not marked with a confidential or other similar proprietary legend. Berry acknowledges that access to BioNano's information may come from third parties, including

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without limitation, Authorized Third parties. Accordingly, all such information is to be protected as BioNano Confidential Information under this Agreement.

(d) During the Term of this Agreement and thereafter, the Recipient Party agrees that it shall hold the Disclosing Party's Confidential Information in confidence using at least the degree of care that is used by the Recipient Party with respect to its own Confidential Information, but no less than reasonable care. The Recipient Party shall disclose the Confidential Information of the Disclosing Party solely on a need to know basis to its employees, contractors, officers, directors, representatives, and those of its Affiliates, under written confidentiality and restricted use terms or undertakings consistent with this Agreement. The Recipient Party shall not use the Disclosing Party's Confidential Information for any purpose other than exercising its rights and fulfilling its obligations under this Agreement. The Confidential Information shall at all times remain the property of the Disclosing Party. The Recipient Party shall, upon written request of the Disclosing Party, return to the Disclosing Party or destroy the Confidential Information of the Disclosing Party. Notwithstanding the foregoing, the Recipient Party may maintain one copy of the Disclosing Party's Confidential Information to be retained by the Recipient Party's Legal Department for archival purposes only.

(e) In the event the Parties have other obligations of confidentiality in other agreements executed between the Parties or their Affiliates prior to the Effective Date, and there is a good-faith question as to whether the information is subject to the confidentiality provisions of this Agreement or those of such other prior agreements, the Parties agree that such information shall be subject to the confidentiality provisions of this Agreement.

10.02 Exceptions. Notwithstanding any provision contained in this Agreement to the contrary, neither Party shall be required to maintain in confidence or be restricted in its use of any of the following: (a) information that, at the time of disclosure to the Recipient Party, is in the public domain through no breach of this Agreement or breach of another obligation of confidentiality owed to the Disclosing Party or its Affiliates by the Receiving Party; (b) information that, after disclosure hereunder, becomes part of the public domain by publication or otherwise, except by breach of this Agreement or breach of another obligation of confidentiality owed to the Disclosing Party or its Affiliate by the Receiving Party; (c) information that was in the Recipient Party's or its Affiliate's possession at the time of disclosure hereunder by the Disclosing Party unless subject to an obligation of confidentiality or restricted use owed to the Disclosing Party or its Affiliate; (d) information that is independently developed by or for the Recipient Party or its Affiliates without use of or reliance on Confidential Information of the Disclosing Party; or (e) information that the Recipient Party receives from a third party where such third party was under no obligation of confidentiality to the Disclosing Party or its Affiliate with respect to such information. The occurrence of (a), (b), (c), (d) or (e) above shall not be deemed to grant either Party any license or other right, express or implied, to any portion of the information or other proprietary rights of the other Party relating thereto. Notwithstanding the exceptions of this Section 10.02, any compilation of otherwise public information in a form not publicly known shall be considered Confidential Information.

10.03 Disclosures Required by Law. Either party may disclose Confidential Information of the other as required by court order, operation of law, or government regulation (including but not limited to all applicable laws and regulations governing the filing with CFDA, China Securities Regulatory Commission, and Securities & Futures Commission of Hong Kong); provided that, the disclosing party promptly notifies the other party of the specifics of such requirement prior to the actual disclosure, or promptly thereafter if prior disclosure is impractical under the circumstances, uses diligent and reasonable efforts to limit the scope of such disclosure or obtain confidential treatment of the Confidential Information if available, and allows the other party to participate in the process undertaken to protect the confidentiality of the other party's Confidential Information, including without limitation, cooperating with the other party in its efforts to permit the disclosing party to comply with the requirements of such order, law, or regulation in a manner that discloses the least amount necessary, if any, of the Confidential Information of the other party.

10.04 Injunctive Relief. Each Party acknowledges that any use or disclosure of the other Party's Confidential Information other than in accordance with this Agreement may cause irreparable damage to the other Party. Therefore, in the event of any such use or disclosure or threatened use or threatened disclosure of the Confidential Information of either Party hereto, the non-breaching Party shall be entitled, in addition to all other rights and remedies available at Law, to seek injunctive relief against the breach or threatened breach of any obligations under this Article X.

10.05 Disclosure of Agreement. Except as expressly provided otherwise in this Agreement, neither Party may disclose this Agreement, the terms and conditions of this Agreement, including any financial terms thereof, and the subject matter of this Agreement to any third party without the prior written consent of the other Party, which consent shall not be unreasonably withheld.

Article XI.
Notices

11.01 Notices. All notices required or permitted under this Agreement shall be in writing, in English, and shall be deemed received only when (a) delivered personally; (b) 5 days after having been sent by registered or certified mail, return receipt requested, postage prepaid (or 10 days for international mail); or (c) 1 day after deposit with a commercial express courier specifying next day delivery or, for international courier packages, 2 days after deposit with a commercial express courier specifying 2-day delivery, with written verification of receipt. All notices shall be sent to the following or any other address designated by a Party using the procedures set forth in Section 11.02:

If to BioNano:

BioNano Genomics, Inc.
9640 Towne Centre Drive, Ste. 100
San Diego, CA 92121
Attn: Erik Holmlin

If to Berry:

Beijing Berry Genomics Co., Ltd.
Building 9, Courtyard 6
East Jingshun Road,
Chaoyang District, Beijing 100015
P. R. China
Attention: Daixing Zhou

With a copy to:

BioNano Genomics, Inc.
9640 Towne Centre Drive, Ste. 100
San Diego, CA 92121
Attn: General Counsel

11.02 Both Parties may give written notice of a change of address and, after notice of such change has been received, any notice or request shall thereafter be given to such Party at such changed address.

Article XII.
Miscellaneous

12.01 Publicity; Use of Names or Trademarks. Except as expressly authorized otherwise in this Agreement, each Party shall obtain the prior written consent of the other Party on all press releases or other public announcements relating to this Agreement, including its existence or its terms, provided that a Party is not required to obtain prior written consent of the other Party for press releases or public disclosures that repeat information that has been previously publicly disclosed. Berry and BioNano intend to announce their supply relationship in a press release and each agrees it will undertake good faith efforts to reach mutual agreement on the text for release within [**…*****…**] after the Effective Date. Except as

expressly authorized otherwise in this Agreement, neither Party shall use the name or trademarks of the other Party without the express prior written consent of the other Party.

12.02 Assignment; Performance by Affiliates.

(a) Berry shall not assign or transfer this Agreement or any rights or obligations to any third party, without the prior written consent of the BioNano. Any assignment or transfer of this Agreement made in contravention of the terms hereof shall be null and void. Subject to the foregoing, this Agreement shall be binding on and inure to the benefit of the Parties' respective successors and permitted assigns.

(b) Each Party recognizes that the other Party may perform some or all of its obligations under this Agreement through Affiliates to the extent permitted under this Agreement; *provided, however*, that such other Party shall remain responsible for the performance by its Affiliates as if such obligations were performed by such other Party.

12.03 Legal Compliance. Nothing in this Agreement is intended, or should be interpreted, to prevent either Party from complying with, or to require a Party to violate, any and all applicable Laws. Should either Party reasonably conclude that any portion of this Agreement is or may be in violation of a change in a Law made after the Effective Date, or if any such change or proposed change would materially increase the cost of any Party's performance hereunder, the Parties agree to negotiate in good faith written modifications to this Agreement as may be necessary to establish compliance with such changes and/or to reflect applicable changes in compensation necessitated by such changes, with any mutually agreed upon modifications added to this Agreement by written amendment in accordance with Section 12.07 of this Agreement.

12.04 Governing Law; Jurisdiction. This Agreement and any dispute or claim arising out of or in connection with it or its subject matter or formation shall be governed and construed in accordance with the laws of the State of Delaware; provided the Parties shall abide by all applicable mandatory laws and regulations of the People's Republic of China. All disputes, controversy, difference or claim arising out of or in connection with this Agreement, including without limitation, any question regarding its existence, validity, interpretation, performance, breach or termination thereof or any dispute regarding non-contractual obligations arising out of or relating to it, shall be referred to and finally resolved by arbitration administered by the American Arbitration Association (the "**AAA**"). The arbitration shall take place in accordance with the AAA rules then in effect. The tribunal shall consist of three arbitrators, each of BioNano and Berry shall appoint one arbitrator, and the third arbitrator shall be appointed in accordance with the AAA rules and shall be the chairman, and shall not be a national of either Party, unless the Parties agree otherwise in writing. Each arbitrator shall have no less than 10 years of experience handling disputes similar to the dispute to be arbitrated hereunder. The language of the arbitration shall be English. The arbitration shall be held in AAA's office in the State of Delaware. Any award made by the arbitral tribunal shall be final and binding on the Parties and each Party hereby waives to the fullest extent permitted by Law and right it may otherwise have under the laws of any jurisdiction to any form of appeal.

12.05 Severability. The terms and conditions stated herein are declared to be severable. If any paragraph, provision, or clause in this Agreement shall be found or be held to be invalid or unenforceable in any jurisdiction in which this Agreement is being performed, the remainder of this Agreement shall be valid and enforceable and the Parties shall use good faith efforts to negotiate a substitute, valid and enforceable provision which most nearly effects the Parties' intent in entering into this Agreement.

12.06 No Waiver; Rights and Remedies. The failure or delay of either Party to exercise any right or remedy provided herein or to require any performance of any term of this Agreement shall not be construed as a waiver, and no single or partial exercise of any right or remedy provided herein, or the waiver by either Party of any breach of this Agreement shall not prevent a subsequent exercise or enforcement of, or be deemed a waiver of any subsequent breach of, the same or any other term of this Agreement. Except as expressly provided in this Agreement, the rights and remedies of each Party under this Agreement are cumulative and not exclusive of any rights or remedies provided by Law.

12.07 Entire Agreement; Amendment; Waiver. This Agreement represents the entire agreement between the Parties regarding the subject matter hereof and supersedes all prior discussions, communications, agreements, and understandings of any kind and nature between the Parties. The Parties acknowledge and agree that by entering into this Agreement, they do not rely on any statement, representation, assurance or warranty of any person or entity other than as expressly set out in the Agreement. Each Party agrees that it shall have no right or remedy (other than for breach of contract) in respect of any statement, representation, assurance or warranty (whether made negligently or innocently) other than as expressly set out in this Agreement. Nothing in this Section 12.07 shall exclude or limit liability for fraud. No amendment to this Agreement will be effective unless in writing and signed by both Parties. No waiver of any right, condition, or breach of this Agreement will be effective unless in writing and signed by the Party who has the right to waive the right, condition or breach and delivered to the other Party.

12.08 Counterparts. This Agreement may be executed in any number of counterparts, each of which will be deemed an original, but all of which together will constitute but one and the same instrument. This Agreement will become effective when duly executed by each Party hereto.

12.09 Cooperation. BioNano and Berry agree to execute any instruments reasonably believed by the other Party to be necessary to implement the provisions of this Agreement.

12.10 Costs. Each Party shall bear its own costs and expenses incurred in connection with the negotiation and execution of this Agreement.

12.11 Force Majeure. Neither Party shall be in breach of this Agreement nor liable for any failure to perform or delay in the performance of this Agreement attributable in whole or in part to any cause beyond its reasonable control, including but not limited to acts of God, fire, flood, tornado, earthquake, hurricane, lightning, any action taken by government or a regulatory authority, actual or threatened acts of war, terrorism, civil disturbance or insurrection, sabotage, labor shortages or disputes, , transportation difficulties, interruption or failure of any utility service, raw materials or equipment, or the other Party's fault or negligence (each an event of **"Force Majeure"**). In the event of any such delay, the delivery date for performance shall be deferred for a period equal to the time lost by reason of the delay.

12.12 Headings and Certain Rules of Construction. Sections, titles and headings in this Agreement are for convenience only and are not intended to affect the meaning or interpretation hereof.

This Agreement has been negotiated in the English language and only the English language version shall control. Any translation of this Agreement into a non-English language is for convenience only. Whenever required by the context, the singular term shall include the plural, the plural term shall include the singular, and the gender of any pronoun shall include all genders. As used in this Agreement except as the context may otherwise require, the words “include”, “includes”, “including”, and “such as” are deemed to be followed by “without limitation”, whether or not they are in fact followed by such words or words of like import, and “will” and “shall” are used synonymously. The terms “hereof,” “herein,” “hereby,” and derivative or similar to refer to this entire Agreement. Except as expressly stated, any reference to “days” shall be to calendar days, and “business day” shall mean all days other than Saturdays, Sundays or a national or local holiday recognized in the United States and the People’s Republic of China, and any reference to “calendar month” shall be to the month and not a 30 day period, and any reference to “calendar quarter” shall mean the first 3 calendar months of the year, the 4-6th calendar months of the year, the 7-9th calendar months of the year, and the last 3 calendar months of the year. Whenever the last day for the exercise of any privilege or the discharge of any duty hereunder shall fall on, or any notice is deemed to be given on a Saturday, Sunday, or national holiday, the Party having such privilege or duty shall have until 5:00 pm PST on the next succeeding business day to exercise such privilege or to discharge such duty or the Party giving notice shall be deemed to have given notice on the next succeeding business day. It is further agreed that no usage of trade or other regular practice between the Parties hereto shall be used to interpret or alter the terms and conditions of this Agreement. Ambiguities, if any, in this Agreement shall not be construed against any particular Party, irrespective of which Party may be deemed to have authored the ambiguous provision.

[signature page follows]

IN WITNESS WHEREOF, effective as of the Effective Date, each of the Parties have executed this Agreement in duplicate originals by their duly authorized officers or representatives.

BIONANO GENOMICS, INC.

By: /s/ Erik Holmlin, Ph.D.
Name: Erik Holmlin, Ph.D.
Title: President and Chief Executive Officer

Date: 03 August 2016

BERRY GENOMICS CO., LTD.

By: /s/ Daixing Zhou
Name: Daixing Zhou
Title: CEO

Date: 8/3/2016

EXHIBIT A

BIONANO COMPONENTS, SERVICE CONTRACTS, AND IQ/OQ PRICING

BioNano Kit Components

Product	Retail Price (or Expected Retail Price)	[...***...]	Transfer Price
Kits			
[...***...]	[...***...]	[...***...]	[...***...]
[...***...]	[...***...]	[...***...]	[...***...]
Hardware			
[...***...]	[...***...]	[...***...]	[...***...]
[...***...]	[...***...]	[...***...]	[...***...]
[...***...]	[...***...]	[...***...]	[...***...]
Service Contracts			
[...***...]	[...***...]	[...***...]	[...***...]

BioNano Instrument Components

Item	Description	Part Number	U.S. List Price (USD)*
1	[...***...]	[...***...]	[...***...]
2	[...***...]	[...***...]	[...***...]
3	[...***...]	[...***...]	[...***...]

* price reflects U.S. list price as of the Effective Date. List price may be subject to change upon mutual written agreement.

Service Contracts

Part Number	Description	US List Price
[...***...]	[...***...]	[... ***...] $
[... ***...]	[... ***...]	[... ***...] $
[... ***...]	[... ***...]	[... ***...] $
[... ***...]	[... ***...]	[... ***...] $

* price reflects U.S. list price as of the Effective Date. List price is subject to change upon mutual written agreement.

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EXHIBIT B
SUPPORT

1. Berry Obligations

a. Technical Support

1st line support for IVD Kits and IVD Instruments (including responding to customer questions and comments, and maintaining appropriate customer records for regulatory compliance)

Conduct validation of IVD Kit in its labs and manufacturing site

Conduct validation for the quality of the results delivered to patients, using protocols and methods of its choosing

Protocol training post instrument installation

All support for issues specific to the protocols

2. BioNano Obligations

a. Installation

Conducts hardware installation and validation of IVD Instruments at Berry facilities and its affiliates.

b. Installation and support training

Train Berry's support team to install, validate and support IVD Instruments and BioNano Kit components.

c. 2nd line support for IVD Kits

Provide secondary support to Berry if they are unable to resolve a problem with the IVD Kits.

d. Warranty and Service Contract Support

Terms and conditions of service and support during the warranty period or Service Contracts shall be further determined by Parties by mutual agreement.

EXHIBIT C
INSTRUMENT SPECIFICATIONS

Specifications as contingency for the Irys V3 Beta systems purchased from Q3 16 to Q4 16:

1) Throughput: [**…*****…**]
2) Detection sensitivity: [**…*****…**]

Specifications as contingency for the Irys V3 systems purchased from Q1 17 to Q2 17:

1) Detection sensitivity: [**…*****…**]
2) Throughput: [**…*****…**]
3) Running chip cost: [**…*****…**]
4) Running time: [**…*****…**]

Specifications as contingency for the Irys V3 systems purchased beginning in Year 2 (which begins in Q3 17):

1) Detection sensitivity: [**…*****…**]
2) Throughput: [**…*****…**]
3) Running chip cost: [**…*****…**]
4) Running time: [**…*****…**]

EXHIBIT D
BRANDING REQUIREMENTS

The following constitutes the general initial Branding Requirements for the IVD Instrument and IVD Kits.

Branding of IVD Instrument	• Berry's sole discretion to brand as Berry Instrument or co-brand as a BioNano | Berry instrument. • Product name label will be supplied by BioNano. It will be placed on the instrument in the upper left hand corner similar to standard product name placement on other BioNano instruments, if co-branding. • If co-branding, the BioNano logo will be supplied by BioNano and must be featured on the lower right hand side of the front of the instrument. In addition the Berry logo will be placed next to the BioNano logo so that it is clear that the instrument is a co-branded product. Detailed guidelines for placement and sizing of logos will be provided by Berry.
Branding of IVD Kits	• Berry's sole discretion to brand as Berry IVD Kit or co-brand as a BioNano | Berry IVD Kit.
Marketing of IVD Instrument and IVD Kit	• All materials referencing BioNano brands must include appropriate trademark acknowledgements.

EXHIBIT E
TRADEMARK LICENSE

This Trademark License is incorporated into and made a part of that certain Agreement entered into by and between BioNano, Inc., a California corporation having a place of business at 9640 Towne Centre Drive, Ste. 100, San Diego, California 92121 (defined in the Agreement as "**BioNano**") and Berry Genomics Co., Ltd., a Chinese corporation having a place of business at Building 9, Courtyard 6, East Jingshun Road, Chaoyang District, Beijing 100015, People's Republic of China (defined in the Agreement as "**Berry**").

WHEREAS, BioNano is the owner of the [TBD] trademark (Application # in the Trademark Office of the People's Republic of China) including all registrations or applications therefore (the "**Mark**"):

WHEREAS, pursuant to the Agreement, BioNano is granting certain rights to Berry to market and Sell IVD Kits and IVD Instruments; and

WHEREAS, the Parties desire to incorporate this Trademark License into the Agreement, in order to grant Berry certain rights to use the Mark in connection with the marketing and Sale of the IVD Kits and IVD Instruments. Capitalized terms used but not defined in this Trademark License will have the definition given to them in the Agreement. Notwithstanding the inclusion of trademarks in the defined term "**Intellectual Property Rights**", this Trademark License exclusively contains all rights granted to Berry under BioNano and its Affiliate(s) trademarks and service marks;

NOW, THEREFORE, for and in consideration of the premises and the mutual covenants contained herein, and other good and valuable consideration, the receipt and sufficiency of which are hereby acknowledged, the Parties hereto do hereby agree as follows:

1. **License Grant**. Subject to, and contingent upon Berry's and the Authorized Affiliates (as defined below) continued compliance with, all terms and conditions of the Agreement (specifically including the Branding Requirements set forth in Exhibit D) BioNano hereby grants to Berry and the Authorized Affiliates, and Berry hereby accepts, on behalf of itself and such Authorized Affiliates, a royalty-free, non-exclusive, transferable, sublicensable, irrevocable, license to use the Mark during the Term solely to market, distribute and have distributed, Sell and have Sold, offer for Sale and have offered for Sale, the IVD Kits and IVD Instruments in the Territory in the manner set forth in Section 2.01 of the Agreement, and to develop and distribute Collateral bearing the Mark in furtherance of such activities in the manner set forth in Sections 4.01, 4.02 and 4.03 of the Agreement. As used herein, "**Authorized Affiliate**" means a Berry Affiliate expressly authorized under the Agreement to market and/or Sell the IVD Kit and/or IVD Instrument in the Territory.

2. **Use of the Mark**.

2.01 **Branding Requirements and Usage Guidelines**. Berry and each Authorized Affiliate shall use the Mark in conformity with the Branding Requirements set forth in Exhibit D to the Agreement, as such Branding Requirements may be updated upon BioNano and Berry's mutual agreement from time to time, and any additional trademark usage guidelines as may be determined upon BioNano and Berry's mutual agreement from time to time.

2.02 **Marking**. Berry and each Authorized Affiliate shall clearly mark all IVD Kits and IVD Instruments with Berry's name and address (and/or the name and address of the Authorized Affiliate(s), if appropriate) in compliance with Article 43 of the China Trademark Law. Berry and each Authorized Affiliate shall include the following notice on all Collateral bearing the Mark, in the language predominantly used in such Collateral:

[TBD] is a trademark of BioNano, Inc. and/or its affiliate in the People's Republic of China used under license.

3. **Ownership of the Marks**.

3.01 **Ownership**. Berry, on behalf of itself and each Authorized Affiliate, acknowledges and agrees that: (i) BioNano is the owner of all right, title, and interest in and to the Mark; (ii) neither Berry nor any Authorized Affiliate has right or interest in the Mark other than those rights expressly granted in this Trademark License; (iii) neither Berry nor any Authorized Affiliate has any right or interest in any other trademark or service mark of BioNano or its Affiliate.

4. **Registration and Enforcement**.

4.01 **Registration**. BioNano shall use commercially reasonable efforts to seek, obtain and, during the Term, maintain in its own name and at its own expense, registration of the Mark within the Territory. In the event that BioNano decides to abandon any of the Mark within the Territory, BioNano will inform Berry and Berry shall have the first right to obtain the ownership of such Mark without costs.

4.02 **Enforcement**. BioNano has the right, but not the obligation, to take action against any third party infringement of the Mark. In the event that Berry or any Authorized Affiliate learns of any potential infringement of the Mark by any third party, Berry shall promptly notify BioNano of the facts concerning such potential infringement. If BioNano elects not to take action with respect to enforcement actions to cease such infringement, BioNano shall so inform Berry within [**…***…**] upon receiving Berry's notice, and Berry shall have the right, but not the obligation, to initiate actions to cease any such infringement in the Territory in the Fields of Use. Among the Parties, enforcing Party shall retain all recovery and income (including damages, licensing fees, royalties, settlement payments and other payments) received as a result of any enforcement action.

5. **Miscellaneous**.

5.01 **Term and Termination**. The term of this Trademark License shall commence on the Effective Date and shall continue until the termination or expiration of the Agreement. Upon termination of this Trademark License, all rights and obligations hereunder shall automatically terminate. The termination of this Trademark License will not affect the validity of the Agreement.

5.02 **Governing Law**. This Agreement and any dispute or claim arising out of or in connection with it or its subject matter or formation shall be governed and construed in accordance with the laws of the State of Delaware; provided the Parties shall abide by all applicable mandatory laws and regulations of the People's Republic of China. All disputes, controversy, difference or claim arising out of or in connection with this Trademark License shall be resolved as set forth in Section 12.04 of the Agreement.

5.03 **Assignment**. Berry shall not assign or transfer this Agreement or any rights or obligations under this Agreement, without the prior written consent of the BioNano. Any assignment or transfer of this Trademark License made in contravention of the terms hereof shall be null and void. Subject to the foregoing, this Trademark License shall be binding on and inure to the benefit of the Parties' respective successors and permitted assigns.

5.04 **Amendment and Waiver**. No provision of this Trademark License may be amended or waived except by a writing signed by both Parties.

IN WITNESS WHEREOF, effective as of the Effective Date, each of the Parties have executed this Agreement in duplicate originals by their duly authorized officers or representatives.

BIONANO GENOMICS, INC.		**BERRY GENOMICS CO., LTD.**	
By:		By:	/s/ Daixing Zhou
Name:	Erik Holmlin, Ph.D.	Name:	Daixing Zhou
Title:	President and Chief Executive Officer	Title:	CEO
Date:		Date:	8/3/2016

EXHIBIT F
BIONANO PATENTS

Country	Applicant Title and Number	Application Date	Grant Number	Grant Date
	[…***…]			
[…***…]	[…***…]			
	[…***…]			
[…***…]	[…***…]		[…***…]	
[…***…]	[…***…]			
	[…***…]			
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	[…***…]			
[…***…]	[…***…]	[…***…]		
[…***…]	[…***…]			

* PROVISIONAL US PATENT APPLICATIONS (Owner: BioNano)

Several unpublished patent applications disclosing new technologies are in preparation for filing as provisional patent application

** Patent License Agreement:

I. Licensor: Princeton University

1. Scope License Rights:

a. Patent rights:

• Princeton Patent Portfolio

[…***…]

• […***…]

[…***…]

• […***…]

b. […***…]

c. Princeton retains rights for non-commercial research and educational purposes.

2. Scope: Exclusive

3. Territory: Worldwide

4. Sublicense Rights: Yes

5. Covenant Not to Sue: One Princeton designee: Nanonex Corporation

6. Technology improvements made by BioNano Genomics: Ownership retained by BioNano Genomics

7. Patent prosecution and enforcement paid by Licensee.

8. Term: Later of a) Last sale of Licensed Product or Service or b) the expiration of Princeton Patent Rights.

EXHIBIT G
CHECKLIST OF DELIVERABLES

[To be inserted]

Exhibit 10.31

*****Text Omitted and Filed Separately**
with the Securities and Exchange Commission
Confidential Treatment Requested
Under 17 C.F.R. Sections 200.80(b)(4)
and 230.406

PATENT SUBLICENSE AGREEMENT

This Patent License Agreement (the "Agreement"), dated December 27, 2013 (the "Effective Date"), is hereby entered into by and between Industry 3200, Inc., a Delaware Corporation with a principal office located at 1155 Camino Del Mar #118, Del Mar, CA 92014 ("Sublicensor"), and BioNano Genomics, Inc., a Delaware Corporation, having a principal place of business at 9640 Towne Centre Drive, Suite 100 ("Sublicensee")

WHEREAS Sublicensor holds a patent license (the Master License Agreement) from the […***…] ("[…***…]") to intellectual property identified as the […***…] portfolio; and

WHEREAS Sublicensor desires to grant and Sublicensee desires to receive a sublicense under certain of the rights granted by […***…] to Sublicensor in the Master License Agreement;

NOW, THEREFORE, for good and valuable consideration, the receipt and sufficiency of which is hereby acknowledged, and in consideration of the following mutual promises and covenants, the parties hereto agree as follows:

1. DEFINITIONS

For purposes of this Agreement, the following terms shall have the meaning as set forth below:

1.1. "Affiliates" means a person or entity that directly or indirectly through one or more intermediaries, controls, or is controlled by, Sublicensee. As used in this definition, the term "control," including the correlative terms "controlling," and "controlled by" means the possession, directly or indirectly, of the power to direct or cause the direction of management or policies (whether through ownership of securities or any partnership or other ownership interest, by contractor otherwise) of a person or entity.

1.2. "Agreement Year" shall be a twelve (12) calendar month period beginning July 1 and ending June 30 of the following year, except that the first Agreement Year shall begin on the Effective Date and shall end June 30, 2014.

1.3. "Licensed Patent" means US Patent No. […***…], and any reexaminations and reissues thereof.

1.4. "Patent Rights" means only […***…] of the Licensed Patent.

1.5. "Licensed Field" shall be limited to the field of nucleic acid analysis.

1.6. "Licensed Territory" shall be limited to the United States.

1.7.

1.8. "Master, License Agreement" means that license agreement entered into between […***…] and Sublicensor on […***…], under which Sublicensor has received a license to the Patent Rights.

1.9. "Non-Commercial Research Purposes" shall mean the use of the inventions of the Patent Rights and/or Improvements for academic research purposes or other not-for-profit or scholarly purposes not involving the use of the inventions of the Patent Rights or Improvements to perform services for a fee or for the production or manufacture of products for sale to third parties.

1.10. "Products" shall refer to and mean any and all products sold for use in the Licensed Territory that employ or are in any way produced by the practice of an invention claimed in a

Valid Claim of the Patent Rights or that would otherwise constitute infringement of any Valid Claim of the Patent Rights.

1.11. "Selling Price" shall mean, in the case of Products and Services that are sold or leased, the […***…] of Products and Services […***…]. The "Selling Price" for a Product that is transferred or Service is provided to a third party for promotional purposes without charge or at a discount shall be […***…] of that type of Product or Service […***…].

1.12. "Services" shall refer to and mean any and all services performed in the Licensed Territory that employ or are in any way produced by the practice of an invention claimed in a Valid Claim of the Patent Rights or that would otherwise constitute infringement of any Valid Claims of the Patent Rights.

1.13. "Third Party" means any person or entity other than […***…], Sublicensor, Sublicensee, or an Affiliate of either of them.

1.14. "Valid Claim" means an issued claim of the Patent Rights, where the claim (a) has not expired or lapsed and (b) has not been held to be invalid or unenforceable by (i) a final judgment of a court of competent jurisdiction from which no appeal can be or is taken or (ii) a governmental authority having the jurisdiction to issue or to review the validity of patent claims from which no appeal can be or is taken.

2. LICENSE

2.1. Nonexclusive License. Sublicensor grants to Sublicensee, and Sublicensee hereby accepts, a nonexclusive right and license to practice the Patent Rights In the Licensed Territory and in the Licensed Field, with the right to make, have made, use, have used, import, export, market, distribute, offer for sale and sell Licensed Product, and to allow its customers to use the same. Sublicensor grants no sublicense to any other claim or patent that Sublicensor has licensed under the Master License Agreement.

2.2. Sublicensing. Sublicensee shall have no right to further sublicense the rights granted hereunder, except with the consent of Sublicensor, which consent shall not unreasonably be withheld in the case of a sale, merger, acquisition, with the intended recipient of such sublicense. In no event shall there be multiple concurrent sublicensees.

2.3. Acknowledgement of Covenant not to Sue. Sublicensor acknowledges that in a separate Option Agreement, […***…] has granted Sublicensee a covenant not to sue under certain other intellectual property rights in the […***…] portfolio. Sublicensor covenants to take no action to undermine, circumvent, interfere with or frustrate the grant of such rights by […***…] or the maintenance of such rights by Sublicensee.

3. FINANCIAL TERMS

3.1. Sublicense Fees: As consideration for the grant and maintenance of this Agreement, Sublicensee shall pay, and Sublicensor shall accept, a sublicense fee as follows:

3.1.1. $[…***…] within thirty (30) days of the full execution of this Agreement or of the Master License Agreement, whichever is later.

3.1.2. $[…***…] on July 1 of the second Agreement Year.

3.1.3. $[…***…] on July 1 of the third Agreement Year.

3.1.4. $[…***…] on July 1 of the fourth Agreement Year.

3.1.5. $[…***…] on July 1 of the fifth Agreement Year.

3.1.6. $[…***…] on July 1 of each subsequent Agreement Year, if the term of this Agreement is extended to include such Agreement Year.

3.2. Royalties: Sublicensee agrees to pay to Sublicensor as "earned royalties" a royalty calculated as a percentage of the Selling Price of Products and Services in accordance with the terms and conditions of this Agreement. The royalty is deemed earned as of […***…]. The royalty shall remain fixed while this Agreement is in effect at a rate of […***…] of the Selling Price of Products and Services., with the proviso that a minimum royalty payment ("Minimum Annual Royalty") for each Agreement Year shall be […***…]. In consideration of Sublicensee being an early licensee of the inventions of the Patent Rights, […***…] and Sublicensor agree that […***…] Products sold, leased or otherwise transferred by Sublicensee that are […***…] shall […***…]; provided, however, Sublicensee will report the sale, lease or transfer of such […***…] Products on its […***…], and thereafter, […***…]. For clarity, the foregoing does not apply to any other Product or sublicensee of Sublicensee.

