

**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
(State or Other Jurisdiction of
Incorporation or Organization)

3826
(Primary Standard Industrial
Classification Code Number)
Bionano Genomics, Inc.
9540 Towne Centre Drive, Suite 100
San Diego, California 92121
(858) 888-7600

26-1756290
(I.R.S. Employer
Identification Number)

(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.
9540 Towne Centre Drive, Suite 100
San Diego, California 92121
(858) 888-7600

(Name, address, including zip code, and telephone number, including area code, of agent for service)

Copies to:

R. Erik Holmlin, Ph.D.
President and Chief Executive Officer
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9540 Towne Centre Drive, Suite 100
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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, smaller reporting company, or an emerging growth company.

Large accelerated filer
Non-accelerated filer

Accelerated filer
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 pursuant to Section 7(a)(2)(B) of the Securities Act.

CALCULATION OF REGISTRATION FEE

| Title of each class of securities to be registered | Amount to be Registered | Proposed Maximum Offering Price per Share | Proposed Maximum Aggregate Offering Price | Amount of Registration Fee |
|--|-------------------------|---|---|----------------------------|
| Common Stock, par value \$0.0001 per share | 2,018,271(1) | \$4.02(2) | \$8,113,450 | \$984 |

- (1) Represents 341,923 shares of common stock currently outstanding and 1,676,348 shares of common stock that are issuable pursuant to a common stock purchase agreement with the selling stockholder named herein. Pursuant to Rule 416(a) of the Securities Act of 1933, as amended, this registration statement also covers any additional shares of common stock which may become issuable to prevent dilution from stock splits, stock dividends and similar events.
- (2) Pursuant to Rule 457(c) under the Securities Act of 1933, as amended, calculated on the basis of the average high and low prices per share of the registrant's common stock reported on The Nasdaq Capital Market on March 27, 2019.

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

The information in this prospectus is not complete and may be changed. The selling stockholder may not sell these securities until the registration statement filed with the Securities and Exchange Commission is effective. This prospectus is not an offer to sell these securities, and the selling stockholder is not soliciting offers to buy these securities, in any state where the offer or sale of these securities is not permitted.

PROSPECTUS, SUBJECT TO COMPLETION, DATED MARCH 28, 2019

2,018,271 Shares

Common Stock



This prospectus relates to the sale of up to 2,018,271 shares of our common stock by Aspire Capital Fund, LLC. Aspire Capital is also referred to in this prospectus as the selling stockholder. The prices at which the selling stockholder may sell the shares will be determined by the prevailing market price for the shares or in negotiated transactions. We will not receive proceeds from the sale of the shares by the selling stockholder. However, we may receive proceeds of up to \$10.0 million from the sale of our common stock to the selling stockholder, pursuant to a common stock purchase agreement entered into with the selling stockholder on March 14, 2019, once the registration statement, of which this prospectus is a part, is declared effective.

The selling stockholder is an “underwriter” within the meaning of the Securities Act of 1933, as amended. We will pay the expenses of registering these shares, but all selling and other expenses incurred by the selling stockholder will be paid by the selling stockholder.

Our common stock is listed on The Nasdaq Capital Market under the ticker symbol “BNGO.” On March 27, 2019, the last reported sale price per share of our common stock was \$4.21 per share.

You should read this prospectus and any prospectus supplement, together with additional information described under the headings “Incorporation of Certain Information by Reference” and “Where You Can Find More Information,” carefully before you invest in any of our securities.

We are an “emerging growth company” as defined by the Jumpstart Our Business Startups Act of 2012 and, as such, we have elected to comply with certain reduced public company reporting requirements for this prospectus and future filings. Please see “Prospectus Summary – Implications of Being an Emerging Growth Company.”

Investing in our securities involves a high degree of risk. See “[Risk Factors](#)” on page 7 of this prospectus.

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

The date of this prospectus is _____, 2019

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We incorporate by reference important information into this prospectus. You may obtain the information incorporated by reference without charge by following the instructions under “Where You Can Find More Information.” You should carefully read this prospectus as well as additional information described under “Incorporation of Certain Information by Reference,” before deciding to invest in our common stock.

Neither we nor the selling stockholder have authorized anyone to provide you with additional information or information different from that contained in this prospectus filed with the Securities and Exchange Commission. We take no responsibility for, and can provide no assurance as to the reliability of, any other information that others may give you. The selling stockholder is offering to sell, and seeking offers to buy, our common stock only in jurisdictions where offers and sales are permitted. 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 shares of our common stock. Our business, financial condition, results of operations and prospects may have changed since that date.