3.3. Antistacking: If Sublicensee is required to pay royalties to one or more independent third parties during any calendar year pursuant to a license or similar right in the absence of which Sublicensee could not legally make, use or sell Products, then the royalty payable hereunder will be reduced by […***…] for each additional […***…] of royalties payable for all of the additional licensing components, to Sublicensor. Notwithstanding the foregoing, in no event shall the royalty due Sublicensor be reduced by more than […***…].

3.4. Royalty Payments: Royalty payments shall be due […***…] following the end of the calendar quarter ending on March 31, June 30, September 30, or December 31, and shall be accompanied by a royalty report indicating each Licensed Product and Net Sales for such Licensed Product, including the basis for calculating the royalty.

3.5. Late Payments: The balance of any amounts owed to Sublicensor under this Agreement which remain unpaid more than […***…] after they are due to Sublicensor shall accrue interest until paid at the rate of the lesser of […***…] per month or the maximum amount allowed under applicable law. However, in no event shall this interest provision be construed as a grant of permission for any payment delays.

3.6. Records: Sublicensee agrees to keep […***…] records to enable the ready determination of Net Sales and any antistacking reduction in royalty pursuant to Section

3.3, and to provide such records within […***…] of request by […***…] or Sublicensor for inspection by a certified public accountant designated by Sublicensor or […***…], in the United States during Sublicensee's regular business hours and at […***…]'s or Sublicensor's expense, but no more often than once per Agreement Year. If Sublicensee has claimed an antistacking reduction in royalty pursuant to Section 3.3, certain underlying documentation will be revealed to the certified public accountant in confidence, but the certified public accountant shall not disclose the details revealed in such underlying documentation to Sublicensor, but only conclusions drawn therefrom. In the event an examination of Sublicensee's records reveals an underpayment of the lesser of […***…] or […***…] of the accurate amounts due hereunder, Sublicensee shall pay all reasonable charges of the certified public accountant for the examination of records, in addition to paying the balance due within […***…], plus interest thereon as set forth above. Sublicensee agrees to maintain the records required hereunder for […***…] after the last royalty period to which the records refer.

3.7. Currency: All payments to be made under this Agreement shall be made in U.S. dollars.

4. TERM & TERMINATION

4.1. Unless otherwise terminated under any other provision of this Agreement, this Agreement shall expire on the earlier of the end of the fifth (5th) Agreement Year or upon the termination of the Master License Agreement.

4.2. So long as the Master License Agreement is not terminated, Sublicensee may extend the termination date under Section 4.1 in one year increments by making payment of the Sublicense Fee in Section 3.1.6 on or before July 1 of each subsequent Agreement Year, but in no event shall the termination date extend beyond the expiration or lapse of the Patent Rights.

4.3. Sublicensee may terminate this Agreement at any time after the end of the fifth Agreement Year, with or without cause, by providing ninety (90) days prior written notice to Sublicensor.

4.4. Either party may terminate this Agreement in the event of: (i) an uncured material breach by the other party of a specified obligation or warranty under the Agreement and only upon sixty (60) days notice; or (ii) the other party is adjudged bankrupt, or subject to appointment of a receiver or trustee in bankruptcy, becomes insolvent, or makes an assignment for the benefit of creditors.

4.5. If a party (the "breaching party") at any time fails to observe or perform any of the material terms of this Agreement, including but not limited to, the obligations to make any payment or royalty, the other party may make written demand that the breaching party remedy any such failure. If the breaching party does not remedy any such failure within ninety (90) days following the other party's demand, the other party by written notice may, at its option, terminate this Agreement. Upon timely remedy of a breach by either party, the Agreement shall remain in full force and effect. If a party believes it has fully cured a noticed breach, but the extent of cure is subject to a bona fide dispute by the other non-breaching party, then the dispute shall be subjected to dispute resolution hereunder.

4.6. Upon termination or expiration of the Agreement, duties and obligations incurred under the Agreement prior to termination shall survive termination. Obligations of royalty payments, as well as causes of action or claims arising out of a breach or default under this Agreement, shall all survive termination. Sublicensee shall make a final accounting and royalty payment to Sublicensor within thirty (30) days of the termination or expiration of this Agreement.

5. MUTUAL INDEMNIFICATION

5.1. Sublicensee's Right to Indemnification. Sublicensor shall indemnify, defend, and hold harmless Sublicensee and its Affiliates, and their respective employees, officers, independent contractors, consultants, or agents, and their respective successors, heirs and assigns and representatives (the "Sublicensee lndemnitees"), from and against any and all Third Party claims, threatened claims, damages, losses, suits, proceedings, liabilities, costs (including reasonable legal expenses, costs of litigation, and reasonable attorney's fees) or judgments, whether for money or equitable relief, of any kind (Losses and Claims), to the extent arising out of or relating to, directly or indirectly: (a) the negligence, recklessness, or wrongful intentional acts or omissions of Sublicensor, its Affiliates and its or their respective employees, officers, independent contractors, consultants, or agents, in connection with Sublicensor's performance of its obligations or exercise of its rights under this Agreement; and (b) any breach by Sublicensor of any representation, warranty, covenant, or obligation set forth in this Agreement; except in any such case for Losses and Claims to the extent reasonably attributable to any recklessness, willful misconduct, or breach of this Agreement by Sublicensee or a Sublicensee lndemnitee, or (c) resulting from Sublicensor's production, manufacture, sale, use, lease, consumption or advertisement of Products and Services arising from any right or obligation of Sublicensor under the Master License Agreement.

5.2. Sublicensor's Right to Indemnification. Sublicensee shall indemnify, defend, and hold harmless Sublicensor and its Affiliates, and their respective employees, officers, and their respective successors, heirs and assigns and representatives (the "Sublicensor lndemnitees"), from and against any and all Third Party claims, threatened claims, damages, losses, suits, proceedings, liabilities, costs (including reasonable legal expenses, costs of litigation, and reasonable attorney's fees) or judgments, whether for money or equitable relief, of any kind (Losses and Claims), to the extent arising out of or relating to, directly or indirectly: (a) the negligence, recklessness, or wrongful intentional acts or omissions of Sublicensee, its Affiliates and its or their respective employees, officers, independent contractors, consultants, or agents, in connection with Sublicensee's performance of its obligations or exercise of its rights under this Agreement; and (b) any breach by Sublicensee of any representation, warranty, covenant, or obligation set forth in this Agreement; except in any such case for Losses and Claims to the extent reasonably attributable to any recklessness, willful misconduct, or breach of this Agreement by Sublicensor or a Sublicensor lndemnitee; or (c) resulting from Sublicensee's production, manufacture, sale, use, lease, consumption or advertisement of Products and Services arising from any right or obligation of Sublicensee hereunder.

5.3. Process for Indemnification. A party's obligation to defend, indemnify and hold harmless the other party under this Section 5 (Mutual Indemnification) shall be conditioned upon the following:

(a) A party seeking indemnification under this Section 5 (the "lndemnitee") shall give prompt written notice of the claim to the other party (the "lndemnitor").

(b) Each party shall promptly to the other party copies of all papers and official documents received in respect of any Losses and Claims. The lndemnitee shall cooperate as requested by the lndemnitor in the defense against any Losses and Claims.

(c) The lndemnitor shall have the right to assume and control the defense of the indemnification claim at its own expense with counsel selected by the lndemnitor and reasonably acceptable to the lndemnitee; provided, however, that an lndemnitee shall have the right to retain its own counsel, with the fees and expenses to be paid by the lndemnitee, if representation of such lndemnitee by the counsel retained by the lndemnitor would be inappropriate due to actual or potential differing interests between such lndemnitee and any other party represented by such counsel in such proceedings. If the lndemnitor does not assume the defense of the indemnification claim as described in this Section 5.3(c), the lndemnitee may defend the indemnification claim but shall have no obligation to do so. The lndemnitee shall not settle or compromise the indemnification claim without the prior written consent of the lndemnitor, and the lndemnitor shall not

settle or compromise the indemnification claim in any manner which would have an adverse effect on the lndemnitee's interests (including any rights under this Agreement or the scope or enforceability of the Patent Rights or Confidential Information or other rights licensed to Sublicensee by Sublicensor hereunder), without the prior written consent of the lndemnitee, which consent, in each case, shall not be unreasonably withheld, delayed, or conditioned. The lndemnitee shall reasonably cooperate with the lndemnitor at the lndemnitor's expense and shall make available to the lndemnitor all pertinent information under the control of the lndemnitee. The lndemnitor shall not be liable for any settlement or other disposition of Losses and Claims by the lndemnitee which is reached without the written consent of the lndemnitor, which consent shall not be unreasonably withheld, conditioned, or delayed.

6. Insurance.

Licensee warrants that it now maintains and will continue to maintain liability insurance coverage appropriate to the risk involved in marketing the Products and Services subject to this Agreement and that such insurance coverage lists Sublicensor, […***…] and the inventors of the Patent rights as additional insureds. Upon Sublicensor's request, Licensee will present evidence to Sublicensor that such coverage is being maintained.

7. TRANSFER OF RIGHTS

Sublicensee shall have the right to transfer this Agreement to another entity that agrees to be bound by the provisions hereof, with the prior written consent of […***…] and prior written notification to Sublicensor.

8. CONFIDENTIALITY

Confidential information of Sublicensee may be revealed to or ascertained by Sublicensor in the course of Sublicensee performing under this Agreement, including in connection with royalty reports and associated records. "Confidential Information" shall include all information concerning a Sublicensee's business and any other information marked confidential or accompanied by correspondence indicating such information is confidentially exchanged between the parties hereto. Sublicensor agrees to keep confidential any information identified as confidential by Sublicensee, using methods at least as stringent as Sublicensor uses to protect its own confidential information, and not to use any of Sublicensee's Confidential Information to its advantage or Sublicensee's detriment, including but not limited to using such Confidential Information in Sublicensor's patent prosecution. In like manner, Sublicensee and its employees shall maintain in confidence the terms of the Master License Agreement. The confidentiality and nonuse obligations set forth above apply to all or any part of the Confidential Information disclosed hereunder except to the extent that:

8.1. Sublicensor can show by written record that it possessed the information prior to its receipt from Sublicensee;

8.2. the information was already available to the public or became so through no fault of Sublicensor;

8.3. the information is subsequently publicly disclosed by Sublicensee or by a third party that has the right to disclose it free of any obligations of confidentiality;

8.4. the information is required by law, rule, regulation or judicial process to be disclosed (if such requirement arises, Sublicensor will, prior to any such disclosure, promptly notify Sublicensee and provide assistance in any reasonable effort to obtain confidential treatment with respect to such disclosure); or

8.5. […***…] years have elapsed from the termination of this Agreement.

9. RIGHTS IN BANKRUPTCY.

All rights and licenses granted under or pursuant to this Agreement by Sublicensor are, and shall otherwise be deemed to be, for purposes of Section 365(n) of the United States Bankruptcy Code, licenses of right to "intellectual property" as defined under Section 91 of the United States Bankruptcy Code or any applicable foreign equivalent thereof. The parties agree that the Sublicensee, as a licensee of such rights under this Agreement, shall retain and may fully exercise all of its rights and elections under the United States Bankruptcy Code.

10. RESOLUTION OF DISPUTES

10.1. Informal Dispute Resolution. The parties shall attempt, whenever possible, to discuss and resolve any Disputes on an informal basis,. A party invoking these dispute resolution procedures shall deliver a notice to the other party (a "Dispute Notice") of the claims it intends to bring and the relief sought, including sufficient details regarding the factual, contractual or other legal bases for the party's claim as reasonably required to enable the party receiving the Dispute Notice to evaluate the claim and respond thereto.

Upon receipt of a Dispute Notice, the receiving party, if it so desires, shall have fifteen (15) days in which to deliver its own Dispute Notice to the first party, responding to the first Dispute Notice and specifying additional Disputes, if any, to be resolved. After the second Dispute Notice is delivered or upon expiration of the fifteen (15) day period therefor, whichever occurs first (the "Dispute Notification Deadline"), the parties shall promptly schedule one or more meetings to discuss and attempt in good faith to resolve all Disputes described in the Dispute Notice(s). Such meetings shall be attended by the parties or their representatives with full authority to settle the Disputes at issue.

11. CONTEST OF VALIDITY

11.1. Sublicensee shall provide […***…] at least […***…] prior written notice before filing any action that contests the validity of any Patent Rights during the term of this Agreement.

11.2. In the event that Sublicensee files any action contesting the validity of any Patent Rights, Sublicensee shall pay a royalty rate of […***…] specified in Section 3.2 or 3.3 of this Agreement, as applicable, for all Products and Services sold during the pendency of such action. Moreover, should the outcome of such contest determine that any claim of the Patent Rights challenged is valid and would be infringed by a Licensed Product sold by

Sublicensee, if not for the Sublicensee granted by this Agreement, Sublicensee shall thereafter, for the remaining term of this Agreement, pay a royalty rate of […***…] specified in Section 3.2. or 3.3 of this Agreement, as applicable.

11.3. In the event that Sublicensee contests the validity of any Patent Rights during the term of this Agreement, Sublicensee agrees to pay to Sublicensor all royalties due under this Agreement during the period of the challenge. For the sake of clarity, such amounts shall not be paid into any escrow or other account, but directly to Sublicensor, and shall not be refunded.

12. PATENT MARKING

Sublicensee shall mark all Products and Services or packaging thereof with the appropriate patent number reference in compliance with the requirements of 35 U.S.C. §287.

13. USE OF NAMES

Sublicensee shall not use […***…]'s or Sublicensor's name, the name of any inventor of the Patent Rights, or the name of the […***…] in sales promotion, advertising, or any other form of publicity without the prior written approval of the entity or person whose name is being used.

14. IMPROVEMENTS

14.1. Sublicensee hereby grants to […***…] a nonexclusive, royalty-free, irrevocable, paid-up license, with the right to grant sublicenses to non-profit research institutions and governmental agencies, to practice and use "Improvements" for Non-Commercial Research Purposes. "Improvements" shall mean any patented modification of an invention claimed in the Patent Rights, invented by Sublicensee during the term of this Agreement, that (1) would be infringed by the practice of an invention claimed in the Patent Rights; or (2) if not for the license granted under this Agreement, would infringe one or more claims of the Patent Rights

14.2. In the event that Sublicensee discontinues use or commercialization of the Improvements, Sublicensee shall grant […***…] an option to obtain a nonexclusive, royalty-bearing license, with the right to grant sublicenses, to practice and use said Improvements for commercial purposes; except for Improvements (1) that would not necessarily be infringed by practicing an invention claimed in the Patent Rights or (2) that are capable of substantial noninfringing use. The scope of a sublicensee's obligation relating to Improvements shall be limited to the claims actually licensed to that sublicensee. Licensee shall provide […***…] with written notice that Licensee and its sublicensee(s) intend to discontinue such use or commercialization immediately upon making a decision. […***…]'s option with respect to each Improvement shall expire […***…] after […***…]'s receipt of said written notice from Licensee. The failure of […***…] to timely exercise its option under this paragraph shall be deemed a waiver of […***…]'s option, but only with respect to the Improvements so disclosed.

15. REPRESENTATIONS AND WARRANTIES

15.1. The Parties' Representations and Warranties. Each party hereby represents and warrants to the other party, as of the Effective Date, as set forth below:

15.1.1. Such party (a) is a corporation duly organized and subsisting under the laws of its jurisdiction of organization, and (b) has full power and authority and the legal right to own and operate its property and assets and to carry on its business as it is now being conducted and as it is contemplated to be conducted by this Agreement.

*****Confidential Treatment Requested**

15.1.2. Such party has the power, authority and legal right, and is free to enter into this Agreement and, in so doing, will not violate any other agreement to which such party is a party as of the Effective Date, or conflict with the rights granted to any Third Party.

15.1.3. This Agreement has been duly executed and delivered on behalf of such party and constitutes a legal, valid, and binding obligation of such party and is enforceable against it in accordance with its terms, subject to the effects of bankruptcy, insolvency, or other laws of general application affecting the enforcement of creditor rights and judicial principles affecting the availability of specific performance and general principles of equity.

15.1.4. Such party has taken all corporate action necessary to authorize the execution and delivery of this Agreement.

15.1.5. The execution and delivery of this Agreement and the performance of such party's obligations hereunder (i) do not conflict with or violate any requirement of applicable laws or any provision of the articles of incorporation, bylaws, limited partnership agreement, or any similar instrument of such party, as applicable, in any material way, and (ii) do not conflict with, violate, or breach or constitute a default or require any consent under, any applicable laws or any contractual obligation or court or administrative order by which such party is bound.

15.1.6. The parties acknowledge that […***…] makes no representations, extends no warranties of any kind, either express or implied, and assumes no responsibilities whatsoever with respect to the use, sale, or other disposition by Sublicensee or its vendees or other transferees of Products and Services incorporating or made by use of the Patent Rights.

15.2. Sublicensor's Representations, Warranties and Covenants. Sublicensor hereby represents, warrants and covenants to Sublicensee, as set forth below:

15.2.1. It is the licensee of the Patent Rights from […***…] and it possesses all rights necessary to grant the sublicenses contained in this Agreement;

15.2.2. It has not previously granted, and will not grant, any right, license or interest in the Patent Rights, or any portion thereof, inconsistent with the rights and licenses granted to Sublicensee herein;

15.2.3. It is not aware of any pending or threatened litigation, nor has it received any written communications, alleging that that the commercialization of the Products and/or Services or of any compound or product claimed in any Patent Rights would violate any intellectual property or other rights of any Third Party or that the Patent Rights are invalid or unenforceable;

15.2.4. as of the Effective Date, no Third Party has any interest in and to any of the Patent Rights;

16. LIMITATION OF LIABILITY AND EXCLUSION OF DAMAGES; DISCLAIMER OF WARRANTY.

16.1. WITHOUT LIMITING THE PARTIES' OBLIGATIONS UNDER SECTION 14 (REPRESENTATIONS AND WARRANTIES), NEITHER PARTY SHALL BE LIABLE TO THE OTHER PARTY FOR SPECIAL, INDIRECT, INCIDENTAL, PUNITIVE, OR CONSEQUENTIAL DAMAGES (INCLUDING DAMAGES RESULTING FROM LOSS OF USE, LOSS OF PROFITS, INTERRUPTION OR LOSS OF BUSINESS, OR OTHER ECONOMIC LOSS) ARISING OUT OF THIS AGREEMENT OR WITH RESPECT TO A PARTY'S PERFORMANCE OR NON-PERFORMANCE HEREUNDER.

16.2. EXCEPT AS EXPRESSLY PROVIDED IN THIS AGREEMENT, NEITHER PARTY PROVIDES ANY REPRESENTATIONS OR WARRANTIES, WHETHER WRITTEN OR ORAL, EXPRESS OR IMPLIED, REGARDING THE LICENSE PRODUCTS, AND EACH PARTY HEREBY DISCLAIMS ALL OTHER REPRESENTATIONS OR WARRANTIES, WHETHER WRITTEN OR ORAL, EXPRESS AND IMPLIED, INCLUDING THE IMPLIED WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE, AND FREEDOM FROM INFRINGEMENT OF THIRD PARTY RIGHTS. THE PARTIES AGREE THAT SUBLICENSEE IS UNDER NO OBLIGATION TO MAKE ANY EFFORTS TO COMMERCIALIZE OR EXPLOIT THE PATENT RIGHTS, AND SUBLICENSOR EXPLICITLY DISCLAIMS ANY SUCH OBLIGATION.

17. GENERAL PROVISIONS

17.1. Governing Law.

17.1.1. This Agreement shall be governed by and interpreted in accordance with the substantive laws of the State of California, U.S. without regard to its or any other jurisdiction's choice of law rules that would result in the application of the laws of any state other than the State of California, U.S. All questions concerning the construction or effect of patent applications and patents shall be decided in accordance with the laws of the country in which the particular patent application or patent concerned has been filed or granted, as the case may be.

17.1.2. Sublicensor and Sublicensee hereby submit to the exclusive jurisdiction of the state and federal courts located in San Diego, California, U.S. for any action or proceeding arising out of or relating to this Agreement, and Sublicensor and Sublicensee hereby agree that all claims in respect of such action or proceeding may be heard and determined exclusively in any such state or federal court, and the parties hereby irrevocably submit to the exclusive jurisdiction of such courts in any such action or proceeding and irrevocably waive the defense of an inconvenient forum to the maintenance of any such action or proceeding. A final judgment in any action or proceeding shall be conclusive and may be enforced in other jurisdictions by suit on the judgment or in any other manner provided by law.

17.2. Legal Counsel; Cooperation in Drafting. Each party recognizes that this is a legally binding contract and acknowledges and agrees that they have had the opportunity to consult with legal counsel of their choice concerning the legal and practical effects of this Agreement. Each party has cooperated in the drafting, negotiation and preparation of this Agreement. Hence, in any construction to be made of this Agreement, the same shall not be construed against either party on the basis of that party being the drafter of such language.

17.3. Notices. All communications hereunder shall be in writing, electronic mail or by confirmed fax, and shall be deemed to have been duly given (a) upon personal delivery, (b) upon deposit with a recognized courier with next-day delivery instructions, or (c) one (1) business day after sending, if sent by electronic mail and no delivery failure notification has been received; to the address set forth below or such other address as either party may specify by notice sent in accordance with this Section 16.3 ("Notices"):

If to Sublicensor, addressed to: Industry 3200 Inc.

Attn: […***…]
1155 Camino Del Mar #118
Del Mar, CA 92014
Email: […***…]

*****Confidential Treatment Requested**

With a copy to:

CapialP
Attn: […***…]
11011 Torreyana Road
San Diego, CA 92121
Email: […***…]

If to Sublicensee, addressed to:

BioNano Genomics, Inc.
Attention: President
9640 Towne Centre Drive, Suite 100
San Diego, CA 92121

With a copy to:

Knobbe Martens Olson & Bear
Attention: […***…]
12790 El Camino Real
San Diego, CA 92130

11.3. Entire Agreement. This Agreement constitutes the entire agreement among the parties hereto with respect to the subject matter hereof and supersedes all prior agreements and understandings relative thereto. The provisions of this Agreement shall be modified only by an agreement in writing signed by both parties hereto.

11.4. No Waiver. The failure of any party to enforce any of the provisions of this Agreement shall not be construed to be a waiver of the right of such party thereafter to enforce such provisions.

11.5. Binding on Successors. This Agreement shall be binding upon the parties, their affiliates, agents, successors and assigns.

11.6. Severability. In the event any provision of this Agreement is invalid or unenforceable or is prohibited by law, the remaining provisions of this Agreement shall remain in full force and effect, and the remainder of this Agreement shall be valid and binding as though such invalid, unenforceable, or prohibited provision were not included herein.

11.7. Attorneys' Fees. If any legal action or any arbitration or other proceeding is brought for the enforcement of this Agreement, or because of an alleged dispute, breach, default, or misrepresentation in connection with any of the provisions of this Agreement, the successful and/or prevailing party or parties shall be entitled to recover reasonable attorneys' fees and other costs incurred in that action or proceeding, including expert witness fees, in addition to any other relief to which it or they may be entitled.

11.8. Equitable Relief. The parties acknowledge that any breach or violation of the confidentiality terms of this Agreement will result in immediate and irreparable damage to the non-breaching party and that there would be no adequate remedy at law for either party's failure to comply with the terms of this Agreement. Each party acknowledges that the other is entitled to equitable relief, including a preliminary and/or permanent injunction and such other relief as a court with jurisdiction may deem proper, to prohibit any further or continuing breach or failure to comply with the confidentiality terms of this Agreement.

11.9. Headings. The paragraph headings herein are for convenience only and shall not be interpreted to limit or affect in any way the meaning of the language contained herein.

11.10. Confidentiality. This Agreement and the terms thereof shall be treated as confidential information of the parties, and, without the consent of the other two parties, shall not be disclosed to entities that are not party to this Agreement and are not evaluating a party for potential investment or acquisition. A party may disclose the terms of this Agreement, without consent, to entities evaluating a party for potential investment or acquisition, provided that such entities agree to keep the terms of this Agreement confidential.

IN WITNESS WHEREOF, the parties hereto, being authorized to sign on behalf of the entity for which they are signing and with full authority to bind such entity by that signature, have caused this Agreement to be executed as of the date first set forth above. Each copy hereof for all purposes shall be deemed an original.

SUBLICENSOR

By: /s/ Leslie A. Hickle

Printed Name: Leslie A. Hickle

Title: Co-Founder & CBO

Dated: Jan 7, 2014

SUBLICENSEE

By: /s/ R. Erik Holmlin

Printed Name: R. Erik Holmlin

Title: CEO

Dated: 9-Jan-2014

Exhibit 10.32

*****Text Omitted and Filed Separately**
with the Securities and Exchange Commission
Confidential Treatment Requested
Under 17 C.F.R. Sections 200.80(b)(4)
and 230.406

NON-EXCLUSIVE PATENT LICENSE AGREEMENT

This non-exclusive patent license agreement ("**Agreement**"), by and between Q Biotechnology C.V. ("**Licensor**"), a Dutch company with a place of business at Spoorstraat 50, 5911 KJ Venlo, the Netherlands and BioNano Genomics, Inc ("**Licensee**"), a Delaware (USA) corporation with a place of business at 9640 Town Centre Drive, Suite 100, San Diego, CA 92121, USA is made effective as of May 1st, 2014 ("**Effective Date**").

WHEREAS, Licensor is responsible for the out-licensing business of the QIAGEN Group and exploits QIAGEN Group's owned and licensed intellectual property by out-licensing intellectual property including marketing intellectual property rights and product related intellectual property and is authorized to enter into this Agreement; and

WHEREAS, Licensee desires to obtain a license under the Patent Rights upon the terms and conditions set forth herein, and Licensor desires to grant such a license; and

NOW, THEREFORE, in consideration of the foregoing premises and the mutual covenants herein contained, and for other good and valuable consideration, the receipt and sufficiency of which is hereby acknowledged, the Parties hereby agree as follows:

1. DEFINITIONS.

"**Affiliate**" of a Party shall mean any corporation or business entity (i) of which more than fifty percent (50%) or more of the securities or other ownership interests representing the equity, the voting stock or general partnership interests are owned, controlled or held, directly or indirectly, by such Party; (ii) which directly or indirectly, owns, controls or holds more than fifty percent (50%) or more of the securities or other ownership interests representing the equity, the voting stock or, if applicable, the general partnership interests, of such Party; or (iii) of which more than fifty percent (50%) or more of the securities or other ownership interests representing the equity, the voting stock or general partnership interests are owned, controlled or held, directly or indirectly, by a corporation or business entity described in (i) or (ii).

"**Calendar Quarter**" shall mean the respective periods of three (3) consecutive calendar months ending on March 31, June 30, September 30, and December 31.

"**Combined Product**" shall mean combined products consisting of Royalty Product(s) and other products.

"**Commercial Sale**" shall mean the Net Sales invoicing of Royalty Products (hereinafter defined) to a third party.

"**Companion Diagnostic(s)**" and "**Companion Diagnostic use**" as the context requires, shall mean the use of Licensed Technology in Royalty Product(s) as part of a kit, a Laboratory developed Test or FDA-approved assay (or an equivalent approval from foreign regulatory agencies) for measurement, observation or determination of attributes, characteristics, disease, traits or other conditions of human beings *in vitro* with the purpose of predicting the likely clinical effectiveness and/or safety of a particular therapeutic intervention for a specific individual. Companion Diagnostics specifically excludes solely testing for the presence of disease or for disease screening or confirmation.

"**Confidential Information**" shall mean all information received by a Party from the other Party pursuant to this Agreement and any prior signed Non-Disclosure Agreement between the Parties still in effect at the Effective Date.

"**Diagnostic(s)**" and "**Diagnostic use**" as the context requires, shall mean the use of Royalty Product(s) for measurement, observation or determination of attributes, characteristics, disease, traits or other conditions of human beings or animals *in vitro* for diagnostic purposes within the Field whether as part of an FDA-approved assay (or an equivalent approval from foreign regulatory agencies) or under research use.

"**Distributor**" shall mean any distributor, reseller, dealer, sales representative, or authorized service provider, as applicable, of Licensee or its Affiliates that offers to sell or sells Royalty Products in the Territory.

"**Economic End Use**" shall have the meaning given in the definition of Net Sales.

"**Effective Date**" shall have the meaning given in the first paragraph of this Agreement, provided timely payment of all fees due and payable on the Effective Date.

"**Field**" shall mean Genome analysis using nanochannels in the Research Field.

"**First Commercial Sale**" shall mean the first time the Licensee or its Affiliates transfers a Royalty Product to an independent Third Party

"**License Fee**" shall have the meaning given in Section 3.1.

"**Licensed Technology**" shall mean any technology described by a Valid Claim in the Patent Rights.

"**List Price**" shall mean the non-discounted price of a product or service sold by Licensee, its Affiliates or Distributors as listed in a product/service catalog for a bona fide sale made to an end-user in an arms-length transaction.

"**Net Sales**" shall mean […***…] ("Economic End-Use"). For

clarity, […***…] shall not be considered an Economic End Use and no royalty shall be due on Royalty Products used for such purpose. For purposes of calculating Net Sales, […***…]. Under any circumstances, revenue received from the sale or transfers of Royalty Products by Licensee, its Affiliates, or Distributors for an Economic End-Use shall give rise to a […***…] royalty payment to Licensor […***…].

In the case Licensee is unable to account for end-user sales by any distributor, the Net Sales shall be calculated as […***…].

"**OEM Sales**" shall mean sales of Combined Product, of Royalty Product in modified form (e.g. sales under another brand than the Own Company Label).

"**Own Company Label**" shall mean providing on the product or product label only the Licensee's own company name, logo, slogans or brand.

"**Party**" or "**Parties**", as the context requires, shall mean Licensee and/or Licensor.

"**Patent Rights**" shall mean any and all claims in any of the patent applications and/or patents listed in Schedule 1, any foreign equivalents thereof, and any divisions, continuations, continuations-in-part, reissues, renewals, extensions and the like of the foregoing. The Licensor has an exclusive license from the original owner of the Licensed Patents with the right to sub-license granted in a license Agreement dated […***…] (the "**Original License**").

"**Research Field**" shall mean the internal use of Royalty Product(s) by an end-user solely in applications of the end-user in scientific research and development or Research Service, excluding for the avoidance of doubt:

(a) any other commercial use

(b) Diagnostic use

(c) Companion Diagnostic use

"**Research Service**" shall mean the performance of research services under contract for the internal research activities by and for a research institution or university.

"**Royalty Product(s)**", shall mean a kit designed, developed, manufactured, or sold by Licensee or its Affiliates or its Distributors comprising "Licensed Technology" for use in the "Field"; in each case the design, development, manufacture, use, sale, offer for sale, provision, or import of which would be, but for the License, an infringement of a Valid claim of the Patent Rights.

"**Term**" shall have the meaning given in Section 5.1.

"**Territory**" shall mean all of the countries in the world at any given time.

"**Third Party**" shall mean any individual or entity other than Licensee or Licensor or Affiliates of either.

"**Valid claim**" shall mean any claim of an issued and unexpired patent, which patent is included within the Patent Rights, on a country-by-country-basis, which claim has not been held invalid, unpatentable or otherwise unenforceable by a court from which no appeal has or can be taken.

2. GRANT OF RIGHTS.

2.1 License Grant to Licensee.

(a) Subject to the terms and conditions of this Agreement, Licensor hereby grants to Licensee and its Affiliates on the Effective Date, a non-exclusive, royalty-bearing, non-sublicenseable (except for end-user licenses), and non-transferable license to make, have made, sell, have sold, use and import the Royalty Product(s) within the Field in the Territory solely under Licensee's Own Company Label. Licensee and Affiliates shall affix to each particular Royalty Product and to no other products, either on a product insert accompanying the product or on the product itself, the applicable notices to purchasers described in Schedule 2.

(b) Upon payment of the Diagnostic Use Option Fee (as defined in section 3.3 below), Licensor shall grant to Licensee and its Affiliates a non-exclusive, royalty-bearing, non-sublicenseable (except for end-user licenses), and non-transferable license to extend the license grant of section 2.1 (a) to cover Diagnostic Use. Licensee and Affiliates shall affix to each particular Royalty Product and to no other products, either on a product insert accompanying the product or on the product itself, the applicable notices to purchasers described in Schedule 3.

(c) Upon payment of the Companion Diagnostic Use Option Fee (as defined in section 3.4 below), Licensor shall grant to Licensee and its Affiliates a non-exclusive, royalty-bearing, non-sublicenseable (except for end-user licenses), and non-transferable license to extend the license grant of section 2.1 (a) to cover Companion Diagnostic Use. Licensee and Affiliates shall affix to each particular Royalty Product and to no other products, either on a product insert accompanying the product or on the product itself, the applicable notices to purchasers described in Schedule 4. [...***...].

2.2 Distributors. Notwithstanding the foregoing, Licensee may sell Royalty Product(s) to end users through distributors of Licensee and of its Affiliates, as long as Licensee reports and pays royalties on the Net Sales of such Royalty Product sales to end users.

2.3 Exclusion of OEM Sales. The License under Section 2.1 does not include the right for Licensee to make, sell, have sold, use and import the Royalty Product(s) in connection with OEM Sales.

2.4 Reporting of Unlicensed Activities. Licensee agrees that once it is notified by Licensor that, or once it independently becomes aware that, a particular purchaser is using or intends to use any Royalty Product(s) other than as permitted hereunder, Licensee shall immediately notify said purchaser in writing that such use is unlicensed and that a license for said use must be obtained from Licensor. Licensee shall also require sublicensed Affiliates, and Distributors to report to Licensor any unlicensed activities of which they become aware. Licensee

further agrees that continued or resumed sales by Licensee, a sublicensed Affiliate, or a Distributor, to a particular purchaser of which Licensee was previously notified or is otherwise aware is violating Patent Rights shall constitute a breach under Section 5.2 (b) of the Agreement. A written certification by a Distributor or purchaser which is executed by an officer of said Distributor or purchaser which officer may legally bind the company, that it has ceased infringing the Patent Rights, and/or, alternatively, that it does not infringe said Patent Rights, or a written certification by Licensee which is executed by an officer of Licensee which officer may legally bind Licensee that sales to such Distributor or purchaser have ceased, shall be a cure under Section 5.2. (b) Licensee shall provide to Licensor a copy of each of its notices to Customers pursuant to this Section.

2.5 No Implied Rights. This Agreement shall not provide either Party with any rights except those expressly granted herein. Licensor shall retain title to the Licensed Technology. This Agreement shall not be construed as a sale, lease, loan, assignment, or transfer of Licensor's intellectual property rights. The License does not permit Licensee, its Affiliates, Distributors, nor Manufacturers to sell, lease, assign, or otherwise transfer the rights granted under this Agreement to anybody.

3. LICENSE AND MILESTONE FEES.

3.1 License Fee. In consideration for the non-exclusive license described in Section 2.1 Licensee shall pay to Licensor a non-refundable, non-creditable fee in the amount of US Dollars […***…] (the "**License Fee**"). The License Fee shall be paid within […***…] after the Effective Date.

3.2 Milestone Fees.

(a) For the commercial launch of the first Royalty Product Licensee shall pay to Licensor a non-refundable, non-creditable milestone fee in the amount of US Dollars […***…]. The milestone shall be paid within […***…] days after the commercial launch.

(b) For the commercial launch of the first Royalty Product that provides insights to human genetic information Licensee shall pay to Licensor a non-refundable, non-creditable milestone fee in the amount of US Dollars […***…]. The milestone shall be paid within […***…] after the commercial launch.

3.3 Diagnostic Use Option. In consideration for the non-exclusive license described in Section 2.1 Licensee shall pay to Licensor […***…] fee in the amount of US Dollars […***…] (the "**Diagnostic Use Option Fee**"). US Dollars […***…] of such fee shall be paid within […***…] after the exercising the option and the remaining US Dollars […***…] shall be paid within […***…] after the First Commercial Sale of the first Royalty Product for "Diagnostic Use"

3.4 Companion Diagnostic Use Option. In consideration for the non-exclusive license described in Section 2.1 Licensee shall pay to Licensor a non-refundable, non-creditable

fee in the amount of US Dollars […***…] (the "Companion Diagnostic Use Option Fee"). US Dollars […***…] of such fee shall be paid within […***…] days after the exercising the option and the remaining US Dollars […***…] shall be paid within […***…] after the First Commercial Sale of the first Royalty Product for "Companion Diagnostic Use"

4. ROYALTIES.

4.1 Royalties.

(a) Running Royalty. As consideration for the grant of the License, Licensee shall pay to Licensor a royalty of […***…] of any and all Net Sales of Royalty Products.

(b) Withholding Tax. Any payments made by Licensee to Licensor under this Agreement shall be free and clear of any taxes, duties, levies, fees or charges, and such amounts shall be reduced by the amount required to be paid or withheld pursuant to any applicable law ("**Withholding Taxes**"). Any such Withholding Taxes required by law to be paid or withheld shall be an expense of, and borne solely by, Licensor. Licensee, as applicable, shall submit to Licensor reasonable proof of payment of the Withholding Taxes, together with an accounting of the calculations of such taxes, within […***…] after such Withholding Taxes are remitted to the proper authority. The Parties will cooperate reasonably in completing and filing documents required under the provisions of any applicable tax laws or under any other applicable law in connection with the making of any required tax payment or withholding payment, or in connection with any claim to a refund of or credit for any such payment.

(c) Payment terms. Royalties shall be payable within […***…] after the end of the Calendar Quarter in which Royalty Products were sold by Licensee, its Distributors and/or any Third Party. Licensee shall make royalty payments to Licensor in US Dollar (USD).

4.2 Royalty Reports. Commencing with respect to the Calendar Quarter in which the sale of the first unit of or provision of the first service component of Royalty Products takes place, and continuing throughout the Term, Licensee shall furnish to Licensor a written report for each Calendar Quarter showing (a) the number of units of Royalty Products sold or amount of services of Royalty Products provided by Licensee or its Affiliates (or treated as sold or provided under this Agreement or transferred to a Distributor for sale) during the Calendar Quarter, total gross invoice or total sales price (as applicable), and Net Sales by country in the local currency with conversion into US Dollar. The exchange rates employed must be those quoted by a reputable, nationally recognized source, such as a recognized money center bank such as JP Morgan, Bank of America or an equivalent, OANDA.com, or the Wall Street Journal. Exchange rates and the sources employed shall be included with the royalty report; (b) the amount of the royalties payable under this Agreement; and (c) if the […***…] approach is applied (identified in the "Net Sales" definition), then in reasonable detail, the calculation or formula used to determine the fair market value of the Royalty Products for the given Calendar Quarter. The sales information for Licensee's Affiliates shall be set out separately for each Affiliate by name of each such entity. Reports shall be due within […***…] after the end of the Calendar Quarter being reported. Licensee shall keep complete and accurate records in sufficient detail to enable the royalties payable hereunder to be determined, and Licensee shall retain the records for a period of […***…] from the date a royalty report is provided to Licensor.

4.3 Audits.

(a) Independent Auditor. Upon Licensor's written request, Licensee shall permit an independent certified public accounting firm of nationally recognized standing and/or an attorney selected by Licensor to have access during normal business hours to such of the records of Licensee or its Affiliates as may be reasonably necessary to verify the accuracy of the royalty reports hereunder. If requested by Licensor, Licensee shall make such records available at the premises of Licensee. Such audit will be conducted by an auditor and/or attorney that will be obligated to keep confidential Licensee's and its Affiliates' financial records and other information. The amounts charged by such accounting firm and/or attorney in connection with such audit shall be borne by Licensor unless a discrepancy as described in Section 4.3(b) is found. Professional advisors shall have a right to examine all materials, data, and information collected by or generated by the accountant and/or attorney during the course of their review, but only as may be relevant for the purpose of verifying the accuracy of amounts owed and paid under this Agreement. On request Licensor shall make a copy of the report available to Licensee. Licensor shall be able to use this information for the purpose of recovering any funds due under this Agreement, either in a negotiation, an alternative dispute resolution proceeding, or a court proceeding.

(b) Discrepancy; Interest.

(i) Discrepancy. If such accounting firm and/or attorney identifies a discrepancy in Licensor's favor during such period, i.e., Licensee has underpaid a royalty owed to Licensor, Licensee shall make payment to Licensor in the amount of such discrepancy, plus interest as calculated in Section 4.3(b)(ii), within […***…] of the date Licensor delivers to Licensee such accounting firm's or attorney's written report, or as otherwise mutually agreed by the Parties. In the event of such discrepancy of more than […***…] of the royalty due in Licensor's favor and subject to a minimum amount of US Dollar […***…] in royalties, Licensee will pay the costs of the audit within […***…] of receipt from Licensor of a copy of the invoice for such audit from the accounting firm.

(ii) Interest on Late Royalty. In the event that Licensee owes a royalty to Licensor under Section 4.3(b)(i), interest at the rate of […***…] above the interest rate of the European Central Bank ("**base rate**") or such lesser rate that is the maximum rate allowable under applicable law) from the due date until the date of full payment thereof shall be added to the discrepancy owed by Licensee to Licensor.

4.4 Payments.

Transactions from Licensee to Licensor under this Agreement shall be made by wire transfer to:

BANK NAME: […***…]

BENEFICIARY NAME: […***…]

IBAN: […***…]

BIC: […***…]

5. TERM AND TERMINATION.

5.1 Term. This license is granted to Licensee as of the Effective Date and will expire upon the expiration of the last to expire of the patents within Patent Rights, unless terminated earlier in accordance with this Agreement, in which case the period of the term shall end at the date of termination.

5.2 Termination by Licensor. Licensor may terminate this Agreement as follows:

(a) Insolvency. Upon thirty (30) days written notice if, at any time, Licensee shall file a petition for bankruptcy or insolvency or similar procedure, or if Licensee shall be served with an involuntary petition for bankruptcy or the like against it, filed in any insolvency proceeding, or if Licensee shall propose or be a party of any dissolution or liquidation procedure.

(b) Breach. Upon any material breach or default under this Agreement by Licensee or an Affiliate sublicensed by Licensee, including the failure to pay any money owed under this Agreement, this Agreement may be terminated by Licensor upon thirty (30) days written notice to Licensee. Said notice shall become effective at the end of the thirty-day period, unless during said period Licensee fully cures such breach or default and notifies Licensor of such cure.

(c) Change of Control. Immediately upon a change in control of Licensee (control means the holding of greater than fifty percent (50%) of (i) the capital and/or (ii) the voting rights and/or (iii) the right to elect or appoint directors) without the prior written consent of Licensor, which consent may be withheld at Licensor's sole discretion with the exception to a one-time event as agreed in section 8.1. Failure by Licensor to respond, within thirty (30) calendar days of receipt of a written request for consent to a change in control shall be deemed consent by Licensor. For the purpose of clarification, any internal restructuring measures within the corporate group of Licensee, or a public offering of its stock, or trading in its stock subsequent to a public offering, resulting in a change in control shall not entitle Licensor to a termination hereunder nor trigger the assignment fee in section 8.1.

(e) Loss of disposal rights regarding Licensed Patents. Upon the termination of the Original License for whatever reason and the resulting loss of disposal rights of Licensor regarding the Licensed Patents, this Agreement may be terminated by Licensor upon thirty (30) days written notice to Licensee.

5.3 Termination by Licensee. Licensee may terminate this Agreement as follows:

(a) Notice. Licensee may terminate the Agreement upon ninety (90) days written notice to Licensor.

5.4 Consequences of Termination

(a) Upon termination of this Agreement as provided herein, Licensee shall stop, and shall cause its Affiliates to stop, selling Royalty Products and all rights and licenses granted to Licensee by Licensor hereunder and all sublicenses granted by Licensee shall automatically terminate. Notwithstanding the foregoing, and upon termination of this Agreement for reasons other than pursuant to either of Sections 5.3, Licensee and its Affiliates shall have the right to continue selling, for a period of time not to exceed […***…] following the effective date of termination of this Agreement, those Royalty Products manufactured prior to the effective date of termination of this Agreement.

(b) Licensee's obligations to report to Licensor and to pay royalties as to the sale of Licensed Product hereunder pursuant to the Agreement prior to termination or expiration of the Agreement shall survive such termination or expiration.

(c) In the event of any termination of this Agreement, Licensee shall within […***…] of said termination, provide a written notice on the area(s) of its website pertaining to Licensed Products that Licensee is no longer licensed under Patent Rights.

6. ENFORCEMENT OF PATENTS.

6.1 Licensee shall advise Licensor promptly upon its becoming aware of infringement by a third party or parties of a patent within Patent Rights in the Territory. All decisions and rights to enforce Patent Rights against infringing third parties reside with Licensor, and nothing in this Agreement shall be construed to require Licensor to take any action to address any infringement or potential infringement or to otherwise enforce the Patent Rights.

7. CONFIDENTIALITY; PUBLICITY

7.1 Each Party shall (i) maintain the terms of this Agreement and any information exchanged in connection with this Agreement ("**Confidential Information**") in confidence during and for a period of […***…] after the termination or expiration of this Agreement, (ii) shall limit dissemination to those of its and its Affiliates' employees who require such Confidential Information in order to perform this Agreement and (iii) shall not disclose such Confidential Information to any other person or entity, and (iv) shall use such Confidential Information only to the extent necessary to perform this Agreement. Notwithstanding any other provision of this Agreement, Confidential Information shall not include any item of information which: (a) is within the public domain prior to the time of the disclosure by the disclosing Party or thereafter becomes within the public domain other than as a result of disclosure by the receiving Party or any of its representatives in violation of this Agreement; (b) was, on or before the date of disclosure in the possession of the receiving Party, as evidenced by records, however maintained; (c) is acquired by the receiving Party from a third party having the right to disclose without burden of confidentiality; (d) is hereafter independently developed by the receiving Party, as evidenced by records, however maintained; or (e) the receiving Party is required to disclose by law or by any administrative agency or is compelled to disclose by order of a court of competent jurisdiction, provided that such disclosure is subject to all applicable governmental or judicial protection available for like material and reasonable advance notice is given to the other Party.

8. ASSIGNMENT/TRANSFERABILITY.

8.1 Assignment by Licensee. The rights to be granted hereunder are specific to Licensee and shall not be assigned, sublicensed, or otherwise transferred by Licensee to any other party, without the prior written consent by Licensor. However, Licensor consents to a one-time assignment by Licensee if Licensee merges, consolidates, or transfers all or substantially all of its assets to a Third Party during the Term of this Agreement, which assignment shall be subject to a one-time assignment fee of US Dollar […***…] paid by Licensee to Licensor.

8.2 Assignment by Licensor. Licensor may assign all or any part of its rights and obligations under this Agreement at any time without the consent of Licensee. Licensee agrees to execute such further acknowledgments or other instruments as Licensor may reasonably request in connection with such assignment.

9. REPRESENTATIONS; WARRANTIES; NEGATION OF WARRANTIES.

Licensor represents and warrants that:

(a) Licensor is not aware that any third party is misappropriating, infringing, diluting, or violating the Patent Rights and no such claims have been brought against any third party by the Licensor.

(b) No patent or patent application under the Patent Rights is involved in any interference, reissue, re-examination or opposition proceeding and no such action has been threatened with respect to any such patent or patent application.

(c) Except for the representations and warranties provided in this Section 9, or otherwise expressly provided in this Agreement, Licensor makes no representations and warranties of any kind or any nature, whether expressed or implied and declines any liability therefrom. In particular Licensor does neither warrant freedom to operate under third-party intellectual property nor that no other intellectual property may be necessary to fully commercialize the Royalty Products in the Territory.

10. GENERAL.

10.1 Governing Law. This Agreement shall be governed by and interpreted in accordance with the laws of Germany, excluding the provisions of conflicts of laws. Any disputes arising out of or in connection with this Agreement shall be settled by the competent court at Düsseldorf, except as to any issue which depends upon the validity, scope or enforceability of any patent within Patent Rights which issue shall be determined in accordance with the laws of the territory in which such Patent Rights exist.

10.2 Severability. Should any provision of this Agreement be or become invalid, ineffective or unenforceable as a whole or in part, the validity, effectiveness and enforceability of the remaining provisions shall not be affected thereby. Any such invalid, ineffective or unenforceable provision shall, to the extent permitted by law, be deemed replaced by such valid,

effective and enforceable provision as comes closest to the economic intent and purpose of such invalid, ineffective or unenforceable provision. The aforesaid shall apply mutatis mutandis to any gap in this Agreement.

10.3 No Waiver of Rights. No failure or delay on the part of either Party in the exercise of any power or right hereunder shall operate as a waiver thereof. No single or partial exercise of any right or power hereunder shall operate as a waiver of such right or of any other right or power. The waiver by any Party of a breach of any provision of this Agreement shall not operate or be construed as a waiver of any other or subsequent breach hereunder.

10.4 Survival. Sections 7, 9 and 10 shall survive any termination or expiration of the Agreement.

10.5 Amendments. Any changes or modifications of this Agreement, including a waiver of the written form, must be made in writing.

10.6 Notices. Any notice to be given under this Agreement must be in writing and delivered either in person, by any method of mail (postage prepaid) requiring return receipt, by nationally recognized overnight courier requiring signature upon delivery, or by facsimile confirmed thereafter by any of the foregoing methods, to the Party to be notified at its address(es) given below, or at any address any such Party has previously designated by prior written notice to the other Party. Notice shall be deemed sufficiently given for all purposes upon date of actual receipt.

(a) **If to Licensor**

Q Biotechnology C.V.
Attn: Sebastian Swienty
Spoorstraat 50
5911 KJ Venlo
Netherlands

With copy to:
QIAGEN GmbH
Attn: Legal Department
QIAGEN Straße 1
40724 Hilden
Germany

If to Licensee
BioNano Genomics, Inc.
9640 Towne Centre Drive, Suite 100
San Diego, CA 92121
Attention: Erik Holmlin
Facsimile: +1(858)888 7601

IN WITNESS WHEREOF, the Parties have executed this Agreement as of the Effective Date.

Q BIOTECHNOLOGY C.V.

By /s/ Dr. Juergen N. Schneider

Dr. Juergen N. Schneider
(Printed Name)

Managing Director
(Title)

BIONANO GENOMICS, INC.

By /s/ R. Erik Holmlin

R. Erik Holmlin
(Printed Name)

CEO
(Title)

Schedule 1 Patent Rights

[…***…]

Docket Number	Status	Application Number	Application Date	Patent Number	Grant Date	Expiration Date
[…***…]	[…***…]	[…***…]	[…***…]	[…***…]	[…***…]	[…***…]
[…***…]	[…***…]	[…***…]	[…***…]	[…***…]	[…***…]	[…***…]
[…***…]	[…***…]	[…***…]	[…***…]	[…***…]	[…***…]	[…***…]
[…***…]	[…***…]	[…***…]	[…***…]	[…***…]	[…***…]	[…***…]
[…***…]	[…***…]	[…***…]	[…***…]			[…***…]
[…***…]	[…***…]	[…***…]	[…***…]	[…***…]	[…***…]	[…***…]
[…***…]	[…***…]	[…***…]	[…***…]			[…***…]
[…***…]	[…***…]	[…***…]	[…***…]	[…***…]	[…***…]	[…***…]

*****Confidential Treatment Requested**

Schedule 2 Product Marketing

NOTICE TO PURCHASER: LIMITED LICENSE

THE USE OF THIS PRODUCT FOR RESEARCH PURPOSES IS COVERED BY A LICENSE FROM QIAGEN GROUP. NO RIGHTS TO USE THIS PRODUCT TO PERFORM OR OFFER DIAGNOSTIC, COMPANION DIAGNOSTIC, COMMERCIAL TESTING OR OTHER COMMERCIAL SERVICES FOR MONEY OR MONEY'S WORTH ARE GRANTED BY THE SUPPLY OF THIS PRODUCT EXPRESSLY, BY IMPLICATION OR BY ESTOPPEL.

SHOULD YOU WISH TO USE THIS PRODUCT FOR ANY OTHER PURPOSE NOT COVERED BY THIS LICENSE, PLEASE CONTACT OIAGEN CORPORATE BUSINESS DEVELOPMENT AT BD@QIAGEN.COM.

Schedule 3 Product Marketing

NOTICE TO PURCHASER: LIMITED LICENSE

THE USE OF THIS PRODUCT FOR DIAGNOSTIC PURPOSES IS COVERED BY A LICENSE FROM QIAGEN GROUP. NO RIGHTS TO USE THIS PRODUCT TO PERFORM OR OFFER COMPANION DIAGNOSTIC TESTING ARE GRANTED BY THE SUPPLY OF THIS PRODUCT EXPRESSLY, BY IMPLICATION OR BY ESTOPPEL.

SHOULD YOU WISH TO USE THIS PRODUCT FOR ANY OTHER PURPOSE NOT COVERED BY THIS LICENSE, PLEASE CONTACT QIAGEN CORPORATE BUSINESS DEVELOPMENT AT BD@QIAGEN.COM.

Schedule 4 Product Marketing

THE USE OF THIS PRODUCT IS COVERED BY A LICENSE FROM QIAGEN GROUP. FOR FURTHER INFORMATION PLEASE CONTACT QIAGEN CORPORATE BUSINESS DEVELOPMENT AT BD@QIAGEN.COM.

Exhibit 10.33

*****Text Omitted and Filed Separately**
with the Securities and Exchange Commission
Confidential Treatment Requested
Under 17 C.F.R. Sections 200.80(b)(4)
and 230.406

AMENDMENT

to the

NON-EXCLUSIVE PATENT LICENSE AGREEMENT

dated 01 May 2014

(the "**Amendment**")

effective as of 01 January 2018 (the "**Effective Date**")

between

Q Biotechnology C.V., a Dutch company with a place of business at Hulsterweg 82 , 5912 PL, Venlo, the Netherlands

- The "**LICENSOR**"

and

BioNano Genomics, Inc, a Delaware (USA) corporation with a place of business at 9640 Town Centre Drive, Suite 100, San Diego, CA 92121, USA,

- the "**LICENSSEE**" —

- the LICENSEE and the LICENSOR also referred to individually as

"**Party**" and together as the "**Parties**" -.

PREAMBLE

1. On 01 May 2014 the Parties entered into a non-exclusive patent license agreement (the "**Agreement**").

2. Effective as of the Effective Date, the Parties wish to amend the Agreement with regard to the conversion to an exclusive license in the Field A.

Now therefore, the Parties agree the following:

1. AMENDMENT OF THE AGREEMENT

1.1 Section 1, Subsection "**Field**" to the Agreement shall be deleted and replaced in its entirety as follows:

"***Field A***" shall mean labeling of DNA for use in genome mapping technologies for applications including, but not limited to, epigenetic analysis and genome structure analysis, but specifically excluding any applications in PCR, Sequencing and in the purification of biomolecules. For clarity, genome mapping shall mean analysis of genome features without doing Sequencing as defined in the present section.

"***Field B***" shall mean labeling of DNA for applications in the purification of biomolecules for use in genome mapping technologies.

"***Sequencing***" shall mean detecting and identifying each nucleotide of the sequence of a polynucleotide molecule.

1.2 Section 1, Subsection "**Patent Rights**" to the Agreement shall be deleted and replaced in its entirety as follows:

"***Patent Rights***" shall mean any and all claims in any of the patent applications and/or patents listed in Schedule 1, and any divisions, continuations, continuations-in-part, reissues, renewals, extensions and the like of the foregoing. The Licensor has an exclusive license from the original owner of the Licensed Patents with the right to sub-license granted in a license agreement dated […***…] (the "**Original License**").

1.3 Section 1 Subsection "Research Field" to the Agreement shall be deleted and replaced in its entirety as follows:

"***Research Field***" *shall mean the internal use of Royalty Product(s) by an end-user solely in applications of the end-user in research and development or Research Service, excluding for the avoidance of doubt:*

(a) Diagnostic use

(b) Companion Diagnostic use.

1.4 Section 1, Subsection "Royalty Product(s)" to the Agreement shall be deleted and replaced in its entirety as follows:

"***Royalty Product(s)***", *shall mean a kit designed, developed, manufactured, or sold by Licensee or its Affiliates or its Distributors comprising "Licensed Technology" in each case the design, development, manufacture, use, sale, offer for sale, provision, or import of which would be, but for the License, an infringement of a Valid claim of the Patent Rights.*

1.5 Section 1, Subsection "Diagnostic(s)" and "Diagnostic use" to the Agreement shall be deleted and replaced in its entirety as follows:

"***Diagnostic(s)***" *and* "***Diagnostic use***" *as the context requires, shall mean the use of Royalty Product(s) for measurement, observation or determination of attributes, characteristics, disease, traits or other conditions of human beings or animals in vitro for diagnostic purposes as part of an FDA-approved assay (or an equivalent approval from foreign regulatory agencies) or a Research Use Only (RUO) assay as regulated under Clinical Laboratory Improvement Amendments (CLIA) or a RUO assay subject to similar government approval or supervision in a non-US country).*

1.6 Section 2.1 (a) of the Agreement shall be deleted and replaced in its entirety as follows:

(a) i) Subject to the terms and conditions of this Agreement, Licensor hereby grants to Licensee and its Affiliates on the Effective Date, an exclusive, royalty-bearing, non-sublicenseable (except for end-user licenses), and non-transferable license to make, have made, sell, have sold, use and import the Royalty Product(s) within the Field A in the Research Field in the Territory solely under Licensee's Own Company Label. […***…]

ii) Subject to the terms and conditions of this Agreement, Licensor hereby grants to Licensee and its Affiliates on the Effective Date, a non-exclusive, royalty-bearing, non-sublicenseable (except for end-user licenses),. and non-transferable license to make, have made, sell, have sold, use and import the Royalty Product(s) within the Field B in the Research Field in the Territory solely under Licensee's Own Company Label. […***…]

(b) Upon payment of the Diagnostic Use Option Fee (as defined in section 3.3 below), Licensor shall grant to Licensee and its Affiliates a non-exclusive, royalty-bearing, non-sublicenseable (except for end-user licenses), and non-transferable license to

extend the license grant of section 2.1 (a) ii) to cover Diagnostic Use in Field A and Field B. […***…]

(c) Upon payment of the Companion Diagnostic Use Option Fee (as defined in section 3.4 below), Licensor shall grant to Licensee and its Affiliates a non-exclusive, royalty-bearing, non-sublicenseable (except for end-user licenses), and non-transferable license to extend the license grant of section 2.1 (a) ii) to cover Companion Diagnostic Use in Field A and Field B. […***…]

1.7 Section 3.2. of the Agreement shall be amended by adding the following:

*(c) For the placement of […***…] Royalty Products Licensee shall pay to Licensor a non-refundable, non-creditable milestone fee in the amount of US Dollars […***…]. The milestone shall be paid within […***…] after the placement of […***…] Royalty products.*

*(d) For reaching a cumulative Net Sales of […***…] Licensee shall pay to Licensor a non-refundable, non-creditable milestone fee in the amount of US Dollars […***…]. The milestone shall be paid within […***…] after reaching the Net Sales target.*

*(e) In the event of the initial public offering of the Licensee's and/or its Affiliates securities on a stock exchange Licensee shall pay to Licensor a non-refundable, non-creditable milestone fee in the amount of US Dollars […***…]. The milestone shall be paid within […***…] after date of the initial public offering.*

1.8 Section 4.1 of the Agreement shall be amended by adding the following:

*(d) Minimum Royalty. Commencing with calendar year 2018, Licensee agrees to pay Licensor an annual Minimum Royalty Payment ("MRP') on January 1, 2019 and on January 1 of each calendar year thereafter. The MRP shall be in the amount of US Dollars […***…] for calendar year 2018, US Dollars […***…] for calendar year 2019, and US Dollars […***…] for calendar year 2020 and each calendar year thereafter until the end of the Term. Licensor shall fully credit each MRP made against any Running Royalties payable by Licensee during the applicable calendar year.*

1.9 Section 8.1 of the Agreement shall be deleted and replaced in its entirety as follows:

Assignment by Licensee. The rights to be granted hereunder are specific to Licensee and shall not be assigned, sublicensed, or otherwise transferred by Licensee to any other party, without the prior written consent by Licensor. However, Licensor consents to a one-time assignment by Licensee if Licensee merges, consolidates, or transfers all or substantially all of its assets to a Third Party during the Term of this Agreement, which assignment shall be subject to a one-time assignment fee of US Dollar […***…] paid by Licensee to Licensor.

1.10 Section 4.4 of the Agreement shall be deleted and replaced in its entirety as follows:

Transactions from Licensee to Licensor under this Agreement shall be made by wire transfer to:

BANK NAME: […***…]

BANK ADDRESS: […***…]

BENEFICIARY NAME: […***…]

IBAN: […***…]

BIC/Swift Code: […***…]

1.11 All other provisions of the Agreement shall remain unaltered and in force. Definitions in this Amendment shall have the same meaning as in the Agreement unless expressly stated otherwise in this Amendment.

2. MISCELLANEOUS

2.1 All notices, requests and other communications hereunder shall be made in writing in English language and delivered by hand, by courier, by post or by fax (provided that the faxes be confirmed promptly in writing) to the person at the address set forth below, or such other address as may be designated by the respective Party to the other Party in the same manner:

2.2 Any provision of the Amendment (including this Section 2.2) may be amended or waived only if such amendment or waiver is (i) by written instrument executed by each Party and explicitly refers to this Amendment or (ii) by notarized deed if required by law.

2.3 Should any provision of this Amendment, or any provision incorporated into this Amendment in the future, be or become invalid or unenforceable, the validity or

enforceability of the other provisions of this Amendment shall not be affected thereby. The Parties hereby agree to substitute the invalid or unenforceable provision by a suitable and equitable provision which, to the extent legally permissible, comes as close as possible to the intent and purpose of the invalid or unenforceable provision. The same shall apply: (i) if the Parties have, unintentionally, failed to address a certain matter in this Amendment; in this case a suitable and equitable provision shall be deemed to have been agreed upon which comes as close as possible to what the Parties, in the light of the intent and purpose of this Amendment, would have agreed upon if they had considered the matter; or (ii) if any provision of this Amendment is invalid because of the scope of any time period or performance stipulated herein; in this case the Parties hereby agree to substitute the time period or performance by that which is legally permissible and comes as close as possible to the stipulated time period or performance. For the avoidance of doubt, any period of limitation shall not be prolonged by sentence 3.

3. AMENDMENT FEE

In consideration for the amendments to the Agreement made hereunder, Licensee shall pay Licensor a non-refundable, non-creditable payment of […***…] within […***…] after the Effective Date. Such payment shall be payable by wire transfer in accordance with Sections 4.1 (b) and 4.4 of the amended Agreement.

Q Biotechnology C.V.

By: /s/ Evander Boogwart
Name: Evander Boogwart
Title: Director

BioNano Genomics, Inc.

By: /s/ R. Erik Holmlin
Name: R. Erik Holmlin
Title: CEO

*****Confidential Treatment Requested**

Exhibit 10.34

*****Text Omitted and Filed Separately**
with the Securities and Exchange Commission
Confidential Treatment Requested
Under 17 C.F.R. Sections 200.80(b)(4)
and 230.406

LICENSE AGREEMENT

This Agreement, effective as of November 4, 2013 (the "Effective Date"), is by and between:

NEW YORK UNIVERSITY (hereinafter "NYU"), a corporation organized and existing under the laws of the State of New York and having a place of business at 70 Washington Square South, New York, New York 10012

AND

BioNano Genomics, Inc. (hereinafter "CORPORATION"), a corporation organized and existing under the laws of the State of Delaware and having its principal office at 9640 Towne Centre Drive, Suite 100, San Diego, CA 92121.