For investors outside the United States: Neither we nor the selling stockholder have done anything that would permit this offering or possession or distribution of this prospectus in any jurisdiction where action for that purpose is required, other than in the United States. Persons outside the United States who come into possession of this prospectus must inform themselves about, and observe any restrictions relating to, the offering of the shares of common stock and the distribution of this prospectus outside the United States.

PROSPECTUS SUMMARY

The following summary highlights information contained or incorporated by reference elsewhere in this prospectus and does not contain all of the information that you should consider in making your investment decision. Before investing in our common stock, you should carefully read this entire prospectus, including our financial statements and the related notes and other documents incorporated by reference in this prospectus, as well as the information under the caption “Risk Factors” herein and under similar headings in the other documents that are incorporated by reference into this prospectus.

Except as otherwise indicated herein or as the context otherwise requires, references in this prospectus to “Bionano,” “the company,” “we,” “us” and “our” refer to Bionano Genomics, Inc.

Company 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 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-intensive, 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 110 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 Institutes of Health, Pennsylvania State University and Salk Institute for Biological Studies. Our revenues in 2017 were \$9.5 million, representing approximately 40% growth over the prior year, and for 2018 our revenues were \$12 million representing approximately 26% growth over the prior year comparable period.

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 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).

Saphyr and its predecessor system, which we collectively refer to as our system in this prospectus, have been cited by researchers and clinicians in hundreds of 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.

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., and in July 2018, we changed our name to Bionano Genomics, Inc.

Our principal executive offices are located at 9540 Towne Centre Drive, Suite 100, San Diego, California 92121, and our telephone number is (858) 888-7600. Our website address is www.bionanogenomics.com and we regularly post copies of our press releases as well as additional information about us on our website.

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.

The trademarks, trade names and service marks appearing in this prospectus are the property of their respective owners. We do not intend our use or display of other companies’ trademarks, trade names or service marks to imply a relationship with, or endorsement or sponsorship of us by, any other companies or products.

Implications of Being an Emerging Growth Company

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 can remain an emerging growth company until the earlier of (1) the last day of the fiscal year (a) ending December 31, 2023, which is the end of the fiscal year following the fifth anniversary of the closing of our initial public offering, (b) in which we have total annual gross revenue of at least \$1.07 billion, or (c) in which we are deemed to be a large accelerated filer, which means the market value of our common stock that is held by non-affiliates exceeds \$700 million as of the prior June 30th, and (2) the date on which we have issued more than \$1.0 billion in non-convertible debt during the prior three-year period. 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

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disclosure requirements, including reduced disclosure obligations regarding executive compensation in our periodic reports and proxy statements. Additionally, even if we no longer qualify as an emerging growth company, as long as we are neither a “large accelerated filer” nor an “accelerated filer,” we would not be required to comply with the auditor attestation requirements of Section 404 of the Sarbanes-Oxley Act.

We cannot predict if investors will find our securities less attractive because we may rely on these exemptions, which could result in a less active trading market for our securities and increased volatility in the price of our securities.

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.

The Offering

| | |
|--|---|
| Common stock being offered by the selling stockholder | 2,018,271 shares |
| Common stock outstanding | 10,503,097 shares (as of March 20, 2019, excluding the Initial Purchase Shares and the Commitment Shares, as defined below) |
| Use of proceeds | The selling stockholder will receive all of the proceeds from the sale of the shares offered for sale by it under this prospectus. We will not receive proceeds from the sale of the shares by the selling stockholder. However, we may receive up to \$10.0 million in proceeds from the sale of our common stock to the selling stockholder under the common stock purchase agreement described below. Proceeds that we receive under the common stock purchase agreement will be used to advance our research and development activities and for working capital and general corporate purposes. |
| Nasdaq Capital Market Symbol | BNGO |
| Risk Factors | Investing in our securities involves a high degree of risk. You should carefully review and consider the “Risk Factors” section of this prospectus beginning on page 7 for a discussion of factors to consider before deciding to invest in shares of our common stock. |

The number of shares of our common stock outstanding is based on an aggregate of 10,503,097 shares outstanding as of March 20, 2019 and excludes the 272,479 Initial Purchase Shares and 69,444 Commitment Shares as defined below, and also excludes:

- 1,710,110 shares of common stock issuable upon the exercise of options outstanding as of March 20, 2019 at a weighted average exercise price of \$6.04 per share;
- 215,906 shares of common stock reserved for future issuance under the 2018 Equity Incentive Plan as of March 20, 2019;
- 253,371 shares of common stock reserved for future issuance under the 2018 Employee Stock Purchase Plan as of March 20, 2019; and
- 4,224,494 shares of common stock issuable upon the exercise of warrants outstanding as of March 20, 2019 at a weighted average exercise price of \$6.25 per share.