RECITALS

WHEREAS, […***…] of NYU (hereinafter "the NYU Scientist") together with […***…], formerly of NYU, have made certain inventions relating to […***…], all as more particularly described in a pending U.S. patent application and issued US patents jointly owned by NYU and […***…] ([…***…]), identified in annexed Appendix I and forming an integral part hereof (hereinafter "the Pre-Existing Inventions");

WHEREAS, NYU and […***…] have entered into an Inter-Institutional Agreement effective […***…] in which […***…] grants to NYU the exclusive right on behalf of […***…] to enter into license Agreements to the Pre-Existing Inventions;

WHEREAS, […***…] have developed software, […***…], as described in Appendix II;

WHEREAS, subject to the terms and conditions hereinafter set forth, NYU is willing to grant to CORPORATION and CORPORATION is willing to accept from NYU the License (as hereinafter defined);

NOW, THEREFORE, in consideration of the mutual promises and agreements contained herein, the parties hereto hereby agree as follows:

1. Definitions.

1.01. "Affiliate" shall mean any company or other legal entity which controls, or is controlled by, or is under common control with, CORPORATION; control means the holding of greater than fifty percent (50%) of (i) the capital and/or (ii) the voting rights and/or (iii) the right to elect or appoint directors.

1.02. "Calendar Year" shall mean any consecutive period of twelve months commencing on the first day of January of any year.

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1.03. “Date of First Commercial Sale” shall mean the date on which a Licensed Product is first offered for sale by CORPORATION or an Affiliate or sublicensee of CORPORATION.

1.04. “Derivative” shall mean any derivative work, product, device or computer software or code using or based on, in whole or in part, the NYU Software or NYU Copyrights and/or incorporating all or any part of the NYU Software or NYU Copyrights including without limitation, translations of such a work to other computer _ languages, adaptations of such a work to other hardware platforms or operating systems, and corrections and enhancements of any such work.

1.05. “Field” shall mean the detection, identification, and analysis of […***…] organisms with the exception of microorganisms.

1.06. “License” shall mean the non-exclusive, non-sublicensable (except for end-user licenses) worldwide license to practice the Research Technology (as hereinafter defined) to develop, make, have made, use, offer for sale, sell or have sold the Licensed Products (as hereinafter defined) in the Field.

1.07. “Licensed Products” shall mean all products and services, including without limitation systems, hardware, and software, covered by a issued claim of any unexpired NYU Patent (as hereinafter defined) which has not been disclaimed or held invalid by a court of competent jurisdiction from which no appeal can be taken, or which incorporates NYU Software or Research Technology.

1.08. “Royalty Bearing Products” shall mean (i) all systems and instruments for the detection, identification, and analysis of […***…] organisms; and (ii) consumables, including without limitation chips, cartridges, and reagents; and (iii) all services related to the use of Licensed Products including without limitation haplotyping services. For the avoidance of doubt, the parties agree that the Irys™ instrument is a Royalty Bearing Product under (i) above if sold without incorporating NYU Software or Research Technology and is a Licensed Product if sold with NYU Software or incorporating Research Technology.

1.09. Net Sales should mean […***…] to any person or entity that is not an Affiliate of CORPORATION under the License, after deduction of all the following to the extent applicable to such sales;

i) […***…]
ii) […***…]
iii) […***…];
iv) […***…];
v) […***…]
vi) […***…]

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Net Sales shall be […***…]

1.10. "NYU Copyrights" shall mean NYU's interest in all United States and foreign copyrights in the NYU Software (as hereinafter defined), including but not limited to software, animation, characters, algorithms, screen design, text, storyboard, scenario, video, and medical imaging masks, and any Derivative thereof developed by CORPORATION or its Affiliates.

1.11. "NYU Patents" shall mean all United States and foreign patents and patent applications, and any existing and future divisionals, continuations, in whole or in part, reissues, renewals and extensions thereof, and pending applications therefor which claim Pre-Existing Inventions and which are identified on annexed Appendix I.

1.12. "NYU Software" shall mean NYU's interest in the […***…] software and computer code, or any portion thereof and which are identified on annexed Appendix II.

1.13. "Research Technology" shall mean all NYU Patents and NYU Copyrights.

2. Effective Date.

This Agreement shall be effective as of the Effective Date and shall remain in full force and effect until it expires or is terminated in accordance with Section 13 hereof.

3. Title.

3.01. It is hereby agreed that all right, title and interest, in and to the Research Technology, and in and to any drawings, plans, diagrams, specifications, and other documents containing any of the Research Technology shall vest solely in NYU. At the request of NYU, CORPORATION shall take all steps as may be necessary to give full effect to said right, title and interest of NYU including, but not limited to, the execution of any documents that may be required to record such right, title and interest with the appropriate agency or government office.

3.02. For so long as the NYU Scientist is employed by NYU, any and all inventions made by the NYU Scientist and relating to the Field shall be owned solely by NYU.

4. Patents and Patent Applications.

4.01. At the initiative of CORPORATION or NYU, the parties shall consult with each other regarding the prosecution of all patent applications with respect to the Research Technology. Such patent applications shall be filed, prosecuted and maintained by the law firm of Dorsey & Whitney or by other patent counsel jointly selected by NYU and CORPORATION. Copies of all such patent applications and patent office actions shall be forwarded in a timely manner to each of NYU and CORPORATION. NYU and CORPORATION shall each also have the right to have such patent applications and patent office actions independently reviewed by other

patent counsel separately retained by NYU or CORPORATION, upon prior notice to and consent of the other party, which consent shall not unreasonably be withheld.

4.03. All applications and proceedings with respect to the NYU Patents shall be filed, prosecuted and maintained by NYU in NYU's sole discretion. NYU shall be free to abandon any NYU Patent.

4.04 NYU agrees to provide written notification to the CORPORATION if NYU intends to terminate prosecution of any patent applications identified in Appendix I or filed with respect to the Research Technology.

4.05 Nothing herein contained shall be deemed to be a warranty by NYU that

i) NYU can or will be able to obtain any patent or patents on any patent application or applications in the NYU Patents or any portion thereof, or that any of the NYU Patents will afford adequate or commercially worthwhile protection, or

ii) that the manufacture, use, or sale of any element of the Research Technology or any Licensed Product will not infringe any patent(s) of a third party.

4.06. CORPORATION and any Affiliates of CORPORATION shall insure that they apply patent markings that meet all requirements of U.S. law, 35 U.S.C. § 287, with respect to all Licensed Products.

5. <u>Grant of License</u>.

5.01. Subject to the terms and conditions hereinafter set forth, NYU hereby grants to CORPORATION and CORPORATION hereby accepts from NYU the License.

5.02. NYU reserves the right to use, and to permit other non-commercial entities to use, the Research Technology for educational and research purposes,

5.03. The parties acknowledge that the United States government retains rights in intellectual property funded under any grant or similar contract with a Federal agency. The License is expressly subject to all applicable United States government rights, including, but not limited to, any applicable requirement that products, which result from such intellectual property and are sold in the United States, must be substantially manufactured in the United States.

5.04. The License granted to CORPORATION in Section 5.01 hereto shall commence upon the Effective Date and shall remain in force on a country-by-country basis, if not previously terminated under the terms of this Agreement, for fifteen (15) years from the Date of First Commercial Sale in such country or until the expiration date of the last to expire of the NYU Patents whichever shall be later. CORPORATION shall inform NYU in writing of the Date of First Commercial Sale with respect to each Licensed Product in each country as soon as practicable after the making of each such first commercial sale.

5.05. The CORPORATION will retain ownership of any improvements or developments of the Research Technology made solely by the CORPORATION, other than Derivatives.

6. Payments for License.

6.01. In consideration for the grant and during the term of the License with respect to each Licensed Product, CORPORATION shall pay to NYU:

(a) on the Effective Date, a non-refundable, non-creditable license issue fee of […***…]; and

(b) a royalty on the Net Sales of CORPORATION and each Affiliate of CORPORATION as follows:

(i) […***…] of the Net Sales of consumables consisting of […***…]; and

(ii) […***…] of the Net Sales of services including without […***…]; and

(iii) […***…] of all other Net Sales.

(c) a milestone payment of […***…] upon the […***…], including without limitation […***…].

6.02. Beginning with Calendar Year 2014 and continuing thereafter until this Agreement shall terminate or expire, CORPORATION agrees that if the total royalties paid to NYU under subsection 6.01(b) hereof do not amount to […***…] in each Calendar Year, CORPORATION will pay to NYU within […***…] after the end of each such Calendar Year, as additional royalty, the difference between the […***…], failing which NYU shall have the right solely at Its election, upon written notice to CORPORATION, to terminate this Agreement for cause.

6.03. For the purpose of computing the royalties due to NYU hereunder, the year shall be divided into four parts ending on March 31, June 30, September 30, and December 31. Not later than […***…] after each December, March, June, and September in each Calendar Year during the term of the License, CORPORATION shall submit to NYU a full and detailed report of royalties or payments due NYU under the terms of this Agreement for the preceding quarter year (hereinafter “the Quarter-Year Report”), setting forth the Net Sales and/or lump sum payments and all other payments or consideration upon which such royalties are computed and including at least

i) the quantity of Licensed Products and Royalty Bearing Products used, sold, transferred or otherwise disposed of;

ii) the selling price of each Licensed Product;

iii) the deductions permitted under subsection 1.09 hereof to arrive at Net Sales; and

iv) the royalty computations and subject of payment.

If no royalties or other payments are due, a statement shall be sent to NYU stating such fact. Payment of the full amount of any royalties or other payments due to NYU for the preceding quarter year shall accompany each Quarter-Year Report on royalties and payments. CORPORATION shall keep for a period of at least six (6) years after the date of entry, full, accurate and complete books and records consistent with sound business and accounting practices and in such form and in such detail as to enable the determination of the amounts due to NYU from CORPORATION pursuant to the terms of this Agreement.

6.04. On reasonable notice and during regular business hours, NYU or the authorized representative of NYU shall each have the right to inspect the books of accounts, records and other relevant documentation of CORPORATION or of Affiliates of CORPORATION insofar as they relate to the production, marketing and sale of the Licensed Products and Royalty Bearing Products, in order to ascertain or verify the amount of royalties and other payments due to NYU hereunder, and the accuracy of the information provided to NYU in the aforementioned reports. The cost of such inspection shall be borne by NYU, unless it is determined in such inspection that NYU has been underpaid in any period by more than […***…] of the amount which NYU should have been paid, in which case the cost of such inspection shall be reimbursed to NYU by CORPORATION.

7. Method of Payment.

7.01. Royalties and other payments due to NYU hereunder shall be paid to NYU in United States dollars. Any such royalties on or other payments relating to transactions in a foreign currency shall be converted into United States dollars based on the closing buying rate of the Morgan Guaranty Trust Company of New York applicable to transactions under exchange regulations for the particular currency on the last business day of the accounting period for which such royalty or other payment is due.

7.02. CORPORATION shall be responsible for payment to NYU of all royalties due on sale, transfer or disposition of Licensed Products and Royalty Bearing Products by each Affiliate of CORPORATION.

7.03. Any amount payable hereunder by one of the parties to the other, which has not been paid by the date on which such payment is due, shall bear interest form such date until the date on which such payment is made, at the rate of […***…] per annum in excess of the prime rate prevailing at the Citibank, N.A., in New York, during the period of arrears and such amount and the interest thereon may be set off against any amount due, whether in terms of this Agreement or otherwise, to the party in default by any non-defaulting party.

8. Development and Commercialization.

8.01. CORPORATION undertakes to use continuous reasonable diligence to make and sell Licensed Products, including but not limited to, the performance of all efficacy, pharmaceutical, safety, toxicological and clinical tests, trials and studies and all other activities necessary in order to obtain the approval of the FDA for the production, use and sale of the Licensed Products, all as set forth in the Development Plan (annexed hereto as Appendix III and which is an integral part of this Agreement) and within all timetables set forth therein. CORPORATION further undertakes to exercise due diligence and to employ its reasonable diligence to obtain, the appropriate approvals of the health authorities for the production, use and sale of the Licensed Products, in each of the other countries of the world in which CORPORATION intend to produce, use, and/or sell Licensed Products.

8.02. Provided that applicable laws, rules and regulations require that the performance of the tests, trials, studies and other activities specified in Paragraph 8.01 above shall be carried out in accordance with FDA Good Laboratory Practices and in a manner acceptable to the relevant health authorities, CORPORATION shall carry out such tests, trials, studies and other activities in accordance with FDA Good Laboratory Practices and in a manner acceptable to the relevant health authorities. Furthermore, the Licensed Products shall be produced in accordance with FDA Good Manufacturing Practice ("GMP") procedures in a facility which has been certified by the FDA as complying with GMP, provided that applicable laws, rules and regulations so require.

8.03. CORPORATION undertakes to begin the regular commercial production, use, and sale of the Licensed Products in good faith in accordance with the Development Plan and to continue diligently thereafter to commercialize the Licensed Products.

8.04. CORPORATION shall provide NYU with written annual reports on all activities and actions undertaken by CORPORATION to develop and commercialize the Licensed Products; such reports shall be made within sixty (60) days after each June 30th for the duration of this Agreement.

8.05. If CORPORATION shall not commercialize the Licensed Products within a reasonable time frame, unless such delay is necessitated by FDA or other regulatory agencies or unless NYU and CORPORATION have mutually agreed to amend the Development Plan because of unforeseen circumstances, NYU shall notify CORPORATION in writing of CORPORATION's failure to commercialize and shall allow CORPORATION sixty (60) days to cure its failure to commercialize. CORPORATION's failure to cure such delay to NYU's reasonable satisfaction within such 60-day period shall be a material breach of this Agreement.

9. CONFIDENTIAL INFORMATION.

9.01. Except as otherwise provided in Section 9.02 and 9.03 below CORPORATION shall maintain any and all of the Research Technology in confidence and shall not release or disclose any tangible or intangible component thereof to any third party without first receiving the prior written consent of NYU to said release or disclosure.

9.02. The obligations of confidentiality set forth in Sections 9.01 shall not apply to any component of the Research Technology which was part of the public domain prior to the Effective Date of this Agreement or which becomes a part of the public domain not due to some unauthorized act by or omission of CORPORATION after the effective date of this Agreement or which is disclosed to the CORPORATION by a third party who has the right to make such disclosure.

9.03. The provisions of Section 9.01 notwithstanding, CORPORATION may disclose the Research Technology to third parties who need to know the same in order to secure regulatory approval for the sale of Licensed Products.

10. Infringement of NYU Patent.

10.01. In the event a party to this Agreement acquires information that a third party is infringing one or more of the NYU Patents, the party acquiring such information shall promptly notify the other party to the Agreement in writing of such infringement.

10.02. As between the parties, NYU shall have the sole right but not the obligation to pursue any infringers and to retain any recovery therefrom. NYU may grants such rights to third parties.

11. Liability and Indemnification.

11.01. CORPORATION shall indemnify, defend and hold harmless NYU and its trustees, officers, medical and professional staff, employees, students and agents and their respective successors, heirs and assigns (the "Indemnitees"), against any liability, damage, loss or expense (including reasonable attorneys' fees and expenses of litigation) incurred by or imposed upon the Indemnitees or any one of them in connection with any claims, suits, actions, demands or judgments (i) arising out of the design, production, manufacture, sale, use in commerce or in human clinical trials, lease, or promotion by CORPORATION or by a licensee, Affiliate or agent of CORPORATION of any Licensed Product or Royalty Bearing Product, process or service relating to, or developed pursuant to, this Agreement or (ii) arising out of any other activities to be carried out pursuant to this Agreement.

11.02. With respect to an Indemnitee, CORPORATION's indemnification under subsection 11.01(i) shall apply to any liability, damage, loss or expense whether or not it is attributable to the negligent activities of such Indemnitee. CORPORATION's indemnification obligation under subsection 11.01(ii) shall not apply to any liability, damage, loss or expense to the extent that it is attributable to the negligent activities of any such Indemnitee.

11.03. CORPORATION agrees, at its own expense, to provide attorneys reasonably acceptable to NYU to defend against any actions brought or filed against any Indemnitee with respect to the subject of indemnity to which such Indemnitee is entitled hereunder, whether or not such actions are rightfully brought.

12. Security for Indemnification.

12.01. At such time as any Licensed Product or Royalty Bearing Product, process or service relating to, or developed pursuant to, this Agreement Is being commercially distributed or sold or tested in clinical trials by CORPORATION or by a licensee, Affiliate or agent of CORPORATION, CORPORATION shall at its sole cost and expense, procure and maintain policies of comprehensive general liability insurance in amounts not less than $[…***…] per incident and $[…***…] annual aggregate during the period that such Licensed Product, Royalty Bearing Product, process, or service is being tested in clinical trials or commercially distributed or sold, and in each case naming the Indemnitees as additional insureds. Such comprehensive general liability insurance, shall provide (i) product liability coverage and (ii) broad form contractual liability coverage for CORPORATION's indemnification under Section 11 of this Agreement. If CORPORATION elects to self-insure all or part of the limits described above (including deductibles or retentions which are in excess of $[…***…] annual aggregate) such self-insurance program shall include assets or reserves which have been actuarially determined for the liabilities associated with this Agreement and must be acceptable to NYU.

The minimum amounts of insurance coverage required under this Section 12 shall not be construed to create a limit of CORPORATION's liability with respect to its indemnification under Section 11 of this Agreement.

12.02. CORPORATION shall provide NYU with written evidence of such insurance upon request of NYU. CORPORATION shall provide NYU with written notice at least sixty (60) days prior to the cancellation, non-renewal or material change in such insurance; if CORPORATION does not obtain replacement insurance providing comparable coverage within such sixty (60) day period, NYU shall have the right to terminate this Agreement effective at the end of such sixty (60) day period without notice or any additional waiting periods.

12.03. CORPORATION shall maintain such comprehensive general liability insurance beyond the expiration or termination of this Agreement during (i) the period that any product, process or service, relating to, or developed pursuant to, this Agreement is being commercially distributed or sold or tested in clinical trials by CORPORATION or by an Affiliate or agent of CORPORATION and,(ii) a reasonable period after the period referred to in (i) above which in no event shall be less than five (5) years.

13. Expiry and Termination

13.01. Unless earlier terminated pursuant to this Section 13 or Section 6.02, hereof, this Agreement shall expire upon the expiration of the period of the License in all countries as set forth in Section 5.04 above.

13.02. At any time prior to expiration of this Agreement, either party may terminate this Agreement forthwith for cause, as "cause" is described below, by giving written notice to the other party. Cause for termination by one party of this Agreement shall be deemed to exist if the other party materially breaches or defaults In the performance or observance of any of the provisions of this Agreement and such breach or default is not cured within sixty (60) days or, in the case of failure to pay any amounts due hereunder, thirty (30) days (unless otherwise specified herein) after the giving of notice by the other party specifying such breach or default, or if either NYU or CORPORATION discontinues its business or becomes insolvent or bankrupt.

13.03. Upon termination of this Agreement for any reason and prior to expiration as set forth in Section 13.01 hereof, all rights in and to the Research Technology shall revert to NYU, and CORPORATION shall not be entitled to make any further use whatsoever of the Research Technology.

13.04. CORPORATION may terminate this Agreement by giving ninety (90) days' advance written notice of termination to NYU.

13.05. This Agreement may be terminated by mutual written consent of both parties.

13.06. Termination of this Agreement shall not relieve either party of any obligation to the other party incurred prior to such termination.

13.07. Sections 3, 9, 11, 12, 13 and 17 hereof shall survive and remain in full force and effect after any termination, cancellation or expiration of this Agreement.

14. Representations and Warranties by CORPORATION.

CORPORATION hereby represents and warrants to NYU as follow:

(1) CORPORATION is a corporation duly organized, validly existing and in good standing under the laws of the State of Delaware. CORPORATION has been granted all requisite power and authority to carry on its business and to own and operate its properties and assets. The execution, delivery and performance of this Agreement has been duly authorized by CORPORATION

(2) There is no pending or, to CORPORATION's knowledge, threatened litigation involving CORPORATION which would have any effect on this Agreement or on CORPORATION's ability to perform its obligations hereunder; and

(3) There is no indenture, contract, or agreement to which CORPORATION is a party or by which CORPORATION is bound which prohibits or would prohibit the execution and delivery by CORPORATION of this Agreement or the performance or observance by CORPORATION of any term or condition of this Agreement,

15. Representations and Warranties by NYU.

NYU hereby represents and warrants to CORPORATION as follows:

(1) NYU is a corporation duly organized, validly existing and in good standing under the laws of the State of New York. NYU has been granted all requisite power and authority to carry on its business and to own and operate its properties and

assets. The execution, delivery and performance of this Agreement have been duly authorized by the Board of Trustees of NYU.

(2) There is no pending or, to NYU's knowledge, threatened litigation involving NYU which would have any effect on this Agreement or on NYU's ability to perform its obligations hereunder; and

(3) There is no indenture, contract, or agreement to which NYU is a party or by which NYU is bound which prohibits or would prohibit the execution and delivery by NYU of this Agreement or the performance or observance by NYU of any term or condition of this Agreement.

16. No Assignment.

Neither CORPORATION nor NYU shall have the right to assign, delegate or transfer at any time to any party, in whole or In part, any or all of the rights, duties and interest herein granted without first obtaining the written consent of the other to such assignment.

17. Use of Name.

Without the prior written consent of the other party, neither CORPORATION nor NYU shall use the name of the other party or any adaptation thereof or of any staff member, employee or student of the other party:

i) in any product labeling, advertising, promotional or sales literature;

ii) in connection with any public or private offering or in conjunction with any application for regulatory approval, unless disclosure is otherwise required by law, in which case either party may make factual statements concerning the Agreement or file copies of the Agreement after providing the other party with an opportunity to comment and reasonable time within which to do so on such statement in draft.

Except as provided herein, neither NYU nor CORPORATION will issue public announcements about this Agreement without prior written approval of the other party.

18. Miscellaneous,

18.01. In carrying out this Agreement the parties shall comply with all local, state and federal laws and regulations including but not limited to, the provisions of Title 35 United States Code §200 et seq. and 15 CFR §368 et seq.

18.02. If any provision of this Agreement is determined to be invalid or void, the remaining provisions shall remain in effect.

18.03. This Agreement shall be governed by and construed in accordance with the laws of New York, without regard to principles relating to conflicts of law. The courts of the State of New York in New York County and the United States District Court for the Southern District of New York shall have exclusive jurisdiction over the parties with respect to any dispute or controversy between them arising under or in connection with this Agreement and, by execution and delivery of this Agreement, the parties to this Agreement submit to the jurisdiction of those courts, including, but not limited to, the in personam and subject matter jurisdiction of those courts, waive any objection to such jurisdiction on the grounds of venue or forum non conveniens, the

absence of in personam or subject matter jurisdiction and any similar grounds, consent to service of process by mail in accordance with paragraph 18.04 or any other manner permitted by law and irrevocably agree to be bound by any such judgment rendered thereby in connection with this Agreement. These consents to jurisdiction shall not be deemed to confer rights on any person other than the parties to this Agreement.

18.04. All payments or notices required or permitted to be given under this Agreement shall be given in writing and shall be effective when either personally delivered or deposited, postage prepaid, in the United States registered or certified mail, or with a recognized overnight delivery service (e.g., Federal Express or DHL), addressed as follows:

To NYU: New York University
Office of Industrial Liaison
One Park Avenue, 6th Floor
New York, NY 10016

Attention: Abram M. Goldfinger
Executive Director,
Industrial Liaison/Technology Transfer

and

Office of Legal Counsel
New York University
Bobst Library
70 Washington Square South
New York, NY 10012

Attention: Mark Righter, Esq
Associate General Counsel

To CORPORATION:

BioNano Genomics, Inc.
9640 Towne Centre Drive, Suite 100
San Diego, CA 92121

Attention: Erik Holmlin
President and CEO

or such other address or addresses as either party may hereafter specify by written notice to the other. Such notices and communications shall be deemed effective on the date of delivery or fourteen (14) days after having been sent by registered or certified mail, whichever is earlier.

18.05. This Agreement (and the annexed Appendix) constitute the entire Agreement between the parties and no variation, modification or waiver of any of the

terms or conditions hereof shall be deemed valid unless made in writing and signed by both parties hereto, This Agreement supersedes any and all prior agreements or understandings, whether oral or written, between CORPORATION and NYU.

18.06. No waiver by either party of any non-performance or violation by the other party of any of the covenants, obligations or agreements of such other party hereunder shall be deemed to be a waiver of any subsequent violation or non-performance of the same or any other covenant, agreement or obligation, nor shall forbearance by any party be deemed to be a waiver by such party of its rights or remedies with respect to such violation or non-performance.

18.07. The descriptive headings contained in this Agreement are included for convenience and reference only and shall not be held to expand, modify or aid in the interpretation, construction or meaning of this Agreement.

18.08. It is not the intent of the parties to create a partnership or joint venture or to assume partnership responsibility or liability. The obligations of the parties shall be limited to those set out herein and such obligations shall be several and not joint.

IN WITNESS WHEREOF, the parties hereto have executed this Agreement effective as of the date and year first above written.

NEW YORK UNIVERSITY

By: /s/ Abram M. Goldfinger
Abram M. Goldfinger
Executive Director,
Industrial Liaison/Technology Transfer

Date: 11/20/13

CORPORATION

By: /s/ Erik Holmlin
Erik Holmlin
Title: President and CEO

Date: 19-NOV-2013

[…***…]

[…***…]

[…***…]

[…***…]

[…***…]

OPTION AND SUBLICENSE AGREEMENT

THIS OPTION AND SUBLICENSE AGREEMENT ("Agreement") dated as of February 2, 2016 ("Effective Date"), is entered into among Pacific Biosciences of California, Inc., a Delaware corporation having an address of 1380 Willow Rd., Menlo Park, CA 94025 ("PacBio") and BioNano Genomics, Inc., a Delaware corporation with its principal place of business located at 9640 Towne Centre Drive, Ste. 100, San Diego, CA 92121 ("BioNano").

W I T N E S S E T H

WHEREAS, PacBio controls certain patents related to analysis of nucleic acid molecules in nanofluidic channels; and

WHEREAS, BioNano desires to obtain a nonexclusive sublicense to such patents controlled by PacBio in order to develop, manufacture, have manufactured and commercially exploit products in the Territory in the Mapping Field as well as an option to obtain a royalty-bearing sublicense to such patents in the Territory in the Sequencing Field, and PacBio desires to grant such sublicense and option to BioNano, upon the terms and conditions set forth herein.

NOW, THEREFORE, in consideration of the foregoing premises and the mutual covenants herein contained, and for other good and valuable consideration, the receipt and sufficiency of which are hereby acknowledged, the Parties hereby agree as follows:

ARTICLE I DEFINITIONS

For purposes of this Agreement, the following terms when used with initial capital letters shall have the respective meanings set forth below.

1.1 "Acquisition" shall mean a transaction with a Third Party comprising a merger or reverse merger coupled with a change of control, a sale of substantially all assets relating to this Agreement, a stock purchase agreement or exchange of stock with a third party (other than an equity investment in original issue stock the primary purpose of which is financing BioNano, where the investor is not a company whose primary business includes nucleic acid sequencing or any affiliate of such company) resulting in a change in control of BioNano.

1.2 "Affiliate" of a Party shall mean any person, corporation, joint venture or other business entity which, directly or indirectly through one or more intermediaries, controls, is controlled by, or is under common control with such Party, as the case may be. As used in this Section 1.2, "control" shall mean: (a) to possess, directly or indirectly, the power to affirmatively direct the management and policies of such person, corporation, joint venture or other business entity, whether through ownership of voting securities or by contract relating to voting rights or corporate governance; or (b) direct or indirect beneficial ownership of fifty percent (50%) or

more of the voting share capital in such person, corporation, joint venture or other business entity.

1.3 "Mapping Field" shall mean detection in a NDS of sequence-related features of a polynucleotide molecule, [...***...].

1.4 "NDS" shall mean a nano-dimensioned structure having a hole or channel with at least one dimension that is between […***…]. For clarity, […***…].

1.5 "Party" shall mean PacBio or BioNano (together, the "Parties").

1.6 "Sequencing Field" shall mean detecting and sequentially identifying each nucleotide of the sequence of a polynucleotide molecule in a NDS […***…].

1.7 "Sublicensed Patents" shall mean the patents set forth on Exhibit 1.7.

1.8 "Territory" shall mean the entire world.

1.9 "Third Party" shall mean any person, corporation, joint venture or other business entity, other than BioNano, PacBio and their respective Affiliates.

1.10 Additional Definitions. Each of the following definitions shall have the meanings defined in the corresponding sections of this Agreement indicated below.

Defined Term	Section
Agreement	Preamble
BioNano	Preamble
[***]	3.3
Disclosing Party	6.1
Effective Date	Preamble
[…***…]	3.3
Infringement	7.2

Losses	10.1
Mapping Products	2.1
Net Sales	Exhibit 2.4 (A)
PacBio	Preamble
Proprietary Information	6.1
Recipient	6.1
Sequencing Field Option	2.4
Sequencing Products	2.4

ARTICLE II

GRANT OF SUBLICENSE; OPTION

2.1 Sublicense. Subject to the terms and conditions of this Agreement, PacBio hereby grants to BioNano a fully paid-up irrevocable nonexclusive sublicense under the Sublicensed Patents only, to import, make, have made, use, offer for sale and sell products and services, solely in the Mapping Field ("Mapping Products"), and to allow its ultimate customers to use Mapping Products made and sold under the sublicense for their intended purpose solely in the Mapping Field.

2.2 Extension of Sublicense to Affiliates. BioNano may extend its rights under the sublicense granted in Section 2.1, and if the Sequencing Field Option is exercised, the sublicense granted under Section 2.4, to one or more of its Affiliates who agree (or for whom BioNano agrees) to assume the same obligations of BioNano under this Agreement; provided that BioNano shall remain responsible to PacBio for such Affiliate's compliance with the obligations under this Agreement which apply to such Affiliate.

2.3 No Further Sublicensing. BioNano may not grant sublicenses to Third Parties under the sublicense granted in Section 2.1 or, if granted, the sublicense granted in Section 2.4.

2.4 Sequencing Field Option. Subject to the terms and conditions of this Agreement, PacBio hereby grants to BioNano a nonexclusive option (the "Sequencing Field Option") to obtain a nonexclusive sublicense under the Sublicensed Patents only, to import, make, have made, use, offer for sale and sell products and services, solely in the Sequencing Field

("Sequencing Products"), and to allow its ultimate customers to use Sequencing Products made and sold under the sublicense for their intended purpose solely in the Sequencing Field.BioNano may exercise the Sequencing Field Option at any time during the Term by providing written notice to PacBio and payment of the option exercise fee set forth in Section 4.2. Upon such exercise and payment of the option exercise fee, PacBio will automatically grant to BioNano a royalty-bearing, nonexclusive sublicense under the Sublicensed Patents, to import, make, have made, use, offer for sale and sell products and services, solely in the Sequencing Field, and to allow its ultimate customers to use products made and sold under the sublicense for their intended purpose solely in the Sequencing Field. The financial terms and conditions of such royalty bearing sublicense are set forth on Exhibit 2.4 to this Agreement.

2.5 No Other Rights. Except as expressly granted herein, neither Party, by implication, estoppel, reliance or otherwise, grants any license or other right under its intellectual property to the other Party. No license or other right to any patents, except those included in the Sublicensed Patents, are conveyed by PacBio.

ARTICLE III

DEVELOPMENT AND COMMERCIALIZATION OF PRODUCTS

3.1 General Responsibilities. BioNano will be responsible for the development and commercialization of Mapping Products and Sequencing Products as it deems appropriate in its sole discretion.

3.2 Marking Products; […***…] License.

(a) Patent Marking. BioNano shall mark Mapping Products and, after the exercise of the Sequencing Field Option, Sequencing Products (or their containers or labels) made, sold, leased, imported, exported or otherwise disposed of by it or its Affiliates under the sublicense(s) granted in this Agreement with the numbers of the applicable Sublicensed Patent(s); provided that such patent notice shall be in accordance with the laws concerning the marking of patented articles in the country in which such articles are sold.

(b) […***…] License. Beginning immediately after the Effective Date for Mapping Products and after the exercise of the Sequencing Field Option for Sequencing Products, BioNano shall […***…] that it sells or offers for sale or otherwise commercializes, with […***…], and shall include […***…] shall (A) be in the form attached hereto as Exhibit 3.2 or (B) such other form approved by PacBio that […***…] and is limited to the Mapping Field or Sequencing Field, as applicable. If applicable law or regulation requires in order for the restrictions of such […***…] to be enforceable that any such form(s) be modified, the Parties

agree to so modify such form(s). For the avoidance of doubt, inclusion of such […***…] in the manual associated with a Mapping Product or Sequencing Product shall be considered […***…] such Product for purpose of the preceding sentence. In connection with clause (B), BioNano shall provide to PacBio, for its review and approval, any such other form of […***…] and PacBio shall respond (with its approval or with requested changes) within […***…] thereafter, or shall be deemed to have approved such language for purposes of this Section 3.2.

3.3 Use of […***…] Names. BioNano shall not use, nor shall BioNano permit any of its Affiliates to use, the names, trademarks and indicia of […***…] ("[…***…]") or of […***…] ("[…***…]"), nor the names of any employee, student or faculty member of […***…] nor of […***…], in connection with the activities contemplated under this Agreement, without prior written approval from […***…].

ARTICLE IV

UPFRONT AND OPTION PAYMENTS

4.1 Upfront Payment. Subject to the terms and conditions of this Agreement, in further consideration of the option and sublicense granted by PacBio to BioNano under this Agreement, BioNano shall pay to PacBio an upfront one-time payment of […***…], payable in […***…], with […***…] due and payable within […***…] after […***…] occurring after the Effective Date in which BioNano, its Affiliate(s) and/or its or their shareholders […***…], but no later than […***…] after the Effective Date. The […***…] shall be due and payable no later than […***…].

4.2 Option Exercise Fee. Subject to the terms and conditions of this Agreement, if BioNano exercises the Sequencing Field Option, BioNano shall pay to PacBio a one-time payment of […***…] payable within […***…] after providing written notice to PacBio of the exercise of the Sequencing Field Option.

ARTICLE V

PAYMENT TERMS

5.1 Payment Method. Unless otherwise expressly stated in this Agreement, all amounts specified in this Agreement shall be in United States dollars.

5.2 Withholding Taxes. All payments by BioNano to PacBio hereunder (including any royalty payments on Sequencing Products) shall be made free and clear of and without reduction for any taxes, duties or similar charges imposed by any government (other than taxes on the net income of PacBio), which shall be paid by BioNano. Accordingly, if BioNano is required to withhold any taxes on the amounts payable to PacBio hereunder, BioNano shall pay PacBio such additional amounts as are necessary to ensure receipt by PacBio of the full amount which PacBio would have received but for the deduction on account of such withholding. BioNano shall provide PacBio with official receipts issued by the appropriate governmental agency or such other evidence as is reasonably requested by PacBio to establish that such taxes have been paid. Each party shall provide the other party with such assistance as shall reasonably be requested in connection with any application to qualify for the benefit of a reduced rate of withholding taxation, under the terms of any income tax treaty between the United States of America and other jurisdictions.

ARTICLE VI

CONFIDENTIALITY

6.1 Proprietary Information. Except as otherwise provided in this Article 6, during the term of this Agreement and for a period of […***…] thereafter, each Party (the "Recipient") shall maintain in confidence and use only for purposes of this Agreement any confidential information, data and materials supplied to such Party by the other Party (the "Disclosing Party") under this Agreement; provided that, unless the confidentiality of any information, data or material is expressly provided in this Agreement, if any such information, data or materials are in tangible form, they are marked "Confidential" or "Proprietary," or if disclosed orally, they are identified as confidential or proprietary when disclosed and are confirmed in writing as confidential or proprietary within […***…] following such disclosure (such information, data and materials so disclosed, collectively "Proprietary Information"). The obligations of the Recipient under this Article 6 not to disclose or use Proprietary Information received from the Disclosing Party shall not apply, however, apply to the extent that any such information, data or materials:

(a) are or become generally available to the public, or otherwise part of the public domain, other than by acts or omissions of the Recipient in breach of this Agreement;

(b) are disclosed to the Recipient, other than under an obligation of confidentiality, by a Third Party who had no obligation to the Disclosing Party not to disclose such information to others;

(c) were already in the possession of the Recipient, other than under an obligation of confidentiality, prior to disclosure by the Disclosing Party; or

(d) is subsequently and independently developed by the Recipient without use of or reference to the Proprietary Information of the Disclosing Party.

6.2 Permitted Disclosures. To the extent it is reasonably necessary or appropriate to fulfill its obligations or exercise its rights under this Agreement:

(a) a Recipient may disclose Proprietary Information which it is otherwise obligated under this Article 6 not to disclose, to its Affiliates, employees, consultants, and outside contractors, on a need-to-know basis in accordance with the exercise of rights granted to such Recipient under this Agreement; provided that such persons agree to be bound by obligations of confidentiality with respect to such Proprietary Information which are substantially similar in scope and duration to those set forth in this Article 6; and

(b) a Recipient may disclose Proprietary Information of the Disclosing Party to government or other regulatory authorities to the extent that such disclosure is: (i) required by applicable law (including applicable securities law), government regulation or court order; or (ii) is reasonably necessary to Prosecute and Maintain any patent, to obtain any authorization to conduct clinical studies, or to obtain any U.S. Food & Drug Administration (or equivalent) marketing approval/clearance for a Mapping Product or Sequencing Product; provided that, in case of any disclosures required by law, the Recipient shall provide reasonable advance notice to the Disclosing Party to allow such Party to oppose such disclosure or to request confidential treatment of such Proprietary Information.

6.3 Nondisclosure of Terms. Each Party agrees not to disclose the terms of this Agreement to any Third Party without the prior written consent of the other Party, except: (a) to such Party's advisors (including financial advisors, attorneys and accountants), potential and existing investors and others on a need-to-know basis, in each case under appropriate confidentiality obligations which are substantially similar in scope and duration to those set forth in this Article 6; or (b) to the extent necessary to comply with applicable law (including applicable securities law), government regulation or court order; provided that the Party required to make such disclosure under (b) above shall promptly notify the other Party and (other than in the case where such disclosure is necessary to comply with applicable securities laws) allow such other Party a reasonable opportunity to oppose such disclosure and/or to seek limitations on the portion of the Agreement required to be disclosed.

ARTICLE VII

INTELLECTUAL PROPERTY AND INFRINGEMENT

7.1 Patent Maintenance.

(a) Allocation of Responsibilities. As between the Parties, PacBio shall have the sole right, but not the obligation, to control the prosecution and maintenance of the Sublicensed Patents in the Territory, using counsel selected by PacBio or its licensor.

(b) Maintenance Costs. BioNano will reimburse PacBio for all amounts due after the Effective Date for patent annuities for maintenance of the Sublicensed Patents in the United States, provided that such amounts shall be prorated if PacBio grants any Third Party a sublicense to the Sublicensed Patents in the Mapping Field or Sequencing Field.

7.2 Enforcement of Patents.

(a) Notice. In the event BioNano learns of any Third Party infringement of the Sublicensed Patents by the manufacture, use, sale, offer for sale or importation of a product in the Territory in the Mapping Field or the Sequencing Field, it shall promptly provide written notice to PacBio of such infringement and shall supply PacBio with all evidence it possesses pertaining to such infringement (an "Infringement").

(b) Infringement Action. As between the Parties, PacBio or its nominee shall have the sole right, but not the obligation, to seek to abate any Infringement of any Sublicensed Patent.

(c) Settlement and Recoveries. Any recovery obtained by PacBio as a result of an Infringement Action shall be retained solely by PacBio.

ARTICLE VIII

TERM AND TERMINATION

8.1 Term. This Agreement shall commence on the Effective Date and, unless terminated earlier pursuant to Sections 8.2, 8.3 or 8.4, shall continue in full force and effect until expiration of the last-to-expire patent among the Sublicensed Patents.

8.2 Termination for Material Breach. If either Party materially breaches this Agreement at any time, the non-breaching Party shall have the right to terminate this Agreement by written notice to the breaching Party, if such breach is not cured within thirty (30) days after written notice is given by the non-breaching Party to the breaching Party specifying the breach.

8.3 Termination by BioNano. This Agreement may be terminated by BioNano, in its sole discretion, in its entirety, upon sixty (60) days' prior written notice to PacBio.

8.4 Termination by PacBio. If BioNano has not paid PacBio the first installment payment of one hundred six thousand two hundred fifty dollars ($106,250) in accordance with Section 4.1 within three (3) months after the Effective Date, or if BioNano fails to pay the second, third or fourth installment payment by the respective due date set forth in Section 4.1, then PacBio shall have the right to terminate this Agreement, with immediate effect, by written notice to BioNano.

8.5 Effect of Expiration or Termination.

(a) Termination for Cause by PacBio or Termination by BioNano. Upon termination of this Agreement by PacBio or by BioNano in accordance with Section 8.2, or termination of this Agreement by BioNano in accordance with Section 8.3, or termination of this Agreement by PacBio in accordance with Section 8.4: the option, licenses and rights granted by PacBio to BioNano under Article 2 will immediately terminate; provided that BioNano shall remain responsible for, and shall pay, any and all payments due to PacBio under the terms of this Agreement as of the effective date of any such termination.

(b) Survival of Certain Obligations. Subject to Section 8.5, expiration or termination of this Agreement for any reason shall not relieve either Party of any obligation accruing on or prior to such expiration or termination, or which is attributable to a period prior to such expiration or termination, nor preclude either Party from pursuing any rights and remedies it may have under this Agreement, or at law or in equity, which accrued or are based upon any event occurring prior to such expiration or termination. The provisions of Articles 1, 6, 8, 10,. and 11 shall survive the expiration or termination of this Agreement for any reason.

ARTICLE IX

REPRESENTATIONS AND WARRANTIES

9.1 General Representations and Warranties. Each Party represents and warrants to the other Party that:

(a) it is a corporation duly organized and validly existing under the laws of the jurisdiction in which it is incorporated;

(b) it has full corporate power and authority, and has obtained all approvals, permits and consents necessary, to enter into this Agreement and to perform its obligations hereunder;

(c) this Agreement is legally binding upon it and enforceable in accordance with its terms; and

(d) the execution, delivery and performance of this Agreement does not conflict with any agreement, instrument or understanding, oral or written, to which it is a party or by which it may be bound, nor violate any material law or regulation of any governmental or regulatory authority having jurisdiction over it.

9.2 Additional Warranties of PacBio. PacBio hereby covenants, represents and warrants to BioNano that:

(a) as of the Effective Date, PacBio has a valid and enforceable written license from […***…] to the Sublicensed Patents; such license is in full force and effect; […***…] has not provided PacBio with any notice of breach of such license (except with regard to any

breach that has been cured prior to the Effective Date); PacBio is in compliance with all material terms of such license; and […***…] has no current right to terminate such license;

(b) PacBio will maintain such license in effect until expiration or termination of this Agreement under Article VIII; and

(c) PacBio has all rights necessary to grant to BioNano the sublicenses and rights granted under this Agreement.

9.3 DISCLAIMER. EXCEPT AS OTHERWISE EXPRESSLY SET FORTH IN THIS AGREEMENT, NEITHER PARTY MAKES ANY REPRESENTATION OR EXTENDS ANY WARRANTIES OF ANY KIND EITHER EXPRESS OR IMPLIED, INCLUDING WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE, NON1NFRINGEMENT, OR VALIDITY OF ANY PATENTS ISSUED OR PENDING.

ARTICLE X

INDEMNIFICATION

10.1 Indemnification by BioNano. BioNano will indemnify and hold harmless PacBio and its Affiliates and their officers, directors, employees, agents, successors and assigns from and against any and all claims (including claims for death, illness, personal injury, property damage or improper business practices), liabilities, losses, damages, costs and expenses, interest, awards, judgments and penalties (including, without limitation, reasonable attorneys' fees and expenses) ("Losses") suffered or incurred by them arising out of or resulting from: (a) the manufacture, use, sale, or other disposition of Mapping Products or Sequencing Products by or on behalf of BioNano, any of its Affiliates, or their respective customers; (b) a Third Party's use of Mapping Products or Sequencing Products purchased, leased, or otherwise acquired from BioNano, any of its Affiliates, or their respective customers; (c) a Third Party's manufacture or provision of Mapping Products or Sequencing Products at the request of BioNano or any of its Affiliates.

10.2 Indemnification Procedures. In the event that PacBio intends to claim indemnification under this Article 10, PacBio shall promptly notify BioNano in writing of the alleged Losses. BioNano shall have the right to control the defense thereof with counsel of its choice as long as such counsel is reasonably acceptable to PacBio; provided, however, that PacBio shall have the right to retain its own counsel at its own expense, for any reason, including if representation of PacBio by the counsel retained by BioNano would be inappropriate due to actual or potential differing interests between such PacBio and any other party represented by such counsel in such proceeding. PacBio shall cooperate with BioNano and its legal representatives in the investigation of any Losses covered by this Article 10. PacBio shall not, except at its own cost, voluntarily make any payment or incur any expense with respect to any claim or suit without the prior written consent of BioNano, which BioNano shall not be required to give.

10.3 Workers' Compensation Insurance. BioNano shall at all times comply, through insurance or self-insurance, with all statutory workers' compensation and employers' liability requirements covering any and all employees with respect to activities performed under this Agreement.

10.4 Liability Insurance. BioNano agrees to obtain and maintain insurance against liability, damage, destruction and loss comparable to that which is maintained by companies in similar businesses at similar stages in their growth.

ARTICLE XI

MISCELLANEOUS

11.1 Force Majeure. Neither Party shall be held liable or responsible to the other Party, nor be deemed to have defaulted under or breached this Agreement, for failure or delay in fulfilling or performing any term of this Agreement, other than the payment of money owed by BioNano, to the extent, and for so long as, such failure or delay is caused by or results from causes beyond the reasonable control of the affected Party, including fire, flood, embargo, power shortage or failure, war, act of war (whether war be declared or not), insurrection, riot, terrorism, civil commotion, strike, lockout or other labor disturbance, act of God or any act, omission or delay in acting by any governmental authority or the other Party.

11.2 Assignment. Except as provided in Section 11.3 of this Agreement, licenses granted to BioNano are personal, and this Agreement and any licenses or rights granted to BioNano may not be assigned or otherwise transferred by BioNano without the consent of PacBio, which consent shall not be unreasonably withheld, and any purported assignment of this Agreement by BioNano without PacBio's consent shall be null and void. Any permitted assignee shall assume all obligations of its assignor under this Agreement.

11.3 Acquisition of BioNano. In the event of an Acquisition of BioNano or of an Affiliate of BioNano, the sublicenses granted herein may be assigned to or assumed by the acquiring party without the consent of PacBio. However, in the event that the Sequencing Field Option has already been exercised at the time of the Acquisition, […***…]; otherwise, if and when the Sequencing Field Option is exercised after the Acquisition, the […***…]. Notwithstanding the foregoing, if BioNano's Affiliate is Acquired and such Affiliate is no longer an Affiliate of BioNano after such transaction, the sublicenses granted herein to such Affiliate will terminate.

11.4 Severability. If one or more provisions of this Agreement is held to be invalid, illegal or unenforceable, the Parties shall substitute, by mutual consent, valid provisions for such invalid, illegal or unenforceable provisions which valid provisions are, in their economic effect, sufficiently similar to the invalid provisions that it can be reasonably assumed that the Parties would have entered into this Agreement with such provisions. In the event that such provisions cannot be agreed upon, the invalidity, illegality or unenforceability of one or more provisions of the Agreement shall not affect the validity of this Agreement as a whole, unless the invalid provisions are of such essential importance to this Agreement that it is to be reasonably assumed that the Parties would not have entered into this Agreement without such invalid provisions.

11.5 Notices. Any notice, consent or report required or permitted to be given or made under this Agreement by one Party to the other Party shall be in English and in writing, delivered personally or by facsimile (receipt verified and a copy promptly sent by personal delivery, U.S.

first class mail or express courier providing evidence of receipt, postage prepaid (where applicable)), or by U.S. first class mail or express courier providing evidence of receipt, postage prepaid (where applicable), at the following address for a Party (or such other address for a Party as may be specified by like notice):

To PacBio:

Pacific Biosciences of California, Inc.
1380 Willow Rd.
Menlo Park, CA 94025

Attention: Legal Department

Facsimile: (650) 323-9420

To BioNano:

BioNano Genomics, Inc.
9640 Towne Centre Drive, Ste. 100
San Diego, CA 92121

Attention: Chief Executive Officer

Facsimile: (858) 888-7601

All such notices, consents or reports shall be effective upon receipt.

11.6 Applicable Law. This Agreement shall be governed by and construed in accordance with the laws of State of California, without regard to the conflicts of law principles thereof. Any claim or dispute arising out of or related to this Agreement shall be subject to the sole jurisdiction and venue of the state and federal courts located in Santa Clara County.

11.7 LIMITATION OF LIABILITY. NEITHER PARTY SHALL BE LIABLE TO THE OTHER FOR ANY PUNITIVE, SPECIAL, CONSEQUENTIAL, INCIDENTAL OR INDIRECT DAMAGES ARISING OUT OF THIS AGREEMENT, HOWEVER CAUSED, UNDER ANY THEORY OF LIABILITY; PROVIDED HOWEVER THAT NOTHING IN THIS SECTION 11.7 SHALL BE DEEMED TO LIMIT THE INDEMNIFICATION OBLIGATIONS OF EITHER PARTY UNDER ARTICLE 10 TO THE EXTENT A THIRD PARTY RECOVERS ANY PUNITIVE, SPECIAL, CONSEQUENTIAL, INCIDENTAL OR INDIRECT DAMAGES FROM AN INDEMNITEE.

11.8 Entire Agreement. This Agreement (including the Exhibits attached hereto) contains the entire agreement by the Parties with respect to the subject matter hereof and supersede any prior and contemporaneous express or implied agreements, understandings and

representations, either oral or written, which may have related to the subject matter hereof in any way.

11.9 Interpretation. The captions to the several Articles and Sections of this Agreement are not a part of this Agreement, but are included for convenience of reference and shall not affect its meaning or interpretation. In this Agreement: (a) the word "including" shall be deemed to be followed by the phrase "without limitation" or like expression; (b) the singular shall include the plural and *vice versa*; and (c) masculine, feminine and neuter pronouns and expressions shall be interchangeable. The Parties acknowledge and agree that they have selected the up-front, option and royalty payment structure for the Mapping Field and Sequencing Field, as described in this Agreement, as the most appropriate and convenient approach to determine the value of the sublicense to BioNano under the Sublicensed Patents, as described in this Agreement.

11.10 Independent Contractors. It is expressly agreed that PacBio and BioNano shall be independent contractors and that the relationship between the two Parties shall not constitute a partnership, joint venture or agency or fiduciary relationship. Neither PacBio nor BioNano shall have the authority to make any statements, representations or commitments of any kind, or to take any action, which shall be binding on the other Party, without the prior written consent of the other Party to do so.

11.11 Waiver; Amendment. Except as otherwise expressly provided in this Agreement, any term of this Agreement may be waived only by a written instrument executed by a duly authorized representative of the Party waiving compliance. The delay or failure of any Party at any time to require performance of any provision of this Agreement shall in no manner affect such Party's rights at a later time to enforce the same. This Agreement may be amended, and any term of this Agreement may be modified, only by a written instrument executed by a duly authorized representative of each Party.

11.12 Counterparts. This Agreement may be executed in two (2) or more counterparts, each of which shall be deemed an original, but all of which together shall constitute one and the same instrument.

11.13 Binding Effect. This Agreement shall be binding upon and inure to the benefit of the Parties and their respective legal representatives, successors and permitted assigns.

[Remainder of page intentionally left blank.]

IN WITNESS WHEREOF, the Parties have executed this Agreement as of the date first set forth above.

PACIFIC BIOSCIENCES OF CALIFORNIA, INC.

BY: /s/ Stephen M. Moore
NAME: Stephen M. Moore
TITLE: Vice President & General Counsel

BIONANO GENOMICS, INC.

BY: /s/ R. Erik Holmlin
NAME: R. Erik Holmlin
TITLE: President & CEO

EXHIBIT 1.7

Sublicensed Patents

Family	Patent No.	Title
1	[***]	[***]
2	[***]	[***]
	[*]**	**[***]**
	[*]**	**[***]**
3	[***]	[***]
4	[***]	[***]
	[*]**	**[***]**
5	[***]	[***]
	[*]**	**] ***]**

*****Confidential Treatment Requested**

EXHIBIT 2.4

Financial Provisions for Sequencing Products

A. "Net Sales" shall mean […***…].

Each of the foregoing […***…].

Net Sales also includes the […***…].

B. Royalty Payments.

(a) Royalty Rate. Subject to the terms and conditions of this Agreement, if BioNano exercises the Sequencing Field Option, BioNano shall pay to PacBio a royalty of […***…].

(b) Currency Conversion. If any currency conversion shall be required in connection with the payment of any royalties under this Agreement, such conversion shall be made by using the average of the exchange rates for the purchase and sale of United States Dollars […***…].

(c) One Royalty. No more than one royalty payment shall be due with respect to a sale of a particular unit of Sequencing Product.

(d) Royalty Payment Terms. Royalties with respect to Net Sales for a given […***…] shall be due and payable on […***…]. Late payments shall be subject to a per annum interest charge equal […***…].

C. Reporting.

(a) Commencing on the first commercial sale of a Sequencing Product in any country in the Territory, BioNano shall furnish to PacBio a written report for each calendar quarter during the term of this Agreement showing:

(i) […***…] of all Sequencing Products sold by BioNano and its Affiliates in the Territory during such calendar quarter and […***…];

(ii) the royalties, payable in United States Dollars, which shall have accrued under this Agreement based upon such Net Sales of the Sequencing Products;

(iii) […***…] not previously reported; and

(iv) the exchange rates used in determining the amount of royalties payable in United States Dollars, as more specifically provided in Section B(b) above.

(b) Reports to be provided by BioNano to PacBio shall be due […***…] following the close of each calendar quarter.

D. No Royalty Avoidance. BioNano agrees that it will not intentionally structure its Net Sales or the consideration or compensation that it receives or is entitled to receive in such a way as to avoid any payment that would otherwise be due to PacBio under this Agreement.

E. Records. BioNano shall keep and maintain, and shall require that its Affiliates keep and maintain, any and all records necessary to certify compliance of BioNano and its Affiliates with this Agreement, including but not limited to accounting general ledgers, distributor agreements, price lists, catalogs, marketing materials, audited financial statements, income tax returns, sales tax returns, inventory records, and shipping documents of Licensed Products. […***…], which shall not unreasonably withhold such acceptance. As between the Parties, […***…]. However, if the results of any […***…] reveal additional royalties owed to PacBio that differ by more the […***…] from those royalties already paid, BioNano shall […***…]. PacBio agrees to hold such records confidential, […***…]. The records required by this paragraph shall be maintained and available for inspection for a period of […***…] following the calendar quarter to which they pertain. This paragraph shall survive termination of this Agreement.

EXHIBIT 3.2

[…*…] Licenses**

Mapping Field

[…***…]

Sequencing Field

[…***…]

*****Confidential Treatment Requested**

BIONANO GENOMICS, INC.

NOTE PURCHASE AGREEMENT

THIS NOTE PURCHASE AGREEMENT (this "***Agreement***") is made and entered into as of February 9, 2018, by and among **BIONANO GENOMICS, INC.**, a Delaware corporation (the "***Company***"), and the persons and entities listed on the Schedule of Investors attached hereto as **EXHIBIT A** (individually, an "***Investor***" and collectively, the "***Investors***").

RECITALS

WHEREAS, in order to provide the Company with additional capital to conduct its business, the Investors are willing to loan to the Company up to an aggregate amount of $15,960,000, subject to the conditions specified herein, and in exchange for such loan, the Company will issue convertible promissory notes to each Investor as set forth herein.

AGREEMENT

NOW THEREFORE, the parties to this Agreement, for good and valuable consideration, the receipt and sufficiency of which is acknowledged and agreed, hereby agree as follows:

1. LOAN AMOUNT; ISSUANCE OF NOTES.

(a) First Closing. Subject to the terms of this Agreement, each Investor agrees, severally and not jointly, to lend to the Company at the First Closing (as defined below) the amount set forth under the heading "First Closing Loan Amount" opposite such Investor's name on the Schedule of Investors attached hereto as **EXHIBIT A** against the issuance and delivery by the Company to such Investor of a Convertible Promissory Note for such amount in the form attached hereto as **EXHIBIT B-1**, with respect to the First Closing, and **EXHIBIT B-2**, with respect to each Additional Closing (a "***Note***" and collectively with any other such notes issued pursuant to this Agreement, the "***Notes***"). The Investors participating in the First Closing shall be referred to as the "***First Closing Investors***."

(b) Additional Closing(s). If the aggregate principal amount of the Notes purchased at the First Closing is less than $15,960,000, then at any time on or before the earlier of the consummation of a Qualified Financing (as defined in the Notes) or March 15, 2018 (the "***Outside Date***"), or such later date as is approved by the Investors holding at least 60% of the then-outstanding and unpaid principal and interest under all Notes (the "***Requisite Investors***"), the Company may sell up to the balance of the authorized Notes not sold at the First Closing in one or more additional closings (each such closing, an "***Additional Closing***" and each of the First Closing and each Additional Closing, a "***Closing***") to First Closing Investors or such other "accredited investors" (as defined in Rule 501 of Regulation D under the Securities Act of 1933, as amended (the "***Securities Act***")) as are acceptable to the Company and the Requisite Investors ("***Eligible Additional Investors***"); *provided*, *however*, that the participation by the eligible investors up to the amounts set forth on **EXHIBIT C** attached hereto shall be considered acceptable to the Company and the Requisite Investors. Each Eligible Additional Investor who elects to acquire Notes at an Additional Closing shall become a party to this Agreement by

signing a counterpart signature page hereto (if such Eligible Additional Investor is not already a party hereto) and the Schedule of Investors attached hereto shall be amended to reflect the amount each Eligible Additional Investor has agreed to lend the Company in the column entitled "Additional Closing Loan Amount" (each such amount and the First Closing Investors' "First Closing Loan Amount," a "***Loan Amount***"). All loans made at an Additional Closing shall be made on the terms and conditions set forth in this Agreement, and the representations and warranties of the Company set forth in Section 3 hereof and the representations and warranties set forth in Section 4 hereof of the Investors participating in such Additional Closing shall speak as of the date of such Additional Closing. Any Notes issued pursuant to this Section 1(b) shall be deemed to be "Notes" for all purposes under this Agreement and any Eligible Additional Investor signing a counterpart signature page to this Agreement shall be deemed to be an "Investor" for all purposes under this Agreement. On each Additional Closing Date (as defined below), each Eligible Additional Investor electing to participate in such Additional Closing (the "***Additional Closing Investors***") shall lend to the Company at such Additional Closing the amount set forth opposite its name under the column entitled "Additional Closing Loan Amount" on the Schedule of Investors attached hereto (as may be amended as described above) against the issuance and delivery by the Company of a Note for such Loan Amount.

2. THE CLOSING.

(a) Closing Dates. The closing of the purchase and sale of at least $6,000,000 of the Notes pursuant to Section 1(a) hereof (the "***First Closing***") shall be held within five days of the date of this Agreement at the offices of Cooley LLP, 4401 Eastgate Mall, SanDiego, California 92121, or at such other time and place as the Company and the First Closing Investors shall agree. Any Additional Closing(s) shall be held at any time on or before the Outside Date as the Company and the Additional Closing Investors participating in such Additional Closing shall agree (each such date, an "***Additional Closing Date***").

(b) Delivery. At each Closing (i) each Investor participating in such Closing will deliver to the Company, by check or wire transfer, funds in the amount set forth opposite each Investor's name on **EXHIBIT A**; and (ii) the Company and each Investor participating in such Closing shall deliver to each other a duly executed Note for such Investor's applicable Loan Amount.

3. REPRESENTATIONS AND WARRANTIES OF THE COMPANY.

The Company hereby represents and warrants to each Investor as of the date of this Agreement as follows:

(a) Organization, Good Standing and Qualification. The Company is a corporation duly incorporated, validly existing and in good standing under the laws of the State of Delaware. The Company has the requisite corporate power and authority to own and operate its properties and assets, to execute and deliver this Agreement and the Notes (collectively, the "***Loan Documents***"), to issue and sell the Securities (as defined below), to carry out the provisions of this Agreement and the other Loan Documents and to carry on its business as presently conducted and as presently proposed to be conducted. The Company is duly

qualified to do business and is in good standing as a foreign corporation in all jurisdictions in which the nature of its activities and of its properties (both owned and leased) makes such qualification necessary, except for those jurisdictions in which failure to do so would not have a material adverse effect on the Company or its business.

(b) Authorization. All corporate action on the part of the Company, its officers, directors and stockholders necessary for the authorization, execution, delivery and performance of this Agreement and the other Loan Documents by the Company and the performance of the Company's obligations hereunder and thereunder, including the issuance and delivery of the Notes and the reservation of the Company's Preferred Stock issuable pursuant to the Notes (together with the Notes, the "***Securities***") has been taken or will be taken prior to the issuance of such Securities, as applicable. The Loan Documents, when executed and delivered by the Company, shall constitute valid and binding obligations of the Company enforceable against the Company in accordance with their terms, subject to laws of general application relating to bankruptcy, insolvency, the relief of debtors and, with respect to rights to indemnity, subject to federal and state securities laws. The Securities, when issued in compliance with the provisions of the Loan Documents, will be validly issued, fully paid and nonassessable. The issuance of the Securities pursuant to the provisions of this Agreement will not violate any preemptive rights or rights of first refusal granted by the Company that will not be validly complied with or waived. The Securities, when issued in compliance with the provisions of the Loan Documents, will be free of any liens or encumbrances, other than any liens or encumbrances created by or imposed upon the Investors through no action of the Company and restrictions on transfer as set forth in the Loan Documents or under state and/or federal securities laws.

(c) Consents. All consents, approvals, orders, or authorizations of, or registrations, qualifications, designations, declarations, or filings with, any governmental authority, stockholder or other third party, required on the part of the Company in connection with the valid execution and delivery of the Loan Documents, the offer, sale or issuance of the Securities, or the consummation of any other transaction contemplated hereby shall have been obtained and will be effective at each Closing, except for notices required or permitted to be filed with certain state and federal securities commissions, which notices will be filed on a timely basis in accordance with applicable law.

(d) Compliance with Laws. To its knowledge, the Company is not in violation of any applicable statute, rule, regulation, order or restriction of any domestic or foreign government or any instrumentality or agency thereof in respect of the conduct of its business or the ownership of its properties, which violation of which would materially and adversely affect the business, assets, liabilities, financial condition, operations or prospects of the Company.

(e) Compliance with Other Instruments. The Company is not in violation or default of any term of its Amended and Restated Certificate of Incorporation or Amended and Restated Bylaws (the "***Bylaws***"), or of any provision of any mortgage, indenture or contract to which it is a party and by which it is bound or of any judgment, decree, order or writ, other than such violation(s) that would not have a material effect on the Company. The execution, delivery and performance of this Agreement and the other Loan Documents, and the

consummation of the transactions contemplated hereby or thereby will not result in any such violation or be in conflict with, or constitute, with or without the passage of time and giving of notice, either a default under any such provision, instrument, mortgage, indenture contract, judgment, decree, order or writ or an event that results in the creation of any lien, charge or encumbrance upon any assets of the Company or the suspension, revocation, impairment, forfeiture, or nonrenewal of any material permit, license, authorization or approval applicable to the Company, its business or operations or any of its assets or properties. Without limiting the foregoing, the Company has obtained all waivers reasonably necessary with respect to any preemptive rights, rights of first refusal or similar rights, including any notice or offering periods provided for as part of any such rights, in order for the Company to consummate the transactions contemplated hereunder without any third party obtaining any rights to cause the Company to offer or issue any securities of the Company as a result of the consummation of the transactions contemplated hereunder.