On March 14, 2019, we entered into a common stock purchase agreement, or the Purchase Agreement, with Aspire Capital Fund, LLC, an Illinois limited liability company, or Aspire Capital, or the selling stockholder, which provides that, upon the terms and subject to the conditions and limitations set forth therein, Aspire Capital is committed to purchase up to an aggregate of \$10.0 million of shares of our common stock over the approximately 30-month term of the Purchase Agreement. In consideration for entering into the Purchase Agreement, concurrently with the execution of the Purchase Agreement, we issued to Aspire Capital 69,444 shares of our common stock, or the Commitment Shares, as a commitment fee and sold to Aspire Capital 272,479 shares of common stock, or the Initial Purchase Shares, at \$3.67 per share for proceeds of \$1.0 million. Concurrently with entering into the Purchase Agreement, we also entered into a registration rights agreement with Aspire Capital, or the Registration Rights Agreement, in which we agreed to file one or more registration statements, including the registration statement of which this prospectus is a part, as permissible and necessary to register under the Securities Act of 1933, as amended, or the Securities Act, the sale of the shares of our common stock that have been and may be issued to Aspire Capital under the Purchase Agreement.

As of March 20, 2019, there were 10,503,097 shares of our common stock outstanding, excluding the 2,018,271 shares offered that have been issued or may be issuable to Aspire Capital pursuant to the Purchase Agreement. If all of such 2,018,271 shares of our common stock offered hereby were issued and outstanding as of the date hereof, such shares would represent 16.1% of the total common stock outstanding as of the date hereof. The number of shares of our common stock ultimately offered for sale by Aspire Capital is dependent upon the number of shares purchased by Aspire Capital under the Purchase Agreement.

The aggregate number of shares that we may issue to Aspire Capital under the Purchase Agreement, including the Commitment Shares, may in no case exceed 2,018,271 shares of our common stock (which is equal to 19.99% of the common stock outstanding on the date of the Purchase Agreement) unless (i) stockholder approval is obtained to issue more, in which case this 2,018,271 share limitation will not apply, or (ii) stockholder approval has not been obtained and at any time the 2,018,271 share limitation is reached and at all times thereafter the average price paid for all shares issued under the Purchase Agreement (including the Commitment Shares) is equal to or greater than \$4.32, referred to as the Minimum Price, a price equal to the arithmetic average of the closing sale prices of our common stock on the five business days prior to the date of the Purchase Agreement; provided that at no one point in time shall Aspire Capital (together with its affiliates) beneficially own more than 19.99% of our common stock.

Pursuant to the Purchase Agreement and the Registration Rights Agreement, we are registering 2,018,271 shares of our common stock under the Securities Act, which includes the Commitment Shares and the Initial Purchase Shares that have already been issued to Aspire Capital, and 1,676,348 shares of common stock that we may issue to Aspire Capital after this registration statement is declared effective under the Securities Act. All 2,018,271 shares of common stock are being offered pursuant to this prospectus. If we elect to sell more than the 2,018,271 shares of common stock offered hereby, we must first register under the Securities Act the sale by Aspire Capital of such additional shares.

After the Securities and Exchange Commission has declared effective the registration statement of which this prospectus is a part, on any trading day on which the closing sale price of our common stock exceeds \$0.25, we have the right, in our sole discretion, to present Aspire Capital with a purchase notice (each, a Purchase Notice), directing Aspire Capital (as principal) to purchase up to 60,000 shares of our common stock per trading day, up to \$9.0 million of our common stock in the aggregate at a per share price, or the Purchase Price, calculated by reference to the prevailing market price of our common stock (as more specifically described below in the section titled “The Aspire Capital Transaction”).

In addition, on any date on which we submit a Purchase Notice for 60,000 shares to Aspire Capital, we also have the right, in our sole discretion, to present Aspire Capital with a volume-weighted average price purchase notice (each, a VWAP Purchase Notice) directing Aspire Capital to purchase an amount of stock equal to up to 30% of the aggregate shares of the Company’s common stock traded on The Nasdaq Capital Market on the next trading day, or VWAP Purchase Date, subject to a maximum number of shares we may determine, or VWAP Purchase Share Volume Maximum, and a minimum trading price, or VWAP Minimum Price Threshold (as more specifically described below). The purchase price per Purchase Share pursuant to such VWAP Purchase Notice, or the VWAP Purchase Price, is calculated by reference to the prevailing market price of our common stock (as more specifically described below in the section titled “The Aspire Capital Transaction”).