(f) Offering. Assuming the accuracy of the representations and warranties of the Investors contained in Section 4 hereof, the offer, issue, and sale of the Securities are and will be exempt from the registration and prospectus delivery requirements of the Securities Act, and have been registered or qualified (or are exempt from registration and qualification) under the registration, permit, or qualification requirements of all applicable state securities laws.

(g) Disclosure. The Company has made available to the Investors all the information reasonably available to the Company that the Investors have requested. No representation or warranty of the Company contained in this Agreement and no certificate furnished or to be furnished to Investors at the Closing as required by this Agreement contains any untrue statement of a material fact or, to the Company's knowledge, omits to state a material fact necessary in order to make the statements contained herein or therein not misleading in light of the circumstances under which they were made. It is understood that this representation is qualified by the fact that the Company has not delivered to the Investors, and has not been requested to deliver, a private placement or similar memorandum or any written disclosure of the types of information customarily furnished to purchasers of securities.

4. REPRESENTATIONS AND WARRANTIES OF THE INVESTORS.

Each Investor, severally and not jointly, hereby represents and warrants to the Company as follows:

(a) Purchase for Own Account. Such Investor represents that it is acquiring the Securities solely for its own account and beneficial interest for investment and not for sale or with a view to distribution of the Securities or any part thereof, has no present intention of selling (in connection with a distribution or otherwise), granting any participation in, or otherwise distributing the same, and does not presently have reason to anticipate a change in such intention.

(b) Information and Sophistication. Without lessening or obviating the representations and warranties of the Company set forth in Section 3, such Investor (i) acknowledges that it has received all the information it has requested from the Company and it considers necessary or appropriate for deciding whether to acquire the Securities, (ii) represents

that it has had an opportunity to ask questions and receive answers from the Company regarding the terms and conditions of the offering of the Securities and to obtain any additional information necessary to verify the accuracy of the information given such Investor and (iii) further represents that it has such knowledge and experience in financial and business matters that it is capable of evaluating the merits and risk of this investment.

(c) Ability to Bear Economic Risk. Such Investor acknowledges that investment in the Securities involves a high degree of risk, and represents that it is able, without materially impairing its financial condition, to hold the Securities for an indefinite period of time and to suffer a complete loss of its investment.

(d) Further Limitations on Disposition. Without in any way limiting the representations set forth above, such Investor further agrees not to make any disposition of all or any portion of the Securities unless and until:

(i) There is then in effect a registration statement under the Securities Act covering such proposed disposition and such disposition is made in accordance with such registration statement; or

(ii) (A) The transferee has agreed in writing to be bound by the terms of the Loan Documents (except as provided in the last sentence of this Section 4(d)(ii)), (B) such Investor shall have notified the Company of the proposed disposition and shall have furnished the Company with a detailed statement of the circumstances surrounding the proposed disposition, and (C) if reasonably requested by the Company, such Investor shall have furnished the Company with an opinion of counsel, reasonably satisfactory to the Company, that such disposition will not require registration of such shares under the Securities Act. It is agreed that the Company will not require opinions of counsel for transactions made pursuant to Rule 144 of the Securities Act, except in unusual circumstances. After the Company's first firm commitment underwritten public offering of its Common Stock registered under the Securities Act (the "***Initial Offering***"), the Company will not require the transferee to be bound by the terms of this Agreement.

(e) Notwithstanding the provisions of subsection (d) above, no such restriction shall apply to a transfer by an Investor that is (i) a partnership transferring to its partners or former partners in accordance with partnership interests, (ii) a corporation transferring to a wholly-owned subsidiary or a parent corporation that owns all of the capital stock of the Investor, (iii) a limited liability company transferring to its members or former members in accordance with their interests in the limited liability company, (iv) an Investor transferring to its affiliated venture capital fund or (v) an individual transferring to the Investor's family member or trust for the benefit of an individual Investor (each such transferee, an "***Affiliate***" of such Investor); *provided*, that in each case the Affiliate will agree in writing to be subject to the terms of this Agreement to the same extent as if such Affiliate were an original Investor hereunder (except as provided in the last sentence of Section 4(d)(ii)).

(f) Each Investor understands and agrees that all certificates evidencing the Securities to be issued to such Investor shall be stamped or otherwise imprinted with legends

substantially similar to the following (in addition to any legend required under the Company's Bylaws and applicable state securities laws):

THE SECURITIES REPRESENTED HEREBY HAVE NOT BEEN REGISTERED UNDER THE SECURITIES ACT OF 1933, AS AMENDED (THE "***ACT***"), AND MAY NOT BE OFFERED, SOLD OR OTHERWISE TRANSFERRED, ASSIGNED, PLEDGED OR HYPOTHECATED UNLESS AND UNTIL REGISTERED UNDER THE ACT OR UNLESS THE COMPANY HAS RECEIVED AN OPINION OF COUNSEL SATISFACTORY TO THE COMPANY AND ITS COUNSEL THAT SUCH REGISTRATION IS NOT REQUIRED.

THE SALE, PLEDGE, HYPOTHECATION OR TRANSFER OF THE SECURITIES REPRESENTED BY THIS CERTIFICATE IS SUBJECT TO THE TERMS AND CONDITIONS OF A CERTAIN NOTE PURCHASE AGREEMENT BY AND BETWEEN THE STOCKHOLDER AND THE COMPANY. COPIES OF SUCH AGREEMENT MAY BE OBTAINED UPON WRITTEN REQUEST TO THE SECRETARY OF THE COMPANY.

(g) Accredited Investor Status. Each Investor is an "accredited investor" as such term is defined in Rule 501 under the Securities Act.

(h) Foreign Investor. Each Investor that is a foreign person or a U.S. subsidiary or affiliate of a foreign parent company (a "***Foreign Investor***") shall notify the Company of its status as a Foreign Investor and the aggregate number of shares of the Company's capital stock and any security held, directly or indirectly, by the Foreign Investor that is convertible into shares of the Company's capital stock.

5. MARKET STAND-OFF AGREEMENT.

(a) Each Investor hereby agrees that such Investor shall not sell, transfer, make any short sale of, grant any option for the purchase of, or enter into any hedging or similar transaction with the same economic effect as a sale, any Common Stock (or other securities) of the Company held by such Investor (other than those included in the registration) during the 180-day period following the effective date of the Initial Offering (or such longer period as the underwriters or the Company shall in good faith request in order to facilitate compliance with NASD Rule 2711 or NYSE Member Rule 472 or any successor or similar rule or regulation); *provided*, that, all officers and directors of the Company are bound by and have entered into similar agreements.

(b) Each Investor agrees to execute and deliver such other agreements as may be reasonably requested by the Company or the underwriter that are consistent with the Investor's obligations under Section 5(a) or that are necessary to give further effect thereto. In addition, if requested by the Company or the representative of the underwriters of Common Stock (or other securities) of the Company, each Investor shall provide, within 10 days of such request, such information as may be required by the Company or such representative in

connection with the completion of any public offering of the Company's securities pursuant to a registration statement filed under the Securities Act. The obligations described in Section 5(a) and this Section 5(b) shall not apply to (i) a registration statement relating to any employee benefit plan or (ii) with respect to any corporate reorganization or transaction under Rule 145 of the Securities Act, any registration statements related to the issuance or resale of securities issued in such a transaction or (iii) a registration related to stock issued upon conversion of debt securities. The Company may impose stop-transfer instructions with respect to the shares of Common Stock (or other securities) subject to the foregoing restriction until the end of said day period. Each Investor agrees that any transferee of any Securities shall be bound by this Section 5. The underwriters of the Company's stock are intended third party beneficiaries of this Section 5 and shall have the right, power and authority to enforce the provisions hereof as though they were a party hereto.

6. SECURITY.

6.1 Ranking. Except for the Existing Loan, each Note shall be senior in all respects (including the right of payment) to all other indebtedness of the Company, now or hereafter existing, provided that each Note will rank *pari passu* with the other Notes issued by the Company.

6.2 Senior Indebtedness. The indebtedness evidenced by this Agreement is subordinated in right of payment to the prior payment in full of all amounts due in connection with that certain Loan and Security Agreement by and among the Company and Western Alliance Bank, as amended on December 9, 2016 (the "***Existing Loan***"). Furthermore, the indebtedness evidenced under this Agreement is subject to the terms of the Subordination Agreement, in the form attached hereto as **Exhibit D** (the "***Subordination Agreement***"), to be entered into by and among the Company, Western Alliance Bank and the Investors, and in the event of any conflict between the terms hereof and the Subordination Agreement, the respective terms of the Subordination Agreement shall prevail.

7. USE OF PROCEEDS. The Company shall use the proceeds received from its issuance of the Notes solely for its working capital, capital expenditure, marketing and operational expenses, subject to Section 8 below.

8. NEGATIVE COVENANTS. In addition to the rights of the Investors in the Company's currently effective certificate of incorporation and agreements amongst stockholders, without the prior written consent of the Investors holding a majority of the then-outstanding and unpaid principal and interest under all Notes, the Company shall not do any of the following:

8.1 repay or amend the terms of existing indebtedness, other than the Existing Loan in accordance with its terms; and

8.2 create or incur or authorize the creation or incurrence of any new indebtedness (or any increase of any existing indebtedness as of the date hereof).

9. FURTHER ASSURANCES. The Company and each Investor agree and covenant that at any time and from time to time it will promptly execute and deliver to each other such further

instruments and documents and take such further action as each of the parties hereto may reasonably require in order to carry out the full intent and purpose of this Agreement.

10. MISCELLANEOUS.

(a) Binding Agreement. The terms and conditions of this Agreement shall inure to the benefit of and be binding upon the respective successors and assigns of the parties. Nothing in this Agreement, express or implied, is intended to confer upon any third party any rights, remedies, obligations, or liabilities under or by reason of this Agreement, except as expressly provided in this Agreement.

(b) Governing Law. This Agreement shall be governed by and construed under the laws of the State of California in all respects as such laws are applied to agreements among California residents entered into and performed entirely within California, without giving effect to conflict of law principles thereof. The parties agree that any action brought by either party under or in relation to this Agreement, including without limitation to interpret or enforce any provision of this Agreement, shall be brought in, and each party agrees to and does hereby submit to the jurisdiction and venue of, any state or federal court located in the State of California.

(c) Counterparts; Facsimile and PDF. This Agreement may be executed in any number of counterparts, each of which shall be an original, but all of which together shall constitute one instrument. Signatures delivered by facsimile or electronic transmission shall have the same effect as originals.

(d) Expenses; Attorney's Fees. Each party shall pay all costs and expenses that it incurs with respect to the negotiation, execution and delivery of the Agreement. If any action at law or in equity (including arbitration) is necessary to enforce or interpret the terms of any of the Loan Documents, the prevailing party shall be entitled to reasonable attorneys' fees, costs and necessary disbursements in addition to any other relief to which such party may be entitled.

(e) Titles and Subtitles. The titles and subtitles used in this Agreement are used for convenience only and are not to be considered in construing or interpreting this Agreement.

(f) Notices. All notices required or permitted hereunder or under the other Loan Documents shall be in writing and shall be deemed effectively given: (i) upon personal delivery to the party to be notified, (ii) when sent by confirmed electronic mail, telex or facsimile if sent during normal business hours of the recipient, if not, then on the next business day, (iii) five days after having been sent by registered or certified mail, return receipt requested, postage prepaid, or (iv) one day after deposit with a nationally recognized overnight courier, specifying next day delivery, with written verification of receipt. All communications shall be sent to the Company at the address as set forth on the signature page hereof and the Investors at the addresses set forth on **Exhibit A** attached hereto or at such other address or electronic mail address as the Company or an Investor may designate by 10 days advance written notice to the other parties hereto.

(g) Amendment; Waiver. No amendment or waiver of any provision of this Agreement shall be effective unless in writing and approved by the Company and the Requisite Investors.

(h) Delays or Omissions. It is agreed that no delay or omission to exercise any right, power or remedy accruing to each Investor, upon any breach or default of the Company under this Agreement or any other Loan Document shall impair any such right, power or remedy, nor shall it be construed to be a waiver of any such breach or default, or any acquiescence therein, or of or in any similar breach or default thereafter occurring; nor shall any waiver of any single breach or default be deemed a waiver of any other breach or default theretofore or thereafter occurring. It is further agreed that any waiver, permit, consent or approval of any kind or character by Investor of any breach or default under this Agreement, or any waiver by any Investor of any provisions or conditions of this Agreement must be in writing and shall be effective only to the extent specifically set forth in writing and that all remedies, either under this Agreement, or by law or otherwise afforded to the Investor, shall be cumulative and not alternative.

(i) Entire Agreement. This Agreement and the Exhibits hereto and thereto constitute the full and entire understanding and agreement between the parties with regard to the subjects hereof and no party shall be liable or bound to any other party in any manner by any representations, warranties, covenants and agreements except as specifically set forth herein.

(j) Severability. Each of the provisions of this Agreement is severable. If any such provision is held to be or becomes illegal, invalid or unenforceable in any respect under the law of any jurisdiction, it shall have no effect on any other provisions of this Agreement and (a) the parties shall use their reasonable efforts to replace such provision with a suitable and equitable provision in order to carry out as closely as is possible, so far as may be valid and enforceable, the intent and purpose of such illegal, invalid or unenforceable provision and (b) the remainder of this Agreement and the application of such provision to other persons or circumstances shall not be affected by such illegality, invalidity or unenforceability, nor shall such illegality, invalidity or unenforceability affect the validity or enforceability of such provision, or the application thereof, in any other jurisdiction.

(k) Corporate Securities Law. THE SALE OF THE SECURITIES WHICH ARE THE SUBJECT OF THIS AGREEMENT HAS NOT BEEN QUALIFIED WITH THE COMMISSIONER OF CORPORATIONS OF THE STATE OF CALIFORNIA AND THE ISSUANCE OF THE SECURITIES OR THE PAYMENT OR RECEIPT OF ANY PART OF THE CONSIDERATION THEREFOR PRIOR TO THE QUALIFICATION IS UNLAWFUL, UNLESS THE SALE OF SECURITIES IS EXEMPT FROM THE QUALIFICATION BY SECTION 25100, 25102 OR 25105 OF THE CALIFORNIA CORPORATIONS CODE. THE RIGHTS OF ALL PARTIES TO THIS AGREEMENT ARE EXPRESSLY CONDITIONED UPON THE QUALIFICATION BEING OBTAINED UNLESS THE SALE IS SO EXEMPT.

[REMAINDER OF THIS PAGE INTENTIONALLY LEFT BLANK]

IN WITNESS WHEREOF, the parties have executed this **NOTE PURCHASE AGREEMENT** as of the date first written above.

COMPANY:

BIONANO GENOMICS, INC.

By: /s/ R. Erik Holmlin, Ph.D.
Name: R. Erik Holmlin, Ph.D.
Title: Chief Executive Officer

Address for notice:

9640 Towne Centre Dr, #100
San Diego, CA 92121

IN WITNESS WHEREOF, the parties have executed this **NOTE PURCHASE AGREEMENT** as of the date first written above.

INVESTOR:

ALEXANDRIA VENTURE INVESTMENTS, LLC
By: Alexandria Real Estate Equities, Inc.,
its managing member

By: /s/ Aaron Jacobson
Name: Aaron Jacobson
Title: VP – Corporate Counsel

IN WITNESS WHEREOF, the parties have executed this **NOTE PURCHASE AGREEMENT** as of the date first written above.

INVESTORS:

DOMAIN PARTNERS VIII, L.P.
By: One Palmer Square Associates VIII, L.L.C., its General Partner

By: /s/ Lisa A Kraeutler
Name: Lisa A. Kraeutler
Title: Attorney-in-fact

DP VIII ASSOCIATES, L.P.
By: One Palmer Square Associates VIII, L.L.C., its General Partner

By: /s/ Lisa A Kraeutler
Name: Lisa A. Kraeutler
Title: Attorney-in-fact

IN WITNESS WHEREOF, the parties have executed this **NOTE PURCHASE AGREEMENT** as of the date first written above.

INVESTOR:

ETP GLOBAL FUND, LP
By: Emerging Technology Partners LLC, its General Partner

By: /s/ James K. Hu
Name: James K. Hu
Title: Managing Director

IN WITNESS WHEREOF, the parties have executed this **NOTE PURCHASE AGREEMENT** as of the date first written above.

INVESTOR:

LC HEALTHCARE FUND I, L.P.

By: /s/ Jafar Wang
Name: Jafar Wang
Title: Managing Director

IN WITNESS WHEREOF, the parties have executed this **NOTE PURCHASE AGREEMENT** as of the date first written above.

INVESTOR:

MONASHEE INVESTMENT MANAGEMENT, LLC

By: /s/ Jeff Muller
Name: Jeff Muller
Title: CCO

IN WITNESS WHEREOF, the parties have executed this **NOTE PURCHASE AGREEMENT** as of the date first written above.

INVESTOR:

ROBERT AUSTIN

/s/ Robert Austin

IN WITNESS WHEREOF, the parties have executed this **NOTE PURCHASE AGREEMENT** as of the date first written above.

INVESTOR:

ROSY SHINE LIMITED

By: /s/ Hao Ouyang
Name: Hao Ouyang
Title: Director

LIST OF EXHIBITS

Exhibit A:	Schedule of Investors
Exhibit B-1:	Form of Convertible Promissory Note at the First Closing
Exhibit B-2:	Form of Convertible Promissory Note at each Additional Closing
Exhibit C:	List of Approved Additional Investors
Exhibit D:	Form of Subordination Agreement

EXHIBIT A

SCHEDULE OF INVESTORS

FIRST CLOSING:

NAME & ADDRESS	FIRST CLOSING LOAN AMOUNT
ROSY SHINE LIMITED Legend Capital, 10F, Tower A, Raycom Infotech Park, No.2 Kexueyuan South Road, Zhongguancun, Haidian District Beijing 100190 PRC	$ 5,000,000
LC HEALTHCARE FUND I, L.P. Legend Capital, 10F, Tower A, Raycom Infotech Park, No.2 Kexueyuan South Road, Zhongguancun, Haidian District Beijing 100190 PRC	$ 3,460,000
ETP GLOBAL FUND, LP 9620 Medical Center Drive, #200 Rockville, MD 20850	$ 3,000,000
DOMAIN PARTNERS VIII, L.P. One Palmer Square, Suite 515 Princeton, NJ 08542	$ 1,488,952
DP VIII ASSOCIATES, L.P. One Palmer Square, Suite 515 Princeton, NJ 08542	$ 11,048
ALEXANDRIA VENTURE INVESTMENTS, LLC Attn: Krystal Garcia 385 Colorado Blvd., Suite 299 Pasadena, CA 91101	$ 250,000
MONASHEE INVESTMENT MANAGEMENT, LLC Attn: Tom Wynn 125 High Street High Street Tower 28 Boston, MA 02110	$ 161,375
ROBERT AUSTIN 135 Harris Road Princeton, NJ 08540	$ 757
Total:	**$ 13,372,132.00**

ADDITIONAL CLOSING:

NAME & ADDRESS	ADDITIONAL CLOSING LOAN AMOUNT
[TBD]	**[TBD]**

EXHIBIT B-1

FORM OF CONVERTIBLE PROMISSORY NOTE AT THE FIRST CLOSING

THIS NOTE AND THE SECURITIES ISSUABLE HEREUNDER HAVE NOT BEEN REGISTERED UNDER THE SECURITIES ACT OF 1933, AS AMENDED (THE "*ACT*"), AND MAY NOT BE OFFERED, SOLD OR OTHERWISE TRANSFERRED, ASSIGNED, PLEDGED OR HYPOTHECATED UNLESS AND UNTIL REGISTERED UNDER THE ACT OR UNLESS THE COMPANY HAS RECEIVED AN OPINION OF COUNSEL SATISFACTORY TO THE COMPANY AND ITS COUNSEL THAT SUCH REGISTRATION IS NOT REQUIRED.

THE SALE, PLEDGE, HYPOTHECATION OR TRANSFER OF THIS NOTE AND THE SECURITIES ISSUABLE HEREUNDER IS SUBJECT TO THE TERMS AND CONDITIONS OF A CERTAIN NOTE PURCHASE AGREEMENT BY AND BETWEEN THE HOLDER AND THE COMPANY. COPIES OF SUCH AGREEMENT MAY BE OBTAINED UPON WRITTEN REQUEST TO THE SECRETARY OF THE COMPANY.

THIS NOTE (AND ALL PAYMENT AND ENFORCEMENT PROVISIONS HEREIN) (THE "*NOTE*") IS AN UNSECURED OBLIGATION OF THE COMPANY AND IS SUBJECT TO THE TERMS OF A SUBORDINATION AGREEMENT DATED AS OF FEBRUARY [7], 2018, BY AND AMONG THE COMPANY, THE HOLDER, WESTERN ALLIANCE BANK AND OTHER PARTIES THERETO (THE "*SUBORDINATION AGREEMENT*"). IN THE EVENT OF ANY INCONSISTENCY BETWEEN THIS NOTE AND THE SUBORDINATION AGREEMENT, THE TERMS OF THE SUBORDINATION AGREEMENT SHALL CONTROL.

BIONANO GENOMICS, INC.

CONVERTIBLE PROMISSORY NOTE

$[_____] [_____], 2018
San Diego, California

FOR VALUE RECEIVED, BIONANO GENOMICS, INC., a Delaware corporation (the "***Company***"), hereby promises to pay to the order of **[_____]** (the "***Holder***"), the principal sum of up to $[_____] (the "***Loan Amount***"), together with accrued and unpaid interest thereon, each due and payable on the date and in the manner set forth below.

This Note is part of a series of similar notes (collectively, the "***Notes***") issued pursuant to the terms of that certain Note Purchase Agreement dated as of February [8], 2018, among the Company and the Investors listed on the Schedule of Investors attached thereto as Exhibit A (as may be amended from time to time, the "***Purchase Agreement***"). Capitalized terms used and not otherwise defined herein shall have the meanings given them in the Purchase Agreement.

1. Maturity Date. Unless converted into equity securities of the Company or repaid pursuant to Sections 5 or 6 hereof, subject to the provisions of Sections 6 and 9 below, the entire outstanding principal balance and all unpaid accrued interest hereof shall, upon written election of the Requisite Investors, become fully due and payable to the Holder on September 30, 2018, or such later date as is approved by the Requisite Investors (the "***Maturity Date***").

2. Interest. Interest shall accrue on the outstanding principal amount hereof from the date of this Note until payment or conversion in full, which interest shall be payable at the rate of 8% per annum or the Highest Lawful Rate (as defined below), whichever is less. Interest shall be due and payable on the Maturity Date, and shall be calculated on the basis of a 365-day year for the actual number of days elapsed.

3. Payment. Unless the indebtedness outstanding under this Note is converted in accordance with Sections 5 hereof, payment shall be made in lawful money of the United States to the Holder at the Company's principal offices or, at the option of the Holder, at such other place in the United States as Holder shall have designated by written notice to the Company. All payments shall be applied first to accrued interest and thereafter to principal and shall be made pro rata among all holders of Notes.

4. Prepayment. Except as provided in Sections 6 and 9, prepayment by the Company of principal or accrued interest outstanding under this Note may be made only with the prior written consent of the Requisite Investors, and provided that any such prepayment shall be made on a *pro rata* basis among all of the Notes.

5. Conversion.

5.1 Conversion at Qualified Financing. Upon the closing of a Qualified Financing (as defined below) before the Maturity Date, if this Note has not been prepaid or converted prior to closing of the Qualified Financing, then all unpaid principal and accrued interest outstanding under this Note (the "***Conversion Amount***") shall automatically convert into that number of shares of the Preferred Stock sold by the Company in the Qualified Financing as is equal to the quotient of (x) the Conversion Amount as of the date immediately prior to the initial closing of such Qualified Financing divided by (y) the Conversion Price (as defined below), and on the other terms and conditions provided to investors in the Qualified Financing; *provided*, *however*, that such Preferred Stock issued to the Holder shall be participating Preferred Stock (for clarity, with participation by the holders of such Preferred Stock being on a pro rata and as-converted basis, together with the holders of the Company's Common Stock and any other series of the Company's participating Preferred Stock, in any remaining proceeds following the payment of all liquidation preferences) and the liquidation preference of each share of such Preferred Stock shall be the greater of (a) the liquidation preference of the Preferred Stock sold by the Company in the Qualified Financing and (b) two and one quarter times the original issue price of such Preferred Stock. "***Qualified Financing***" shall mean the first equity financing following the date of this Note involving the sale by the Company of its Preferred Stock in which the Company receives an aggregate of at least $15,000,000 in cumulative gross proceeds, excluding conversion of the Conversion Amount under this Note and all other Notes in connection with such financing. "***Conversion Price***" shall mean 75% of the lowest per share cash purchase price of the Preferred Stock sold by the Company in the Qualified Financing.

5.2 Conversion at Initial Public Offering. If at any time prior to the Maturity Date the Company completes an initial public offering of its Common Stock pursuant to an effective registration statement under the Securities Act of 1933, as amended (the "***IPO***"), if this Note has not been prepaid or converted prior to the closing of the IPO, then the Company

shall provide to the Holder at least 10 days written notice prior to the closing of the IPO, and the Conversion Amount shall automatically convert into that number of shares of Common Stock as is equal to the quotient of (x) the Conversion Amount as of the date immediately prior to the closing of the IPO divided by (y) 75% of the per share cash purchase price of the Common Stock to the public in the IPO.

5.3 Optional Conversion at Maturity Date. If this Note has not been previously converted pursuant to a Qualified Financing or an IPO, then, effective as of the Maturity Date, upon written election of the Requisite Investors, the Conversion Amount shall automatically convert into a number of shares of Series D-2 Preferred (as defined below) as is equal to the quotient of (x) the Conversion Amount as of the Maturity Date divided by (y) the price per share equal to $60,000,000 divided by the aggregate number of outstanding shares of the Company's Common Stock (the "***Common Stock***") as of the Maturity Date (assuming, for purposes of calculating such number of outstanding shares, conversion of all securities convertible into Common Stock and exercise of all outstanding options and warrants (whether vested or unvested) and including all shares reserved for future issuance under authorized but unissued options, but excluding the shares of equity securities of the Company issuable upon conversion of the Notes). Any election by the Requisite Investors to convert the Notes pursuant to this Section 5.3 will be made in writing and delivered to the Company at least five days prior to the Maturity Date. "***Series D-2 Preferred***" shall mean a newly designated series of Preferred Stock of the Company with rights and preferences equivalent to the most senior then outstanding series of Preferred Stock, which shall be participating Preferred Stock (for clarity, with participation by the holders of such preferred stock being on a pro rata and as-converted basis, together with the holders of the Company's Common Stock and any other series of the Company's participating Preferred Stock, in any remaining proceeds following the payment of all liquidation preferences) and the liquidation preference of each share of such Preferred Stock shall be equal to two and one quarter times the original issue price of such Preferred Stock.

6. Liquidation Event or Deemed Liquidation Event. If at any time prior to the Maturity Date there occurs a Liquidation Event or Deemed Liquidation Event (each as defined in the Company's Eighth Amended and Restated Certificate of Incorporation, as amended (the "***Charter***")), if this Note has not been prepaid or converted prior to the closing of such Liquidation Event or Deemed Liquidation Event, then the Company shall provide to the Holder at least 10 days written notice prior to the closing of such Liquidation Event or Deemed Liquidation Event, and the Notes will become payable contingent upon and concurrently with the successful closing of such Liquidation Event or Deemed Liquidation Event, for an amount equal to (x) 250% of the outstanding principal amount of such Note plus (y) all unpaid interest accrued hereunder as of the date of the Liquidation Event or Deemed Liquidation Event. Notwithstanding the foregoing, none of the following events shall be deemed to be a Liquidation Event or Deemed Liquidation Event: any transaction or series of transactions principally for bona fide equity financing purposes in which cash is received by the Company or any successor or indebtedness of the Company is cancelled or converted or a combination thereof.

7. Reservation of Shares. In case the Company does not, at the time of conversion of this Note, have sufficient authorized but unissued shares of stock of whatever class or series

necessary to properly give effect to the conversion of the Note as outlined above, the Company shall promptly (a) give notice to the Holder and (b) subject to receipt of requisite stockholder approvals (the failure of which shall not be deemed a breach or default under this Note, provided that the Company shall make good faith best efforts to secure such approvals), amend its charter documents so as to provide for adequate shares of authorized stock to the appropriate class and/or series.

8. Termination of Rights. All rights with respect to this Note shall terminate upon a payment or conversion of the Conversion Amount in full, whether or not this Note has been surrendered.

9. Default. Each of the following events shall be an "***Event of Default***" hereunder:

(a) The Company fails to pay timely any of the principal amount due under this Note on the date the same becomes due and payable or any accrued interest or other amounts due under this Note on the date the same becomes due and payable;

(b) The Company commits a material breach of the representations, warranties or covenants in the Purchase Agreement or any other Loan Document;

(c) The Company ceases to conduct or carry out the core business of the Company substantially as now conducted;

(d) The Company files a petition or action for relief under any bankruptcy, insolvency or moratorium law or any other law for the relief of, or relating to, debtors, now or hereafter in effect, or makes any assignment for the benefit of creditors or takes any action in furtherance of any of the foregoing;

(e) An involuntary petition is filed against the Company (unless such petition is dismissed or discharged within 60 days) under any bankruptcy statute now or hereafter in effect, or a custodian, receiver, trustee, assignee for the benefit of creditors (or other similar official) is appointed to take possession, custody or control of any property of the Company;

(f) The occurrence of an "event of default" or other event or circumstance under any agreement evidencing any indebtedness for borrowed money which results in the acceleration of, or entitles the holder of such indebtedness to accelerate, the maturity thereof;

(g) The appointment of a receiver to foreclose the Company's assets or the initiation of judicial or non-judicial proceedings to enforce collateral rights (such as foreclosure or sale of the Company's assets) under any agreement evidencing any indebtedness for borrowed money; or

(h) The dissolution or winding up of the Company, the suspension of its operations, or the taking of any corporate action to effect any of the foregoing.

Upon the occurrence of an Event of Default, all unpaid principal, accrued interest and other amounts owing hereunder shall automatically, be immediately due, payable and collectible by

the Holder pursuant to applicable law. Subject to the provisions hereof, the Holder shall have all rights and may exercise any remedies available to it under law, successively or concurrently.

10. Fractional Shares. No fractional shares shall be issued upon conversion of this Note, and instead any fractional shares shall be rounded down to the nearest whole share.

11. No Impairment. Except and to the extent as waived or consented to by the Requisite Investors in accordance with Section 17 below, the Company will not, by amendment of the Charter or through any reorganization, transfer of assets, consolidation, merger, dissolution, issue or sale of any debt or equity securities or any other voluntary action, avoid or seek to avoid the observance or performance of any of the terms to be observed or performed hereunder by the Company, but will at all times in good faith assist in the carrying out of all the provisions of this Note in order to protect the rights of Holder hereunder against impairment.

12. Highest Lawful Rate. Anything herein to the contrary notwithstanding, if during any period for which interest is computed hereunder, the amount of interest computed on the basis provided for in this Note, together with all fees, charges, and other payments or rights which are treated as interest under applicable law, as provided for herein or in any other document executed in connection herewith, would exceed the amount of such interest computed on the basis of the Highest Lawful Rate (as defined below), the Company shall not be obligated to pay, and the Holder shall not be entitled to charge, collect, receive, reserve, or take, interest in excess of the Highest Lawful Rate, and during any such period the interest payable hereunder shall be computed on the basis of the Highest Lawful Rate. "***Highest Lawful Rate***" means the maximum non-usurious rate of interest, as in effect from time to time, which may be charged, contracted for, reserved, received, or collected by the Holder in connection with this Note under applicable law. In accordance with this section, any amounts received in excess of the Highest Lawful Rate shall be applied towards the prepayment of principal then outstanding.

13. Security

13.1 Ranking. Except for the Existing Loan, this Note shall be senior in all respects (including the right of payment) to all other indebtedness of the Company, now or hereafter existing, provided that this Note will rank *pari passu* with the other Notes issued by the Company.

13.2 Senior Indebtedness. The indebtedness evidenced by this Note is subordinated in right of payment to the prior payment in full of all amounts due in connection with that certain Loan and Security Agreement dated as of March 8, 2016, by and between the Company and Western Alliance Bank, as amended on December 9, 2016, May 2, 2017 and November 20, 2017 (as may be amended from time to time, the "***Existing Loan***"). Furthermore, the indebtedness evidenced under this Note is subject to the terms of the Subordination Agreement by and among the Company, Western Alliance Bank and the Holder, and in the event of any conflict between the terms hereof and the Subordination Agreement, the respective terms of the Subordination Agreement shall prevail.

14. More Favorable Terms. So long as any portion of the Loan Amount and/or any accrued interest thereon remains unpaid and outstanding, if after the date hereof the Company

issues any convertible promissory notes to or enters into any note purchase agreement with any lender having any terms and/or conditions that are, individually or in the aggregate, more favorable than the terms and conditions granted to the Holder under this Note or any other Loan Document, then the Holder shall have the right to require the Company to amend this Note or any other Loan Document to reflect substantially equivalent terms and conditions in favor of the Holder.

15. Waiver. Subject to any other provision herein or in the other Loan Documents, the Company hereby waives demand, notice, presentment, protest and notice of dishonor.

16. Governing Law. This Note shall be governed by and construed under the laws of the State of California in all respects as such laws are applied to agreements among California residents entered into and performed entirely within California, without giving effect to conflict of law principles thereof.

17. Successors and Assigns. Neither this Note nor any rights hereunder shall be transferable by the Holder without the prior written consent of the Company, except to an Affiliate of the Holder in accordance with the terms of the Purchase Agreement. Subject to the foregoing, the provisions of this Note shall inure to the benefit of and be binding on any successor to the Company and shall extend to any Holder hereof.

18. Amendment; Waiver. Any term of this Note may be amended or waived with the written consent of the Company and the Requisite Investors. Any such amendment or waiver so effected by the Company and the Requisite Investors shall be binding on the Holder.

19. Agreement to be Bound. As a condition to the conversion of the Note, the Holder, if requested by the Company, shall agree in writing to be fully bound by any purchase agreement or investors rights, stockholders, voting or similar agreements applicable to the holders of the Company's capital stock.

20. Expenses; Attorney's Fees. Each party shall pay all costs and expenses that it incurs with respect to the negotiation, execution and delivery of the Agreement. If any action at law or in equity (including arbitration) is necessary to enforce or interpret the terms of any of the Loan Documents, the prevailing party shall be entitled to reasonable attorneys' fees, costs and necessary disbursements in addition to any other relief to which such party may be entitled.

21. Severability. Each of the provisions of this Note is severable. If any such provision is held to be or becomes illegal, invalid or unenforceable in any respect under the law of any jurisdiction, it shall have no effect on any other provisions of this Note and (a) the parties shall use their reasonable efforts to replace such provision with a suitable and equitable provision in order to carry out as closely as is possible, so far as may be valid and enforceable, the intent and purpose of such illegal, invalid or unenforceable provision and (b) the remainder of this Note and the application of such provision to other persons or circumstances shall not be affected by such illegality, invalidity or unenforceability, nor shall such illegality, invalidity or unenforceability affect the validity or enforceability of such provision, or the application thereof, in any other jurisdiction.

22. Counterparts. This Note may be executed in any number of counterparts, including via facsimile or electronic transmission, each of which shall be an original, but all of which together shall constitute one instrument.

IN WITNESS WHEREOF, the Company has caused this **CONVERTIBLE PROMISSORY NOTE** to be executed by its duly authorized officer as of the date first written above.

BIONANO GENOMICS, INC.

By: _____
Name: R. Erik Holmlin, Ph.D.
Title: Chief Executive Officer

Acknowledged and Accepted:

[HOLDER]

By: _____
Name:
Title:

EXHIBIT B-2

FORM OF CONVERTIBLE PROMISSORY NOTE AT EACH ADDITIONAL CLOSING

THIS NOTE AND THE SECURITIES ISSUABLE HEREUNDER HAVE NOT BEEN REGISTERED UNDER THE SECURITIES ACT OF 1933, AS AMENDED (THE "*ACT*"), AND MAY NOT BE OFFERED, SOLD OR OTHERWISE TRANSFERRED, ASSIGNED, PLEDGED OR HYPOTHECATED UNLESS AND UNTIL REGISTERED UNDER THE ACT OR UNLESS THE COMPANY HAS RECEIVED AN OPINION OF COUNSEL SATISFACTORY TO THE COMPANY AND ITS COUNSEL THAT SUCH REGISTRATION IS NOT REQUIRED.

THE SALE, PLEDGE, HYPOTHECATION OR TRANSFER OF THIS NOTE AND THE SECURITIES ISSUABLE HEREUNDER IS SUBJECT TO THE TERMS AND CONDITIONS OF A CERTAIN NOTE PURCHASE AGREEMENT BY AND BETWEEN THE HOLDER AND THE COMPANY. COPIES OF SUCH AGREEMENT MAY BE OBTAINED UPON WRITTEN REQUEST TO THE SECRETARY OF THE COMPANY.

THIS NOTE (AND ALL PAYMENT AND ENFORCEMENT PROVISIONS HEREIN) (THE "*NOTE*") IS AN UNSECURED OBLIGATION OF THE COMPANY AND IS SUBJECT TO THE TERMS OF A SUBORDINATION AGREEMENT DATED AS OF FEBRUARY [7], 2018, BY AND AMONG THE COMPANY, THE HOLDER, WESTERN ALLIANCE BANK AND OTHER PARTIES THERETO (THE "*SUBORDINATION AGREEMENT*"). IN THE EVENT OF ANY INCONSISTENCY BETWEEN THIS NOTE AND THE SUBORDINATION AGREEMENT, THE TERMS OF THE SUBORDINATION AGREEMENT SHALL CONTROL.

BIONANO GENOMICS, INC.

CONVERTIBLE PROMISSORY NOTE

$[_____] [_____], 2018
San Diego, California

FOR VALUE RECEIVED, BIONANO GENOMICS, INC., a Delaware corporation (the "***Company***"), hereby promises to pay to the order of **[_____]** (the "***Holder***"), the principal sum of up to $[_____] (the "***Loan Amount***"), together with accrued and unpaid interest thereon, each due and payable on the date and in the manner set forth below.

This Note is part of a series of similar notes (collectively, the "***Notes***") issued pursuant to the terms of that certain Note Purchase Agreement dated as of February [8], 2018, among the Company and the Investors listed on the Schedule of Investors attached thereto as Exhibit A (as may be amended from time to time, the "***Purchase Agreement***"). Capitalized terms used and not otherwise defined herein shall have the meanings given them in the Purchase Agreement.

1. Maturity Date. Unless converted into equity securities of the Company or repaid pursuant to Sections 5 or 6 hereof, subject to the provisions of Sections 6 and 9 below, the entire outstanding principal balance and all unpaid accrued interest hereof shall, upon written election of the Requisite Investors, become fully due and payable to the Holder on September 30, 2018, or such later date as is approved by the Requisite Investors (the "***Maturity Date***").

2. Interest. Interest shall accrue on the outstanding principal amount hereof from the date of this Note until payment or conversion in full, which interest shall be payable at the rate of 8% per annum or the Highest Lawful Rate (as defined below), whichever is less. Interest shall be due and payable on the Maturity Date, and shall be calculated on the basis of a 365-day year for the actual number of days elapsed.

3. Payment. Unless the indebtedness outstanding under this Note is converted in accordance with Sections 5 hereof, payment shall be made in lawful money of the United States to the Holder at the Company's principal offices or, at the option of the Holder, at such other place in the United States as Holder shall have designated by written notice to the Company. All payments shall be applied first to accrued interest and thereafter to principal and shall be made pro rata among all holders of Notes.

4. Prepayment. Except as provided in Sections 6 and 9, prepayment by the Company of principal or accrued interest outstanding under this Note may be made only with the prior written consent of the Requisite Investors, and provided that any such prepayment shall be made on a *pro rata* basis among all of the Notes.

5. Conversion.

5.1 Conversion at Qualified Financing. Upon the closing of a Qualified Financing (as defined below) before the Maturity Date, if this Note has not been prepaid or converted prior to closing of the Qualified Financing, then all unpaid principal and accrued interest outstanding under this Note (the "***Conversion Amount***") shall automatically convert into that number of shares of the Preferred Stock sold by the Company in the Qualified Financing as is equal to the quotient of (x) the Conversion Amount as of the date immediately prior to the initial closing of such Qualified Financing divided by (y) the Conversion Price (as defined below), and on the other terms and conditions provided to investors in the Qualified Financing; *provided*, *however*, that such Preferred Stock issued to the Holder shall be participating Preferred Stock (for clarity, with participation by the holders of such Preferred Stock being on a pro rata and as-converted basis, together with the holders of the Company's Common Stock and any other series of the Company's participating Preferred Stock, in any remaining proceeds following the payment of all liquidation preferences) and the liquidation preference of each share of such Preferred Stock shall be the greater of (a) the liquidation preference of the Preferred Stock sold by the Company in the Qualified Financing and (b) two and one quarter times the original issue price of such Preferred Stock. "***Qualified Financing***" shall mean the first equity financing following the date of this Note involving the sale by the Company of its Preferred Stock in which the Company receives an aggregate of at least $15,000,000 in cumulative gross proceeds, excluding conversion of the Conversion Amount under this Note and all other Notes in connection with such financing. "***Conversion Price***" shall mean 80% of the lowest per share cash purchase price of the Preferred Stock sold by the Company in the Qualified Financing.

5.2 Conversion at Initial Public Offering. If at any time prior to the Maturity Date the Company completes an initial public offering of its Common Stock pursuant to an effective registration statement under the Securities Act of 1933, as amended (the "***IPO***"), if this Note has not been prepaid or converted prior to the closing of the IPO, then the Company

shall provide to the Holder at least 10 days written notice prior to the closing of the IPO, and the Conversion Amount shall automatically convert into that number of shares of Common Stock as is equal to the quotient of (x) the Conversion Amount as of the date immediately prior to the closing of the IPO divided by (y) 80% of the per share cash purchase price of the Common Stock to the public in the IPO.

5.3 Optional Conversion at Maturity Date. If this Note has not been previously converted pursuant to a Qualified Financing or an IPO, then, effective as of the Maturity Date, upon written election of the Requisite Investors, the Conversion Amount shall automatically convert into a number of shares of Series D-2 Preferred (as defined below) as is equal to the quotient of (x) the Conversion Amount as of the Maturity Date divided by (y) the price per share equal to $60,000,000 divided by the aggregate number of outstanding shares of the Company's Common Stock (the "***Common Stock***") as of the Maturity Date (assuming, for purposes of calculating such number of outstanding shares, conversion of all securities convertible into Common Stock and exercise of all outstanding options and warrants (whether vested or unvested) and including all shares reserved for future issuance under authorized but unissued options, but excluding the shares of equity securities of the Company issuable upon conversion of the Notes). Any election by the Requisite Investors to convert the Notes pursuant to this Section 5.3 will be made in writing and delivered to the Company at least five days prior to the Maturity Date. "***Series D-2 Preferred***" shall mean a newly designated series of Preferred Stock of the Company with rights and preferences equivalent to the most senior then outstanding series of Preferred Stock, which shall be participating Preferred Stock (for clarity, with participation by the holders of such preferred stock being on a pro rata and as-converted basis, together with the holders of the Company's Common Stock and any other series of the Company's participating Preferred Stock, in any remaining proceeds following the payment of all liquidation preferences) and the liquidation preference of each share of such Preferred Stock shall be equal to two and one quarter times the original issue price of such Preferred Stock.

6. Liquidation Event or Deemed Liquidation Event. If at any time prior to the Maturity Date there occurs a Liquidation Event or Deemed Liquidation Event (each as defined in the Company's Eighth Amended and Restated Certificate of Incorporation, as amended (the "***Charter***")), if this Note has not been prepaid or converted prior to the closing of such Liquidation Event or Deemed Liquidation Event, then the Company shall provide to the Holder at least 10 days written notice prior to the closing of such Liquidation Event or Deemed Liquidation Event, and the Notes will become payable contingent upon and concurrently with the successful closing of such Liquidation Event or Deemed Liquidation Event, for an amount equal to (x) 200% of the outstanding principal amount of such Note plus (y) all unpaid interest accrued hereunder as of the date of the Liquidation Event or Deemed Liquidation Event. Notwithstanding the foregoing, none of the following events shall be deemed to be a Liquidation Event or Deemed Liquidation Event: any transaction or series of transactions principally for bona fide equity financing purposes in which cash is received by the Company or any successor or indebtedness of the Company is cancelled or converted or a combination thereof.

7. Reservation of Shares. In case the Company does not, at the time of conversion of this Note, have sufficient authorized but unissued shares of stock of whatever class or series

necessary to properly give effect to the conversion of the Note as outlined above, the Company shall promptly (a) give notice to the Holder and (b) subject to receipt of requisite stockholder approvals (the failure of which shall not be deemed a breach or default under this Note, provided that the Company shall make good faith best efforts to secure such approvals), amend its charter documents so as to provide for adequate shares of authorized stock to the appropriate class and/or series.

8. Termination of Rights. All rights with respect to this Note shall terminate upon a payment or conversion of the Conversion Amount in full, whether or not this Note has been surrendered.

9. Default. Each of the following events shall be an "***Event of Default***" hereunder:

(a) The Company fails to pay timely any of the principal amount due under this Note on the date the same becomes due and payable or any accrued interest or other amounts due under this Note on the date the same becomes due and payable;

(b) The Company commits a material breach of the representations, warranties or covenants in the Purchase Agreement or any other Loan Document;

(c) The Company ceases to conduct or carry out the core business of the Company substantially as now conducted;

(d) The Company files a petition or action for relief under any bankruptcy, insolvency or moratorium law or any other law for the relief of, or relating to, debtors, now or hereafter in effect, or makes any assignment for the benefit of creditors or takes any action in furtherance of any of the foregoing;

(e) An involuntary petition is filed against the Company (unless such petition is dismissed or discharged within 60 days) under any bankruptcy statute now or hereafter in effect, or a custodian, receiver, trustee, assignee for the benefit of creditors (or other similar official) is appointed to take possession, custody or control of any property of the Company;

(f) The occurrence of an "event of default" or other event or circumstance under any agreement evidencing any indebtedness for borrowed money which results in the acceleration of, or entitles the holder of such indebtedness to accelerate, the maturity thereof;

(g) The appointment of a receiver to foreclose the Company's assets or the initiation of judicial or non-judicial proceedings to enforce collateral rights (such as foreclosure or sale of the Company's assets) under any agreement evidencing any indebtedness for borrowed money; or

(h) The dissolution or winding up of the Company, the suspension of its operations, or the taking of any corporate action to effect any of the foregoing.

Upon the occurrence of an Event of Default, all unpaid principal, accrued interest and other amounts owing hereunder shall automatically, be immediately due, payable and collectible by

the Holder pursuant to applicable law. Subject to the provisions hereof, the Holder shall have all rights and may exercise any remedies available to it under law, successively or concurrently.

10. Fractional Shares. No fractional shares shall be issued upon conversion of this Note, and instead any fractional shares shall be rounded down to the nearest whole share.

11. No Impairment. Except and to the extent as waived or consented to by the Requisite Investors in accordance with Section 17 below, the Company will not, by amendment of the Charter or through any reorganization, transfer of assets, consolidation, merger, dissolution, issue or sale of any debt or equity securities or any other voluntary action, avoid or seek to avoid the observance or performance of any of the terms to be observed or performed hereunder by the Company, but will at all times in good faith assist in the carrying out of all the provisions of this Note in order to protect the rights of Holder hereunder against impairment.

12. Highest Lawful Rate. Anything herein to the contrary notwithstanding, if during any period for which interest is computed hereunder, the amount of interest computed on the basis provided for in this Note, together with all fees, charges, and other payments or rights which are treated as interest under applicable law, as provided for herein or in any other document executed in connection herewith, would exceed the amount of such interest computed on the basis of the Highest Lawful Rate (as defined below), the Company shall not be obligated to pay, and the Holder shall not be entitled to charge, collect, receive, reserve, or take, interest in excess of the Highest Lawful Rate, and during any such period the interest payable hereunder shall be computed on the basis of the Highest Lawful Rate. "***Highest Lawful Rate***" means the maximum non-usurious rate of interest, as in effect from time to time, which may be charged, contracted for, reserved, received, or collected by the Holder in connection with this Note under applicable law. In accordance with this section, any amounts received in excess of the Highest Lawful Rate shall be applied towards the prepayment of principal then outstanding.

13. Security

13.1 Ranking. Except for the Existing Loan, this Note shall be senior in all respects (including the right of payment) to all other indebtedness of the Company, now or hereafter existing, provided that this Note will rank *pari passu* with the other Notes issued by the Company.

13.2 Senior Indebtedness. The indebtedness evidenced by this Note is subordinated in right of payment to the prior payment in full of all amounts due in connection with that certain Loan and Security Agreement dated as of March 8, 2016, by and between the Company and Western Alliance Bank, as amended on December 9, 2016, May 2, 2017 and November 20, 2017 (as may be amended from time to time, the "***Existing Loan***"). Furthermore, the indebtedness evidenced under this Note is subject to the terms of the Subordination Agreement by and among the Company, Western Alliance Bank and the Holder, and in the event of any conflict between the terms hereof and the Subordination Agreement, the respective terms of the Subordination Agreement shall prevail.

14. More Favorable Terms. So long as any portion of the Loan Amount and/or any accrued interest thereon remains unpaid and outstanding, if after the date hereof the Company

issues any convertible promissory notes to or enters into any note purchase agreement with any lender having any terms and/or conditions that are, individually or in the aggregate, more favorable than the terms and conditions granted to the Holder under this Note or any other Loan Document, then the Holder shall have the right to require the Company to amend this Note or any other Loan Document to reflect substantially equivalent terms and conditions in favor of the Holder.

15. Waiver. Subject to any other provision herein or in the other Loan Documents, the Company hereby waives demand, notice, presentment, protest and notice of dishonor.

16. Governing Law. This Note shall be governed by and construed under the laws of the State of California in all respects as such laws are applied to agreements among California residents entered into and performed entirely within California, without giving effect to conflict of law principles thereof.

17. Successors and Assigns. Neither this Note nor any rights hereunder shall be transferable by the Holder without the prior written consent of the Company, except to an Affiliate of the Holder in accordance with the terms of the Purchase Agreement. Subject to the foregoing, the provisions of this Note shall inure to the benefit of and be binding on any successor to the Company and shall extend to any Holder hereof.

18. Amendment; Waiver. Any term of this Note may be amended or waived with the written consent of the Company and the Requisite Investors. Any such amendment or waiver so effected by the Company and the Requisite Investors shall be binding on the Holder.

19. Agreement to be Bound. As a condition to the conversion of the Note, the Holder, if requested by the Company, shall agree in writing to be fully bound by any purchase agreement or investors rights, stockholders, voting or similar agreements applicable to the holders of the Company's capital stock.

20. Expenses; Attorney's Fees. Each party shall pay all costs and expenses that it incurs with respect to the negotiation, execution and delivery of the Agreement. If any action at law or in equity (including arbitration) is necessary to enforce or interpret the terms of any of the Loan Documents, the prevailing party shall be entitled to reasonable attorneys' fees, costs and necessary disbursements in addition to any other relief to which such party may be entitled.

21. Severability. Each of the provisions of this Note is severable. If any such provision is held to be or becomes illegal, invalid or unenforceable in any respect under the law of any jurisdiction, it shall have no effect on any other provisions of this Note and (a) the parties shall use their reasonable efforts to replace such provision with a suitable and equitable provision in order to carry out as closely as is possible, so far as may be valid and enforceable, the intent and purpose of such illegal, invalid or unenforceable provision and (b) the remainder of this Note and the application of such provision to other persons or circumstances shall not be affected by such illegality, invalidity or unenforceability, nor shall such illegality, invalidity or unenforceability affect the validity or enforceability of such provision, or the application thereof, in any other jurisdiction.

22. Counterparts. This Note may be executed in any number of counterparts, including via facsimile or electronic transmission, each of which shall be an original, but all of which together shall constitute one instrument.

IN WITNESS WHEREOF, the Company has caused this **CONVERTIBLE PROMISSORY NOTE** to be executed by its duly authorized officer as of the date first written above.

BIONANO GENOMICS, INC.

By: _____
Name: R. Erik Holmlin, Ph.D.
Title: Chief Executive Officer

Acknowledged and Accepted:

[HOLDER]

By: _____
Name:
Title:

EXHIBIT C

LIST OF APPROVED ADDITIONAL INVESTORS

Investor	Maximum Approved Participation Amount
Full Succeed International Limited	$ 853,880
Novartis Bioventures Ltd.	$ 803,857
Han Cao	$ 391,272
Ascender Prosperity Capital Co., Ltd	$ 341,551
Innovation Valley Partners, LP	$ 209,320
AriMed International Ltd.	$ 179,315
HybriBio Limited	$ 170,780
Shrewsbury Capital Partners LLC	$ 72,035
BVP GP, LLC	$ 12,340
Steve Chazen	$ 12,262
Ben Franklin Technology Partners	$ 11,408
Peter B. Dervan	$ 6,000
Michael Kochersperger	$ 1,023

EXHIBIT D

FORM OF SUBORDINATION AGREEMENT

Please see attached

Exhibit 10.37

BIONANO GENOMICS, INC.

FIRST AMENDMENT TO NOTE PURCHASE AGREEMENT

This First Amendment (this "***Amendment***") to that certain Note Purchase Agreement, dated as of February 9, 2018 (the "***Purchase Agreement***"), by and among **BIONANO GENOMICS, INC.**, a Delaware corporation (the "***Company***"), and the persons and entities named on the Schedule of Investors attached thereto (the "***Investors***"), is made and entered into as of April 2, 2018 by and among the Company and the Investors listed on the signature pages to this Amendment. Capitalized terms used and not otherwise defined herein shall have the respective meanings given to them in the Purchase Agreement.

RECITALS

WHEREAS, the Company and the Investors have previously entered into the Purchase Agreement;

WHEREAS, Section 10(g) of the Purchase Agreement provides that no amendment of any provision of the Purchase Agreement shall be effective unless in writing and approved by (i) the Company and (ii) the Investors holding at least 60% of the then-outstanding and unpaid principal and interest under all Notes (the "***Requisite Investors***"); and

WHEREAS, the undersigned constitute the Company and the Requisite Investors.

AGREEMENT

NOW, THEREFORE, in consideration of the foregoing and the promises and covenants contained in this Amendment and in the Purchase Agreement, and for other good and valuable consideration, the receipt of which is hereby acknowledged, the parties to this Amendment agree as follows:

1. Recitals. The reference to $15,960,000 in the paragraph located under the heading "Recitals" in the Purchase Agreement shall be replaced with $18,372,132.

2. Section 1(a). The reference to "each Additional Closing" in Section 1(a) of the Purchase Agreement shall be replaced with "the Additional Closing."

3. Section 1(b) of the Purchase Agreement. Section 1(b) of the Purchase Agreement is hereby amended and restated as follows:

"(b) Additional Closing. If the aggregate principal amount of the Notes purchased at the First Closing is less than $18,372,132, then at any time on or before the earlier of the consummation of a Qualified Financing (as defined in the Notes), the filing of a public registration statement with respect to an IPO (as defined in the Notes), Liquidation Event or Deemed Liquidation Event (each as defined in the Notes), or July 31, 2018 (the "Outside Date"), or such later date as is approved by the Investors holding at least 60% of the then-outstanding and unpaid principal and interest under all Notes (the "Requisite Investors"), the Company may sell up to the balance of the

authorized Notes not sold at the First Closing in one additional closing (the "***Additional Closing***" and each of the First Closing and the Additional Closing, a "***Closing***") to Chengdu Berry Genomics Technology Co., Ltd. or its Affiliate ("***Berry***"), up to the amount set forth on **EXHIBIT C** attached hereto. In addition to the other closing conditions set forth in this Agreement, the Additional Closing with Berry shall be subject to (i) Berry's receipt of internal approval and authorization for the transactions contemplated under the Purchase Agreement, (ii) Berry's receipt of any and all approvals or notices of record filing from the Ministry of Commerce, State Administration of Foreign Exchange and the National Development and Reform Commission of China, relating to the transactions contemplated under the Purchase Agreement, and (iii) no material adverse effect relating to the Company's business, properties, assets, or operations, taken as a whole, existing at the time of the Additional Closing with Berry. Upon signing a counterpart signature page to this Agreement and its purchase of a Note at the Additional Closing, Berry shall become a party to this Agreement and shall be deemed to be an "***Investor***" for all purposes under this Agreement, and the Schedule of Investors attached hereto shall be amended to reflect the amount Berry has agreed to lend the Company in the column entitled "Additional Closing Loan Amount" (such amount and the First Closing Investors' "First Closing Loan Amount," a "Loan Amount"). The loan made at the Additional Closing shall be made on the terms and conditions set forth in this Agreement, and the representations and warranties of the Company set forth in Section 3 hereof and the representations and warranties of the Investors set forth in Section 4 hereof shall speak as of the date of the Additional Closing. Any Note issued pursuant to this Section 1(b) shall be deemed to be a "Note" for all purposes under this Agreement. On the Additional Closing Date (as defined below), Berry shall lend to the Company at the Additional Closing the amount set forth opposite its name under the column entitled "Additional Closing Loan Amount" on the Schedule of Investors attached hereto (as may be amended as described above) against the issuance and delivery by the Company of a Note for such Loan Amount."

4. Section 2(a) of the Purchase Agreement. The second sentence of Section 2(a) of the Purchase Agreement is hereby amended and restated as follows:

"**(a) Closing Dates.** The Additional Closing shall be held at any time on or before the Outside Date as the Company and Berry shall agree (such date, the "***Additional Closing Date*").**"**

5. Section 10(m) of the Purchase Agreement. A new section 10(m) shall be inserted following Section 10(l) of the Purchase Agreement, which shall read as follows:

"**(m) Waiver of Conflicts.** Each party to this Agreement acknowledges that Cooley LLP ("***Cooley***"), outside general counsel to the Company, has in the past performed and is or may now or in the future represent one or more Investors or their affiliates in matters unrelated to the transactions contemplated by this Agreement (the "***Financing***"), including representation of such Investors or their affiliates in matters of a similar nature to the Financing. The applicable rules of professional conduct require that Cooley inform the parties hereunder of this representation and obtain their consent. Cooley has served as outside general counsel to the Company and has negotiated the

terms of the Financing solely on behalf of the Company. The Company and each Investor hereby (a) acknowledge that they have had an opportunity to ask for and have obtained information relevant to such representation, including disclosure of the reasonably foreseeable adverse consequences of such representation; (b) acknowledge that with respect to the Financing, Cooley has represented solely the Company, and not any Investor or any stockholder, director or employee of the Company or any Investor; and (c) gives its informed consent to Cooley's representation of the Company in the Financing."

6. List of Exhibits and Exhibit Pages. The reference to "each Additional Closing" under the headings "List of Exhibits" and "Exhibit B-2" in the Purchase Agreement shall be replaced with "the Additional Closing."

7. Exhibit C to the Purchase Agreement. Exhibit C to the Purchase Agreement is hereby amended and restated in the form attached to this Amendment as Exhibit C.

8. Effect of Amendment. Except as expressly modified by this Amendment, the Purchase Agreement shall remain unmodified and in full force and effect.

9. Governing Law. This Amendment shall be governed by and construed under the laws of the State of California in all respects as such laws are applied to agreements among California residents entered into and performed entirely within California, without giving effect to conflict of law principles thereof.

10. Counterparts. This Amendment may be executed in any number of counterparts, each of which shall be an original, but all of which together shall constitute one instrument. Signatures delivered by facsimile or electronic transmission shall have the same effect as originals.

[Remainder of Page Intentionally Left Blank]

IN WITNESS WHEREOF, the undersigned has executed this **FIRST AMENDMENT TO NOTE PURCHASE AGREEMENT** as of the date first written above.

BIONANO GENOMICS, INC.

By: /s/ Erik Holmlin
Name: Erik Holmlin
Title: Chief Executive Officer

IN WITNESS WHEREOF, the undersigned has executed this **FIRST AMENDMENT TO NOTE PURCHASE AGREEMENT** as of the date first written above.

INVESTOR:

LC HEALTHCARE FUND I, L.P.

By: /s/ Jafar Wang
Name: Jafar Wang
Title: Managing Director

IN WITNESS WHEREOF, the undersigned has executed this **FIRST AMENDMENT TO NOTE PURCHASE AGREEMENT** as of the date first written above.

INVESTOR:

ROSY SHINE LIMITED

By: /s/ Hao Ouyang
Name: Hao Ouyang
Title: Director

IN WITNESS WHEREOF, the undersigned has executed this **FIRST AMENDMENT TO NOTE PURCHASE AGREEMENT** as of the date first written above and shall become a party to the Purchase Agreement and that certain Subordination Agreement, dated as of February 9, 2018, by and among Western Alliance Bank and the Creditors named therein (the "***Subordination Agreement***").

The representations and warranties contained in Section 4 of the Purchase Agreement shall be true and correct as to the undersigned as of the date of the Additional Closing with the undersigned.

In connection with the Additional Closing to with the undersigned, the undersigned agrees to lend to the Company the principal amount set forth below (the "***Loan Amount***") against issuance by the Company of a Note, in the form attached to the Purchase Agreement as Exhibit B-2, evidencing such Loan Amount. Upon the payment of the Loan Amount to the Company, the undersigned shall become (i) an "Investor" for all purposes under the Purchase Agreement and (ii) a "Creditor" for all purposes under the Subordination Agreement. Receipt of the Note by the undersigned shall constitute acceptance of and agreement to all of the terms and conditions contained in the Note.

INVESTOR:

CHENGDU BERRY GENOMICS TECHNOLOGY CO., LTD

By: /s/ Daixing Zhou
Name: Daixing Zhou
Title: Chief Executive Officer

EXHIBIT C

LIST OF APPROVED ADDITIONAL INVESTORS

Investor	Maximum Approved Participation Amount
Chengdu Berry Genomics Technology Co., LTD	$ 5,000,000

FIFTH AMENDMENT TO LOAN AND SECURITY AGREEMENT

This Fifth Amendment to Loan and Security Agreement (this "Amendment") is entered into as of June 13, 2018, by and between WESTERN ALLIANCE BANK, an Arizona corporation ("Bank") and BIONANO GENOMICS, INC., a Delaware corporation ("Borrower").

RECITALS

A. Borrower and Bank are parties to that certain Loan and Security Agreement dated as of March 8, 2016, as amended from time to time, including by that certain First Amendment to Loan and Security Agreement dated as of December 9, 2016, that certain Second Amendment to Loan and Security Agreement dated as of May 2, 2017, that certain Third Amendment to Loan and Security Agreement dated as of November 20, 2017 and that certain Forbearance and Fourth Amendment to Loan and Security Agreement dated as of February 9, 2018 (collectively, the "Loan Agreement"). The parties desire to amend the Loan Agreement in accordance with the terms of this Amendment.