The Purchase Agreement provides that the Company and Aspire Capital shall not effect any sales under the Purchase Agreement on any purchase date where the closing sale price of our common stock is less than \$0.25 per share, or the Floor Price. This Floor Price and the respective prices and share numbers in the preceding paragraphs will be appropriately adjusted for any reorganization, recapitalization, non-cash dividend, stock split, reverse stock split or other similar transaction. There are no trading volume requirements or restrictions under the Purchase Agreement, and we will control the timing and amount of any sales of our common stock to Aspire

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Capital. Aspire Capital has no right to require any sales by us, but is obligated to make purchases from us as we direct in accordance with the Purchase Agreement. There are no limitations on use of proceeds, financial or business covenants, restrictions on future fundings, rights of first refusal, participation rights, penalties or liquidated damages in the Purchase Agreement. Aspire Capital may not assign its rights or obligations under the Purchase Agreement. The Purchase Agreement may be terminated by us at any time, at our discretion, without any penalty or cost to us.

RISK FACTORS

Investing in our common stock involves a high degree of risk. You should consider carefully the following risks and uncertainties as well as the risks and uncertainties described in the section entitled “Risk Factors” contained in our Annual Report on Form 10-K for the year ended December 31, 2018, as filed with the Securities and Exchange Commission, or SEC, on March 14, 2019, as well as in our subsequent Quarterly and Annual Reports filed with the SEC, which descriptions are incorporated in this prospectus by reference in their entirety, as well as in any prospectus supplement hereto. These risks and uncertainties are not the only risks and uncertainties we face. Additional risks and uncertainties not currently known to us, or that we currently view as immaterial, may also impair our business. If any of the risks or uncertainties described in our SEC filings or any additional risks and uncertainties actually occur, our business, financial condition, results of operations and cash flow could be materially and adversely affected. In that case, the trading price of our common stock could decline and you might lose all or part of your investment. You should carefully consider the following information about risks, together with the other information contained in this prospectus, before making an investment in our common stock.

We will need to raise substantial additional capital in the future to fund our operations and we may be unable to raise such funds when needed and on acceptable terms.

We will need to raise substantial additional capital in the future to fund our operations. The extent to which we utilize the Purchase Agreement with Aspire Capital as a source of funding will depend on a number of factors, including the prevailing market price of our common stock, the volume of trading in our common stock and the extent to which we are able to secure funds from other sources. The number of shares that we may sell to Aspire Capital under the Purchase Agreement on any given day and during the term of the Purchase Agreement is limited. See “The Aspire Capital Transaction” for additional information. Additionally, we and Aspire Capital may not effect any sales of shares of our common stock under the Purchase Agreement during the continuance of an event of default or on any trading day that the closing sale price of our common stock is less than \$0.25 per share. Even if we are able to access the full \$10.0 million under the Purchase Agreement, we will still need additional capital to fully implement our business, operating and development plans.

The sale of our common stock to Aspire Capital may cause substantial dilution to our existing stockholders and the sale of the shares of common stock acquired by Aspire Capital could cause the price of our common stock to decline.

We are registering for sale the Commitment Shares and Initial Purchase Shares that we have issued and 1,676,348 additional shares that we may sell to Aspire Capital from time to time under the Purchase Agreement. It is anticipated that shares registered in this offering will be sold over a period of up to approximately 30 months from the date of this prospectus. The number of shares ultimately offered for sale by Aspire Capital under this prospectus is dependent upon the number of shares we elect to sell to Aspire Capital under the Purchase Agreement. Depending on a variety of factors, including market liquidity of our common stock, the sale of shares under the Purchase Agreement may cause the trading price of our common stock to decline.

Aspire Capital may ultimately purchase all, some or none of the \$10.0 million of common stock that, together with the Commitment Shares and Initial Purchase Shares, is the subject of this prospectus. Aspire Capital may sell all, some or none of our shares that it holds or comes to hold under the Purchase Agreement. Sales by us to Aspire Capital of shares pursuant to the Purchase Agreement may result in dilution to the interests of other holders of our common stock. The sale of a substantial number of shares of our common stock by Aspire Capital in this offering, or anticipation of such sales, could cause the trading price of our common stock to decline or make it more difficult for us to sell equity or equity-related securities in the future at a time and at a price that we might otherwise desire.