B. As of the date hereof, there is owing under the Loan Agreement a principal amount (not including, to the extent applicable, any contingent obligations, e.g. those arising out of any undrawn letters of credit issued by Bank for Borrower's benefit), accrued and unpaid interest, legal fees and costs, plus all other outstanding amounts and costs of enforcement due under the Loan Agreement. Such amount, plus accruing interest and costs and accrued and accruing attorneys' fees and costs are hereinafter referred to herein as the "Existing Debt."

C. Event of Defaults have occurred and exist under Section 6.8(b) of the Loan Agreement (as in effect prior to the Fourth Amendment Effective Date) as a result of Borrower's failure on or before December 31, 2017 to provide evidence satisfactory to Bank that Borrower received at least Fifteen Million Dollars ($15,000,000) from the sale or issuance of its equity securities or Subordinated Debt (the "Existing Default").

NOW, THEREFORE, the parties agree as follows:

1. Defined Terms. Capitalized terms not otherwise defined herein shall have the same meanings as set forth in the Loan Agreement.

2. Acknowledgement of Liability. As of the date of this Amendment, Borrower owes Bank an amount equal to the Existing Debt. Borrower reaffirms all of its obligations under the Loan Agreement and hereby forever waives and relinquishes any and all claims, set-offs or defenses that Borrower may now have with respect to the payment of sums due to Bank and the performance of other obligations under the Loan Agreement. The security interests granted to Bank in the Loan Agreement in the Collateral remain perfected, first priority liens.

3. Amendments. The Loan Agreement is hereby amended as follows:

3.1 The following defined terms in Section 1.1 of the Loan Agreement hereby are added, amended or restated as follows:

"Collections Account" is defined in Section 6.7 hereof.

"Fifth Amendment Effective Date" means June 13, 2018.

3.2 The following defined term in Section 1.1 of the Loan Agreement hereby is deleted:

"Amortization Date", "IP Release Event", "New Equity Milestone"

3.3 Section 2.2(b) of the Loan Agreement hereby is amended and restated in its entirety to read as follows:

"(b) Repayment. Borrower shall make monthly payments of interest only, in arrears,

commencing on the first (1st) Payment Date following the Funding Date of the Term Loan, and continuing on the Payment Date of each successive month thereafter through and including the Payment Date immediately preceding the Amortization Date. Borrower agrees to pay, on the Funding Date of the Term Loan, any initial partial monthly interest payment otherwise due for the period between the Funding Date of the Term Loan and the first Payment Date thereof. Commencing on August 1, 2018, and continuing on the Payment Date of each month thereafter, Borrower shall make equal monthly payments of principal, together with applicable interest, in arrears, to Bank, as calculated by Bank (which calculations shall be deemed correct absent manifest error) based upon: (1) the amount of the Term Loan, (2) the effective rate of interest, as determined in Section 2.4(a), and (3) a repayment schedule equal to twenty-one (21) months. All unpaid principal and accrued and unpaid interest with respect to the Term Loan is due and payable in full on the Term Loan Maturity Date. The Term Loan may only be prepaid in accordance with Sections 2.2(c) and 2.2(d)."

3.4 New Subsection (f) of Section 2.6 of the Loan Agreement hereby is added to the end of Section 2.6 of the Loan Agreement to read as follows:

"**(h) Fifth Amendment Fee**. An amendment fee equal to Fifty-Two Thousand Five Hundred Dollars ($52,500) (the "Fifth Amendment Fee") which shall be nonrefundable, due on the earliest to occur of (a) the Term Loan Maturity Date, or (b) the acceleration of any Term Loan, or (c) the prepayment of a Term Loan pursuant to Section 2.2(c) or (d)."

3.5 The following sentence hereby is added to the end of Section 4.1 of the Loan Agreement to read as follows:

"Borrower further agrees that all Obligations shall be secured by cash held in the Collections Account and Borrower authorizes Bank to hold such balances in pledge and to decline to honor any drafts thereon or any requests by Borrower or any other Person to pay or otherwise transfer any part of such balances for so long as such Obligations are outstanding."

3.6 Section 6.7 of the Loan Agreement hereby is amended and restated in its entirety to read as follows:

"**6.7 Accounts**. Borrower shall maintain and shall cause each of its Domestic Subsidiaries to maintain its primary depository, operating, and investment accounts with Bank or Bank's affiliates, and endeavor to utilize and shall cause each of its Subsidiaries to endeavor to utilize Bank's International Banking Division for any international banking services required by Borrower, including, but not limited to, foreign currency wires, hedges, and swaps. In addition, on or before the Fifth Amendment Effective Date, Borrower shall establish and maintain a segregated account with Bank (the "Collections Account"). Until such time as Borrower maintains cash in the Collections Account of at least Two Million Five Dollars ($2,500,000), Borrower shall notify, transfer and deliver to Bank all collections any Borrower or any of its Subsidiaries receives for deposit into the Collection Account and all such collections which are not originally deposited into the Collections Account shall be swept to the Collections Account no less often than once per week. Notwithstanding the foregoing, Borrower shall be permitted to maintain the SVB Accounts indefinitely."

3.7 Section 6.8 of the Loan Agreement hereby is amended and restated in its entirety to read as follows:

"**6.8 Capital Milestones**. Borrower shall provide evidence to Bank of Borrower's (i) filing of its SEC Form S-1 (or DRS confidential submission thereof) (Bank acknowledges this has been achieved as of the Fifth Amendment Effective Date); (ii) receipt of a signed and accepted term sheet, from investors or other financing sources, and on terms and conditions, reasonably acceptable to Bank, by no later than June 15, 2018, to refinance all Obligations owing to Bank (Bank acknowledges this has been achieved as of the Fifth Amendment Effective Date); (iii) filing

of amendment to its filed SEC Form S-1 (or DRS/A confidential submission thereof) which updates that filing to include Borrower's financial statements for the period ending March 31, 2018 by no later than July 15, 2018 (Bank acknowledges this has been achieved as of the Fifth Amendment Effective Date); and (iv) receipt of not less than Five Million Dollars ($5,000,000) of gross cash proceeds (provided that Borrower shall only incur a reasonable amount of transaction expenses in connection therewith) from the sale of its equity securities, to investors and on terms and conditions reasonably acceptable to Bank, by no later than August 3, 2018."

3.8 Section 6.10 of the Loan Agreement hereby is amended and restated in its entirety to read as follows:

"**6.10 Intellectual Property Rights.**

(a) Borrower shall, (i) concurrently with the delivery of the monthly Compliance Certificate, give Bank written notice of any applications or registrations of intellectual property rights filed with the United States Patent and Trademark Office, including the date of such filing and the registration or application numbers, if any, and the filing of any applications or registrations with the United States Copyright Office, including the title of such intellectual property rights to be registered, as such title will appear on such applications or registrations, and the date such applications or registrations will be filed and (ii) prior to the filing of any such applications or registrations, shall execute such documents as Bank may reasonably request for Bank to maintain its perfection in such intellectual property rights to be registered by Borrower, and upon the request of Bank, shall file such documents simultaneously with the filing of any such applications or registrations. Upon filing any such applications or registrations with the United States Copyright Office, Borrower shall promptly provide Bank with (i) a copy of such applications or registrations, without the exhibits, if any, thereto, (ii) evidence of the filing of any documents requested by Bank to be filed for Bank to maintain the perfection and priority of its security interest in such intellectual property rights, and (iii) the date of such filing.

(b) Bank may audit Borrower's Intellectual Property to confirm compliance with this Section, provided such audit may not occur more often than twice per year, unless an Event of Default has occurred and is continuing. Bank shall have the right, but not the obligation, to take, at Borrower's sole expense, any actions that Borrower is required under this Section to take but which Borrower fails to take, after 15 days' notice to Borrower. Borrower shall reimburse and indemnify Bank for all reasonable costs and reasonable expenses incurred in the reasonable exercise of its rights under this Section."

3.9 Exhibit A to the Loan Agreement hereby is replaced with Exhibit A attached hereto.

3.10 Exhibit D to the Loan Agreement hereby is replaced with Exhibit D attached hereto.

3.11 Borrower hereby acknowledges and Bank hereby waives the Existing Default.

4. Repayment. Borrower shall continue to make all payments as they become due under the Loan Agreement.

5. Ratification by Borrower of Bank's First Priority Security Interest in Collateral. Borrower hereby confirms and ratifies Bank's first priority lien and security interest in and to all Collateral, including all property described on Exhibit A hereto. Borrower shall execute such security agreements, financing statements and other documents as Bank may from time to time reasonably request to carry out the terms of this Amendment and the Loan Agreement. Borrower authorizes Bank to file such financing statements and amendments relating to the Collateral. Such liens and security interests shall secure all of the obligations of Borrower under this Amendment and the Loan Agreement.

6. Receipt and Application of Payments. All payments hereunder and under the Loan Agreement may, at Bank's option, first be applied against Bank Expenses and accrued and unpaid interest, and the balance against the principal portion of the Existing Debt in reverse order of maturity, all in Bank's sole and absolute discretion. Acceptance by Bank of any payment in an amount less than the amount then due shall be deemed an acceptance on account only, and the failure to pay the entire amount then due shall be and continue to be an Event of Default pursuant to this Amendment, and at any time thereafter and until the entire amount then due has been paid, Bank shall be entitled to exercise all rights conferred upon it herein or in the Loan Agreement upon the occurrence of an Event of Default. To the extent that Bank receives any payment or benefit and such payment or benefit, or any part thereof, is required to be repaid to a trustee, receiver, or any other party under any bankruptcy act, state or federal law, common law or equitable cause, then to the extent of such payment or benefit, the Existing Debt, or any part thereof intended to be satisfied shall be revived and continued in full force and effect as if such payment or benefit had not been made, shall accrue interest at the highest rate applicable to any portion thereof, shall be secured by the Collateral and payable on demand.

7. Representations and Warranties.

7.1 Borrower hereby represents and warrants that no Event of Default or failure of condition has occurred or exists, or would exist with notice or lapse of time or both under any of the Loan Agreement, other than the Existing Default.

7.2 All representations and warranties of Borrower in this Amendment and the Loan Agreement are true and correct in all material respects as of the date hereof, and shall survive the execution of this Amendment.

7.3 All of Borrower's deposit accounts (including operating and payroll accounts) and investment accounts are with Bank other than those permitted under the Loan Agreement.

8. Rights and Remedies.

8.1 Upon the occurrence and during the continuance of an Event of Default, Bank may, at its election, without notice of its election and without demand, do any one or more of the following, all of which are authorized by Borrower:

(a) Without notice to Borrower, set off and apply to the amounts due and owing under the Loan Agreement and this Amendment:

(i) any and all cash or certificates of deposit held by Bank for whatever purpose; and

(ii) indebtedness at any time owing to or for the credit or the account of Borrower held by Bank.

(b) Take action against Borrower for payment under the Loan Agreement and this Amendment;

(c) Demand that Borrower (i) deposit cash with Bank in an amount equal to the amount of any Letters of Credit remaining undrawn, as collateral security for the repayment of any future drawings under such Letters of Credit, and (ii) pay in advance all Letter of Credit fees scheduled to be paid or payable over the remaining term of the Letters of Credit, and Borrower shall promptly deposit and pay such amounts; and/or

(d) Exercise any right and remedy authorized by the Loan Agreement and/or this Amendment and/or applicable law.

8.2 Bank's rights and remedies under this Amendment, the Loan Agreement and all other agreements shall be cumulative. Bank shall have all other rights and remedies not inconsistent herewith as provided

under the Code, by law, or in equity. No exercise by Bank of one right or remedy shall be deemed an election, and no waiver by Bank of any Event of Default on the part of Borrower shall be deemed a continuing waiver. No delay by Bank shall constitute a waiver, election, or acquiescence by it. Bank shall have the right to take any action it deems necessary against Borrower in order to enforce or perfect, or to realize on its security interest in the Collateral.

9. Power of Attorney. Effective only upon the occurrence and during the continuance of an Event of Default, Borrower hereby irrevocably appoints Bank (and any of Bank's designated officers, or employees) as Borrower's true and lawful attorney to: (a) send requests for verification of Accounts or notify account debtors of Bank's security interest in the Accounts; (b) endorse Borrower's name on any checks or other forms of payment or security that may come into Bank's possession; (c) sign Borrower's name on any invoice or bill of lading relating to any Account, drafts against account debtors, schedules and assignments of Accounts, verifications of Accounts, and notices to account debtors; (d) dispose of any Collateral; (e) make, settle, and adjust all claims under and decisions with respect to Borrower's policies of insurance; (f) settle and adjust disputes and claims respecting the accounts directly with account debtors, for amounts and upon terms which Bank determines to be reasonable; (g) to modify, in its sole discretion, any intellectual property security agreement entered into between Borrower and Bank without first obtaining Borrower's approval of or signature to such modification by amending Exhibits A, B, and C, thereof, as appropriate, to include reference to any right, title or interest in any Copyrights, Patents or Trademarks acquired by Borrower after the execution hereof or to delete any reference to any right, title or interest in any Copyrights, Patents or Trademarks in which Borrower no longer has or claims to have any right, title or interest; and (h) to file, in its sole discretion, one or more financing or continuation statements and amendments thereto, relative to any of the Collateral without the signature of Borrower where permitted by law; provided Bank may exercise such power of attorney to sign the name of Borrower on any of the documents described in clauses (g) and (h) above, regardless of whether an Event of Default has occurred. The appointment of Bank as Borrower's attorney in fact, and each and every one of Bank's rights and powers, being coupled with an interest, is irrevocable until all of the Obligations have been fully repaid and performed and Bank's obligation to provide advances hereunder is terminated.

10. Conditions Precedent. The effectiveness of this Amendment is subject to Bank's receipt of all of the following:

(a) this Amendment, duly executed by Borrower;

(b) a UCC Financing Statement Amendment;

(c) evidence Borrower has deposited not less than One Million Five Hundred Thousand Dollars ($1,500,000) into the Collections Account;

(d) a Certificate of the Secretary of Borrower with respect to incumbency and resolutions authorizing the execution and delivery of this Amendment;

(e) all reasonable Bank Expenses incurred through the date of this Amendment, which may be debited from any of Borrower's accounts; and

(f) such other documents, and completion of such other matters, as Bank may reasonably deem necessary or appropriate.

11. Waiver of Notice and Cure. Borrower acknowledges that Events of Default have occurred under the Loan Agreement that, but for this Amendment, would have entitled Bank to exercise all the remedies available to Bank under the Loan Agreement and applicable law. Borrower waives all notices of default and rights to cure that are otherwise provided in the Loan Agreement or applicable law, including, but not limited to, rights to notice and redemption under California Uniform Commercial Code sections 9611, 9620 and 9623. Borrower further waives any claim that a sale or other disposition by Bank of the Collateral is not commercially reasonable because Bank disclaims any warranties with respect to such sale or other disposition, including, without limitation, disclaimers of warranties relating to title, possession, quiet enjoyment, or the like. Borrower recognizes that Bank may be unable to effect a public sale of any or all the Collateral, by reason of certain prohibitions contained in

federal securities laws and applicable state securities laws or otherwise, and may be compelled to resort to one or more private sales thereof to a restricted group of purchasers which will be obliged to agree, among other things, to acquire such securities for their own account for investment and not with a view to the distribution or resale thereof. Borrower acknowledges and agrees that any such private sale may result in prices and other terms less favorable than if such sale were a public sale and, notwithstanding such circumstances, agrees that any such private sale shall be deemed to have been made in a commercially reasonable manner. Bank shall be under no obligation to delay a sale of any of the Collateral for the period of time necessary to permit the issuer thereof to register such securities for public sale under federal securities laws or under applicable state securities laws, even if such issuer would agree to do so.

12. Release.

12.1 Borrower acknowledges that Bank would not enter into this Amendment without Borrower's assurance hereunder. Except for the obligations arising hereafter under this Amendment, Borrower hereby absolutely discharges and releases Bank, any person or entity that has obtained any interest from Bank under the Loan Agreement and each of Bank's and such entity's former and present partners, stockholders, officers, directors, employees, successors, assignees, agents and attorneys from any known or unknown claims which Borrower now has against Bank of any nature, including any claims that Borrower, its successors, counsel, and advisors may in the future discover they would have now had if they had known facts not now known to them, whether founded in contract, in tort or pursuant to any other theory of liability arising out of or related to this Amendment or the Loan Agreement or the transactions contemplated hereby or thereby.

12.2 Borrower waives the provisions of California Civil Code Section 1542, which states:

A GENERAL RELEASE DOES NOT EXTEND TO CLAIMS WHICH THE CREDITOR DOES NOT KNOW OR SUSPECT TO EXIST IN HIS FAVOR AT THE TIME OF EXECUTING THE RELEASE, WHICH IF KNOWN BY HIM MUST HAVE MATERIALLY AFFECTED HIS SETTLEMENT WITH THE DEBTOR.

12.3 The provisions, waivers and releases set forth in this section are binding upon Borrower and Borrower's shareholders, agents, employees, assigns and successors in interest. The provisions, waivers and releases of this section shall inure to the benefit of Bank and its agents, employees, officers, directors, assigns and successors in interest.

12.4 Borrower warrants and represents that Borrower is the sole and lawful owner of all right, title and interest in and to all of the claims released hereby and Borrower has not heretofore voluntarily, by operation of law or otherwise, assigned or transferred or purported to assign or transfer to any person any such claim or any portion thereof. Borrower shall indemnify and hold harmless Bank from and against any claim, demand, damage, debt, liability (including payment of attorneys' fees and costs actually incurred whether or not litigation is commenced) based on or arising out of any assignment or transfer.

12.5 The provisions of this section shall survive payment in full of the Obligations, full performance of all the terms of this Amendment and the Loan Agreement, and/or Bank's actions to exercise any remedy available under the Loan Agreement or otherwise.

13. Further Assurances. Borrower will take such other actions as Bank may reasonably request from time to time to perfect or continue Bank's security interests in Borrower's property, and to accomplish the objectives of this Amendment.

14. Consultation of Counsel. Borrower acknowledges that Borrower has had the opportunity to be represented by legal counsel of its own choice throughout all of the negotiations that preceded the execution of this Amendment. Borrower has executed this Amendment after reviewing and understanding each provision of this Amendment and without reliance upon any promise or representation of any person or persons acting for or on behalf of Bank. Borrower further acknowledges that Borrower and its counsel have had adequate opportunity to make whatever investigation or inquiry they may deem necessary or desirable in connection with the subject matter

of this Amendment prior to the execution hereof and the delivery and acceptance of the consideration described herein.

15. Miscellaneous.

15.1 Successors and Assigns. This Amendment shall be binding upon and shall inure to the benefit of Borrower and Bank and their respective successors and assigns; provided, however, that the foregoing shall not authorize any assignment by Borrower of its rights or duties hereunder.

15.2 Integration. This Amendment and any documents executed in connection herewith or pursuant hereto contain the entire agreement between the parties with respect to the subject matter hereof and supersede all prior agreements, understandings, offers and negotiations, oral or written, with respect thereto and no extrinsic evidence whatsoever may be introduced in any judicial or arbitration proceeding, if any, involving this Amendment; except that any financing statements or other agreements or instruments filed by Bank with respect to Borrower shall remain in full force and effect.

15.3 Entire Agreement. This Amendment and the Loan Agreement contain the entire agreement of the parties hereto and supersede any other oral or written agreements or understandings with respect to the subject matter hereof and thereof.

15.4 Course of Dealing; Waivers. No course of dealing on the part of Bank or its officers, nor any failure or delay in the exercise of any right by Bank, shall operate as a waiver thereof, and any single or partial exercise of any such right shall not preclude any later exercise of any such right. Bank's failure at any time to require strict performance by Borrower of any provision shall not affect any right of Bank thereafter to demand strict compliance and performance. Any suspension or waiver of a right must be in writing signed by an officer of Bank.

15.5 Time is of the Essence. Time is of the essence as to each and every term and provision of this Amendment and the other Loan Agreement.

15.6 Counterparts. This Amendment may be signed in counterparts and all of such counterparts when properly executed by the appropriate parties thereto together shall serve as a fully executed document, binding upon the parties.

15.7 Legal Effect. The Loan Agreement remain in full force and effect. If any provision of this Amendment conflicts with applicable law, such provision shall be deemed severed from this Amendment, and the balance of this Amendment shall remain in full force and effect.

15.8 WAIVER OF JURY. BANK AND BORROWER ACKNOWLEDGE AND AGREE THAT THE TIME AND EXPENSE REQUIRED FOR TRIAL BY JURY EXCEED THE TIME AND EXPENSE REQUIRED FOR A BENCH TRIAL AND HEREBY WAIVE, TO THE EXTENT PERMITTED BY LAW, TRIAL BY JURY OF ANY CLAIM OR CAUSE OF ACTION BASED UPON, RELATED TO OR ARISING OUT OF THE TRANSACTIONS CONTEMPLATED BY THE LOAN AGREEMENT, INCLUDING CONTRACT CLAIMS, TORT CLAIMS, BREACH OF DUTY CLAIMS, AND ALL OTHER COMMON LAW OR STATUTORY CLAIMS. EACH PARTY RECOGNIZES AND AGREES THAT THE FOREGOING WAIVER CONSTITUTES A MATERIAL INDUCEMENT FOR IT TO ENTER INTO THIS AMENDMENT. EACH PARTY REPRESENTS AND WARRANTS THAT IT HAS REVIEWED THIS WAIVER WITH ITS LEGAL COUNSEL AND THAT IT KNOWINGLY AND VOLUNTARILY WAIVES ITS JURY TRIAL RIGHTS FOLLOWING CONSULTATION WITH LEGAL COUNSEL.

16. Governing Law. This Agreement and the rights and obligations of the parties hereto shall be governed by and construed in accordance with the laws of the State of California.

17. Assignment and Indemnity. Borrower consents to Bank's assignment of all or any part of Bank's rights under this Amendment and the Loan Agreement in accordance with the terms of the Loan Agreement. Borrower shall indemnify and defend and hold Bank and any assignee of Bank's interests harmless from any

actions, costs, losses or expenses (including attorneys' fees) arising out of such assignment, this Amendment and the Loan Agreement in accordance with the terms of the Loan Agreement.

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IN WITNESS WHEREOF, the undersigned have executed this Amendment as of the first date above written.

BIONANO GENOMICS, INC., a Delaware corporation

By: /s/ R. Erik Holmlin
Name: R. Erik Holmlin
Title: President and CEO

WESTERN ALLIANCE BANK, an Arizona corporation

By: /s/ Bill Wickline
Name: Bill Wickline
Title: SVP, Director of Portfolio Mgmt

[*Signature Page to Fifth Amendment to Loan and Security Agreement*]

EXHIBIT A

DEBTOR: **BIONANO GENOMICS, INC., a Delaware Corporation**

SECURED PARTY: **WESTERN ALLIANCE BANK, an Arizona Corporation**

COLLATERAL DESCRIPTION ATTACHMENT
TO LOAN AND SECURITY AGREEMENT

All personal property of Borrower (herein referred to as "Borrower" or "Debtor") whether presently existing or hereafter created or acquired, and wherever located, including, but not limited to:

(a) all accounts (including health-care-insurance receivables), chattel paper (including tangible and electronic chattel paper), deposit accounts, documents (including negotiable documents), equipment (including all accessions and additions thereto), general intangibles (including payment intangibles and software), goods (including fixtures), instruments (including promissory notes), inventory (including all goods held for sale or lease or to be furnished under a contract of service, and including returns and repossessions), investment property (including securities and securities entitlements), letter of credit rights, money, and all of Debtor's books and records with respect to any of the foregoing, and the computers and equipment containing said books and records;

(b) any and all cash proceeds and/or noncash proceeds of any of the foregoing, including, without limitation, insurance proceeds, and all supporting obligations and the security therefor or for any right to payment. All terms above have the meanings given to them in the California Uniform Commercial Code, as amended or supplemented from time to time.

Notwithstanding the foregoing, the Collateral shall not include (i) more than 65% of the presently existing and hereafter arising issued and outstanding shares of capital stock owned by Borrower of any Foreign Subsidiary which shares entitle the holder thereof to vote for directors or any other matter. or (ii) any property that is financed by a third party permitted by clause (a) or (c) of the definition of "Permitted Liens" hereunder to the extent prohibited by the terms of such agreement, provided that upon the termination or lapse of any such prohibition, such property (and any accessions, attachments, replacements or improvements thereon) shall be deemed to be Collateral hereunder and shall be subject to the security interest granted.

EXHIBIT D

COMPLIANCE CERTIFICATE

TO: WESTERN ALLIANCE BANK, an Arizona corporation

FROM: BIONANO GENOMICS, INC.

The undersigned authorized officer of BIONANO GENOMICS, INC. hereby certifies that in accordance with the terms and conditions of the Loan and Security Agreement between Borrower and Bank (the "Agreement"), (i) Borrower is in complete compliance for the period ending _____ with all required covenants except as noted below and (ii) all representations and warranties of Borrower stated in the Agreement are true and correct in all material respects as of the date hereof except as noted below; provided that those representations and warranties expressly referring to another date shall be true, correct and complete in all material respects as of such date. Attached herewith are the required documents supporting the above certification. The Officer further certifies that these are prepared in accordance with Generally Accepted Accounting Principles (GAAP) and are consistently applied from one period to the next except as explained in an accompanying letter or footnotes.

Please indicate compliance status by circling Yes/No under "Complies" column.

Reporting Covenant	**Required**			**Complies**
Annual financial statements (CPA Audited)	FYE within 180 days		Yes	No
Monthly financial statements and Compliance Certificate	Prior to each Credit Extension, and monthly within 30 days		Yes	No
10K and 10Q	(as applicable)		Yes	No
Annual operating budget, sales projections and operating plans approved by board of directors	Annually no later than 45 days after the beginning of each fiscal year		Yes	No
Deposit balances with Bank	$ _____			
Deposit balance outside Bank	$ _____			
Financial Covenant	**Required**	**Actual**		**Complies**
Capital Milestones	Receipt of:			
	(i) filed SEC Form S-1 (or DRS confidential submission thereof);	_____	Yes	No
	(ii) term sheet to refinance all Obligations owing to Bank by no later than June 15, 2018; and	_____	Yes	No
	(iii) amendment filed SEC Form S-1 (or DRS/A confidential submission thereof) for updated March 31, 2018 financials by no later than July 15, 2018;	_____	Yes	No
	(iv) receipt of $5,000,000 in equity by no later than August 3, 2018	$ _____	Yes	No
Minimum Cash with Bank	ratio of (i) minimum unrestricted cash in accounts with Bank to (ii) Indebtedness to Bank, of at least 0.75 to 1.00	_____; _____	Yes	No
Performance to Plan (monthly; T6M)	At least 75% of the projections (see Exhibit C)	____%	Yes	No

Comments Regarding Exceptions: See Attached.

Sincerely,

SIGNATURE

TITLE

DATE

BANK USE ONLY

Received by: _____
AUTHORIZED SIGNER

Date: _____

Verified: _____
AUTHORIZED SIGNER

Date: _____

Compliance Status Yes No

CORPORATE RESOLUTIONS TO BORROW

Borrower: BIONANO GENOMICS, INC.

I, the undersigned Secretary or Assistant Secretary of BIONANO GENOMICS, INC. (the "Corporation"), HEREBY CERTIFY that the Corporation is organized and existing under and by virtue of the laws of the State of Delaware.

I FURTHER CERTIFY that attached hereto as Attachments 1 and 2 are true and complete copies of the Certificate of Incorporation, as amended, and the Bylaws of the Corporation, each of which is in full force and effect on the date hereof.

I FURTHER CERTIFY that at a meeting of the Directors of the Corporation, duly called and held, at which a quorum was present and voting (or by other duly authorized corporate action in lieu of a meeting), the following resolutions (the "Resolutions") were adopted.

BE IT RESOLVED, that any one (1) of the following named officers, employees, or agents of this Corporation, whose actual signatures are shown below:

NAMES	POSITION	ACTUAL SIGNATURES
R. Erik Holmlin	President and CEO	/s/ R. Erik Holmlin

acting for and on behalf of this Corporation and as its act and deed be, and they hereby are, authorized and empowered:

Borrow Money. To borrow from time to time from Western Alliance Bank, an Arizona corporation ("Bank"), on such terms as may be agreed upon between the officers, employees, or agents of the Corporation and Bank, such sum or sums of money as in their judgment should be borrowed, without limitation.

Execute Loan Documents. To execute and deliver to Bank that certain Loan and Security Agreement dated as March 8, 2016 (the "Loan Agreement") and any other agreement entered into between Corporation and Bank in connection with the Loan Agreement, including any amendments, all as amended or extended from time to time, including but not limited to that certain First Amendment to Loan and Security Agreement dated as of December 9, 2016, and that certain Second Amendment to Loan and Security Agreement dated as of May 2, 2017, that certain Third Amendment to Loan and Security Agreement dated as of November 20, 2017 and that certain Forbearance, Fourth Amendment to Loan and Security Agreement dated as of February 9, 2018 (collectively, with the Loan Agreement and Fifth Amendment to Loan and Security Agreement dated as of even date herewith (collectively, with the Loan Agreement, the "Loan Documents"), and also to execute and deliver to Bank one or more renewals, extensions, modifications, refinancings, consolidations, or substitutions for the Loan Documents, or any portion thereof.

Grant Security. To grant a security interest to Bank in the Collateral described in the Loan Documents, which security interest shall secure all of the Corporation's Obligations, as described in the Loan Documents.

Negotiate Items. To draw, endorse, and discount with Bank all drafts, trade acceptances, promissory notes, or other evidences of indebtedness payable to or belonging to the Corporation or in which the Corporation

may have an interest, and either to receive cash for the same or to cause such proceeds to be credited to the account of the Corporation with Bank, or to cause such other disposition of the proceeds derived therefrom as they may deem advisable.

Warrants. To issue Bank warrants to purchase the Corporation's capital stock.

Letters of Credit. To execute letter of credit applications and other related documents pertaining to Bank's issuance of letters of credit.

Corporate Credit Cards. To execute corporate credit card applications and agreements and other related documents pertaining to Bank's provision of corporate credit cards.

Further Acts. In the case of lines of credit, to designate additional or alternate individuals as being authorized to request advances thereunder, and in all cases, to do and perform such other acts and things, to pay any and all fees and costs, and to execute and deliver such other documents and agreements as they may in their discretion deem reasonably necessary or proper in order to carry into effect the provisions of these Resolutions.

BE IT FURTHER RESOLVED, that any and all acts authorized pursuant to these resolutions and performed prior to the passage of these resolutions are hereby ratified and approved, that these Resolutions shall remain in full force and effect and Bank may rely on these Resolutions until written notice of their revocation shall have been delivered to and received by Bank. Any such notice shall not affect any of the Corporation's agreements or commitments in effect at the time notice is given.

I FURTHER CERTIFY that the officers, employees, and agents named above are duly elected, appointed, or employed by or for the Corporation, as the case may be, and occupy the positions set forth opposite their respective names; that the foregoing Resolutions now stand of record on the books of the Corporation; and that the Resolutions are in full force and effect and have not been modified or revoked in any manner whatsoever.

IN WITNESS WHEREOF, I have hereunto set my hand on June __, 2018 and attest that the signatures set opposite the names listed above are their genuine signatures.

CERTIFIED AND ATTESTED BY:

X /s/ Tom Coll

Exhibit 21.1

Subsidiaries of Bionano Genomics, Inc.

BioNano Genomics UK, Ltd., a private limited company organized under the laws of the United Kingdom

BioNano Genomics (Shanghai) Trading Co., Ltd., a private limited company organized under the laws of the China

Exhibit 23.1

CONSENT OF INDEPENDENT REGISTERED PUBLIC ACCOUNTING FIRM

We consent to the use in the Registration Statement on Form S-1 and related Prospectus of our report dated May 11, 2018, relating to the consolidated financial statements of Bionano Genomics, Inc., appearing in the Prospectus, which is a part of such Registration Statement, and to the reference to us under the heading “Experts” in such Prospectus.

/s/ DELOITTE & TOUCHE LLP

San Diego, California
June 28, 2018