SPECIAL NOTE REGARDING FORWARD-LOOKING STATEMENTS

This prospectus and the documents incorporated by reference herein contain forward-looking statements that reflect our management's beliefs and views with respect to future events and are subject to substantial risks and uncertainties within the meaning of Section 27A of the Securities Act, Section 21E of the Securities Exchange Act of 1934, as amended and the safe harbor provisions for the U.S. Private Securities Litigation Reform Act of 1995. All statements, other than statements of historical fact, contained in this prospectus and the documents incorporated by reference herein, including statements regarding our strategy, future operations, future financial position, future revenue, projected costs, prospects, plans and objectives of management, are forward-looking statements. In some cases, forward-looking statements can be identified by the use of forward-looking words such as "aim," "anticipate," "believe," "contemplate," "continue," "could," "estimate," "expect," "intend," "may," "plan," "potential," "predict," "pro forma," "project," "seek," "should," "target," "will," "would" or other similar words or expressions (including their use in the negative), or by discussions of future matters such as the development of products, technology enhancements, possible changes in legislation, and other statements that are not historical.

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 and the documents incorporated by reference herein, 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; and
- our ability to attract collaborators and strategic partnerships;
- our ability to sell shares of common stock to Aspire Capital pursuant to the terms of the Purchase Agreement and our ability to register and maintain the registration of the shares issued and issuable thereunder; and
- our anticipated use of the net proceeds from the potential sale of shares of our common stock to Aspire Capital.

We may not actually achieve the plans, intentions or expectations disclosed in our forward-looking statements. We operate in a very competitive and rapidly changing environment. It is not possible for our management to predict all risks, nor can we assess the impact of all factors on our business or the extent to which any factor, or combination of factors, may cause actual results to differ materially from those contained in any forward-looking statements we may make. Actual results or events could differ materially from the plans, intentions and

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expectations disclosed in the forward-looking statements we make, and accordingly you should not place undue reliance on our forward-looking statements. We have included important factors in the cautionary statements included in this prospectus, particularly in the “Risk Factors” section in this prospectus and the documents incorporated by reference herein, that we believe could cause actual results or events to differ materially from the forward-looking statements that we make. Our forward-looking statements do not reflect the potential impact of any future acquisitions, mergers, dispositions, joint ventures or investments we may make.

You should read this prospectus, the documents incorporated by reference herein and the documents that we have filed as exhibits to the registration statement of which this prospectus is a part completely and with the understanding that our actual future results may be materially different from what we expect. We qualify all of the forward-looking statements in this prospectus and the documents incorporated by reference herein by these cautionary statements. Except as required by law, we undertake no obligation to publicly update any forward-looking statements, whether as a result of new information, future events or otherwise.

THE ASPIRE CAPITAL TRANSACTION

General

On March 14, 2019, we entered into the Purchase Agreement, which provides that, upon the terms and subject to the conditions and limitations set forth therein, Aspire Capital is committed to purchase up to an aggregate of \$10.0 million of our shares of common stock over the term of the Purchase Agreement. In consideration for entering into the Purchase Agreement, concurrently with the execution of the Purchase Agreement, we issued to Aspire Capital the 69,444 Commitment Shares. Upon execution of the Purchase Agreement, we also sold to Aspire Capital the 272,479 Initial Purchase Shares for proceeds of \$1.0 million. Concurrently with entering into the Purchase Agreement, we also entered into the Registration Rights Agreement, in which we agreed to file one or more registration statements as permissible and necessary to register under the Securities Act, the sale of the shares of our common stock that have been and may be issued to Aspire Capital under the Purchase Agreement.

As of March 20, 2019, there were 10,503,097 shares of our common stock outstanding, excluding the 2,018,271 shares offered that have been issued or may be issuable to Aspire Capital pursuant to the Purchase Agreement. If all of such 2,018,271 shares of our common stock offered hereby were issued and outstanding as of the date hereof, such shares would represent 16.1% of the total common stock outstanding. The number of shares of our common stock ultimately offered for sale by Aspire Capital is dependent upon the number of shares purchased by Aspire Capital under the Purchase Agreement.

The aggregate number of shares that we may issue to Aspire Capital under the Purchase Agreement, including the Commitment Shares, may in no case exceed 2,018,271 shares of our common stock (which is equal to 19.99% of the common stock outstanding on the date of the Purchase Agreement) unless (i) stockholder approval is obtained to issue more, in which case this 2,018,271 share limitation will not apply, or (ii) stockholder approval has not been obtained and at any time the 2,018,271 share limitation is reached and at all times thereafter the average price paid for all shares issued under the Purchase Agreement (including the Commitment Shares) is equal to or greater than \$4.32, referred to as the Minimum Price, a price equal to the arithmetic average of the closing sale prices of our common stock on the five business days prior to the date of the Purchase Agreement; provided that at no one point in time shall Aspire Capital (together with its affiliates) beneficially own more than 19.99% of our common stock.

Pursuant to the Purchase Agreement and the Registration Rights Agreement, we are registering 2,018,271 shares of our common stock under the Securities Act, which includes the Commitment Shares and Initial Purchase Shares that have already been issued to Aspire Capital and 1,676,348 shares of common stock which we may issue to Aspire Capital after this registration statement is declared effective under the Securities Act. All 2,018,271 shares of common stock are being offered pursuant to this prospectus. Under the Purchase Agreement, we have the right but not the obligation to issue more than the 2,018,271 shares of common stock included in this prospectus to Aspire Capital under some circumstances. If we elect to sell more than the 2,018,271 shares of common stock offered hereby, we must first register under the Securities Act the sale by Aspire Capital of any such additional shares.

After the Securities and Exchange Commission has declared effective the registration statement of which this prospectus is a part, on any trading day on which the closing sale price of our common stock is not less than \$0.25 per share, we have the right, in our sole discretion, to present Aspire Capital with a Purchase Notice, directing Aspire Capital (as principal) to purchase up to 60,000 shares of our common stock per business day, up to \$9.0 million of our common stock in the aggregate over the term of the Purchase Agreement, at a Purchase Price calculated by reference to the prevailing market price of our common stock over the preceding 10-business day period (as more specifically described below); however, no sale pursuant to a Purchase Notice may exceed \$300,000 per trading day.

In addition, on any date on which we submit a Purchase Notice to Aspire Capital for 60,000 Purchase Shares, we also have the right, in our sole discretion, to present Aspire Capital with a VWAP Purchase Notice directing

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Aspire Capital to purchase an amount of stock equal to up to 30% of the aggregate shares of our common stock traded on the Nasdaq Capital Market on the next trading day, subject to the VWAP Purchase Share Volume Maximum and the VWAP Minimum Price Threshold. The VWAP Purchase Price is calculated by reference to the prevailing market price of our common stock (as more specifically described below).

The Purchase Agreement provides that we and Aspire Capital shall not effect any sales under the Purchase Agreement on any purchase date where the closing sale price of our common stock is less than the Floor Price. There are no trading volume requirements or restrictions under the Purchase Agreement, and we will control the timing and amount of any sales of our common stock to Aspire Capital. Aspire Capital has no right to require any sales by us, but is obligated to make purchases from us as we direct in accordance with the Purchase Agreement. There are no limitations on use of proceeds, financial or business covenants, restrictions on future financings, rights of first refusal, participation rights, penalties or liquidated damages in the Purchase Agreement.

Aspire Capital may not assign its rights or obligations under the Purchase Agreement. The Purchase Agreement may be terminated by us at any time, at our discretion, without any penalty or cost to us.

Purchase of Shares under the Purchase Agreement

Under the Purchase Agreement, on any trading day selected by us on which the closing sale price of our common stock exceeds \$0.25 per share, we may direct Aspire Capital to purchase up to 60,000 shares of our common stock per trading day. The Purchase Price of such shares is equal to the lesser of:

- the lowest sale price of our common stock on the purchase date; or
- the arithmetic average of the three lowest closing sale prices for our common stock during the ten consecutive trading days ending on the trading day immediately preceding the purchase date.

In addition, on any date on which we submit a Purchase Notice to Aspire Capital for the purchase of up to 60,000 shares, we also have the right to direct Aspire Capital to purchase an amount of stock equal to up to 30% of the aggregate shares of our common stock traded on the Nasdaq Capital Market on the next trading day, subject to the VWAP Purchase Share Volume Maximum and the VWAP Minimum Price Threshold, which is equal to the greater of (a) 80% of the closing price of the Company's common stock on the business day immediately preceding the VWAP Purchase Date or (b) such higher price as set forth by the Company in the VWAP Purchase Notice. The VWAP Purchase Price of such shares is the lower of:

- the closing sale price on the VWAP Purchase Date; or
- 97% of the volume-weighted average price for our common stock traded on the Nasdaq Capital Market:
 - on the VWAP Purchase Date, if the aggregate shares to be purchased on that date have not exceeded the VWAP Purchase Share Volume Maximum or
 - during that portion of the VWAP Purchase Date until such time as the sooner to occur of (i) the time at which the aggregate shares traded on the Nasdaq Capital Market exceed the VWAP Purchase Share Volume Maximum or (ii) the time at which the sale price of the Company's common stock falls below the VWAP Minimum Price Threshold.

The Purchase Price will be adjusted for any reorganization, recapitalization, non-cash dividend, stock split, or other similar transaction occurring during the trading day(s) used to compute the Purchase Price. We may deliver multiple Purchase Notices and VWAP Purchase Notices to Aspire Capital from time to time during the term of the Purchase Agreement, so long as the most recent purchase has been completed.

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Minimum Share Price

Under the Purchase Agreement, we and Aspire Capital may not effect any sales of shares of our common stock under the Purchase Agreement on any trading day that the closing sale price of our common stock is less than \$0.25 per share.

Events of Default

Under the Purchase Agreement, no sales are permitted to be made upon the occurrence of any of the following, among other, events of default:

- the effectiveness of any registration statement that is required to be maintained effective pursuant to the terms of the Registration Rights Agreement between us and Aspire Capital lapses for any reason (including, without limitation, the issuance of a stop order) or is unavailable to Aspire Capital for sale of our shares of common stock, and such lapse or unavailability continues for a period of ten consecutive business days or for more than an aggregate of 30 business days in any 365-day period, which is not in connection with post-effective amendment to any such registration statement or the filing of a new registration statement; provided, however, that in connection with any post-effective amendment to such registration statement or filing of a new registration statement that is required to be declared effective by the SEC, such lapse or unavailability may continue for a period of no more than 30 consecutive business days, which such period shall be extended for an additional 30 business days if we receive a comment letter from the SEC in connection therewith;
- the suspension from trading or failure of our common stock to be listed on our principal market for a period of three consecutive business days;
- the delisting of our common stock from our principal market, provided our common stock is not immediately thereafter trading on the New York Stock Exchange, the NYSE American, the Nasdaq Global Select Market, the Nasdaq Global Market, or the Nasdaq Capital Market;
- our transfer agent's failure to issue to Aspire Capital shares of our common stock which Aspire Capital is entitled to receive under the Purchase Agreement within five business days after an applicable purchase date;
- any breach by us of the representations or warranties or covenants contained in the Purchase Agreement or any related agreements which could have a material adverse effect on us, subject to a cure period of five business days;
- if we become insolvent or are generally unable to pay our debts as they become due;
- any participation or threatened participation in insolvency or bankruptcy proceedings by or against us; or
- 2,018,271 shares of our common stock are issued under the Purchase Agreement, unless and until stockholder approval is obtained to issue more, in which case this 2,018,271 share limitation will not apply.

Our Termination Rights

The Purchase Agreement may be terminated by us at any time, at our discretion, without any penalty or cost to us.

No Short-Selling or Hedging by Aspire Capital

Aspire Capital has agreed that neither it nor any of its agents, representatives and affiliates shall engage in any direct or indirect short-selling or hedging of our common stock during any time prior to the termination of the Purchase Agreement.

Effect of Performance of the Purchase Agreement on Our Stockholders

The Purchase Agreement does not limit the ability of Aspire Capital to sell any or all of the 2,018,271 shares registered in this offering. It is anticipated that shares registered in this offering will be sold over a period of up to approximately 30 months from the date of this prospectus. The sale by Aspire Capital of a significant amount of shares registered in this offering at any given time could cause the market price of our common stock to decline and/or to be highly volatile. Aspire Capital may ultimately purchase all, some or none of the 1,676,348 shares of common stock not yet issued but registered in this offering. After it has acquired such shares, it may sell all, some or none of such shares. Therefore, sales to Aspire Capital by us pursuant to the Purchase Agreement also may result in substantial dilution to the interests of other holders of our common stock. However, we have the right to control the timing and amount of any sales of our shares to Aspire Capital and the Purchase Agreement may be terminated by us at any time at our discretion without any penalty or cost to us.

Percentage of Outstanding Shares after Giving Effect to the Purchased Shares Issued to Aspire Capital

In connection with entering into the Purchase Agreement, we authorized the sale to Aspire Capital of up to \$10.0 million of our shares of common stock. However, we estimate that we will sell no more than 2,018,271 shares to Aspire Capital under the Purchase Agreement (including the Commitment Shares and Initial Purchase Shares), all of which are included in this offering. Subject to any required approval by our board of directors, we have the right but not the obligation to issue more than the 2,018,271 shares included in this prospectus to Aspire Capital under the Purchase Agreement under some circumstances. In the event we elect to issue more than 2,018,271 shares under the Purchase Agreement, we will be required to file a new registration statement and have it declared effective by the SEC. The number of shares ultimately offered for sale by Aspire Capital in this offering is dependent upon the number of shares purchased by Aspire Capital under the Purchase Agreement. The following table sets forth the number and percentage of outstanding shares to be held by Aspire Capital after giving effect to the sale of shares of common stock sold to Aspire Capital at varying purchase prices:

| Assumed Average Purchase Price | Proceeds from the Sale of Shares to Aspire Capital Under the Purchase Agreement Registered in this Offering | Number of Shares to be Issued in this Offering at the Assumed Average Purchase Price (1) | Total Number of Outstanding Shares After Giving Effect to the Shares Issued to Aspire Capital (2) | Percentage of Outstanding Shares After Giving Effect to the Purchased Shares Issued to Aspire Capital (3) |
|--------------------------------|---|--|---|---|
| \$0.50 | \$ 838,174 | 1,676,348 | 12,521,368 | 16.1% |
| \$1.00 | \$ 1,676,348 | 1,676,348 | 12,521,368 | 16.1% |
| \$2.00 | \$ 3,352,696 | 1,676,348 | 12,521,368 | 16.1% |
| \$3.00 | \$ 5,029,044 | 1,676,348 | 12,521,368 | 16.1% |
| \$4.00 | \$ 6,705,392 | 1,676,348 | 12,521,368 | 16.1% |
| \$5.00 | \$ 8,381,740 | 1,676,348 | 12,521,368 | 16.1% |
| \$6.00 | \$ 9,000,000 | 1,500,000 | 12,345,020 | 14.9% |
| \$7.00 | \$ 8,999,998 | 1,285,714 | 12,130,734 | 13.4% |

- (1) Excludes the 69,444 Commitment Shares and the 272,479 Initial Purchase Shares issued under the Purchase Agreement between us and Aspire Capital.
- (2) Based on an assumed number of shares outstanding as of March 20, 2019, which includes the 10,503,097 shares of common stock outstanding immediately prior to the execution of the Purchase Agreement, 69,444 Commitment Shares previously issued to Aspire Capital, 272,479 Initial Purchase Shares previously issued to Aspire Capital and the number of shares set forth in the adjacent column that we would have sold to Aspire Capital.

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- (3) The numerator includes the 69,444 Commitment Shares, the 272,479 Initial Purchase Shares plus the number of shares set forth in the column titled, "Number of Shares to be Issued in this Offering at the Assumed Average Purchase Price." The denominator is set forth in the adjacent column.

USE OF PROCEEDS

This prospectus relates to shares of our common stock that may be offered and sold from time to time by Aspire Capital. We will not receive any proceeds upon the sale of shares by Aspire Capital. However, we have received proceeds of \$1.0 million, and may receive additional proceeds of up to \$9.0 million, for an aggregate of \$10.0 million gross proceeds, from the sale of shares under the Purchase Agreement to Aspire Capital. The proceeds will be used for operating activities, the advancement of our research and development activities, working capital and general corporate purposes. This anticipated use of net proceeds from the sale of our common stock to Aspire Capital under the Purchase Agreement represents our intentions based upon our current plans and business conditions.

SELLING STOCKHOLDER

The selling stockholder may from time to time offer and sell any or all of the shares of our common stock set forth below pursuant to this prospectus. When we refer to the “selling stockholder” in this prospectus, we mean the entity listed in the table below, and its respective pledgees, donees, permitted transferees, assignees, successors and others who later come to hold any of the selling stockholder’s interests in shares of our common stock other than through a public sale.

The following table sets forth, as of the date of this prospectus, the name of the selling stockholder for whom we are registering shares for sale to the public, the number of shares of common stock beneficially owned by the selling stockholder prior to this offering, the total number of shares of common stock that the selling stockholder may offer pursuant to this prospectus and the number of shares of common stock that the selling stockholder will beneficially own after this offering. Except as noted below, the selling stockholder does not have, or within the past three years has not had, any material relationship with us or any of our predecessors or affiliates and the selling stockholder is not or was not affiliated with registered broker-dealers.

Based on the information provided to us by the selling stockholder, assuming that the selling stockholder sells all of the shares of our common stock beneficially owned by it that have been registered by us and does not acquire any additional shares during the offering, the selling stockholder will not own any shares other than those appearing in the column entitled “Beneficial Ownership After This Offering.” We cannot advise you as to whether the selling stockholder will in fact sell any or all of such shares of common stock. In addition, the selling stockholder may have sold, transferred or otherwise disposed of, or may sell, transfer or otherwise dispose of, at any time and from time to time, the shares of our common stock in transactions exempt from the registration requirements of the Securities Act after the date on which it provided the information set forth in the table below.

| <u>Name</u> | <u>Shares of Common Stock Owned Prior to this Offering</u> | <u>Additional Shares of Common Stock Being Offered</u> | <u>Beneficial Ownership After this Offering(1) Number of Shares</u> | <u>%</u> |
|-----------------------------|--|--|---|----------|
| Aspire Capital Fund, LLC(2) | 341,923(3) | 1,676,348 | — | * |

* Represents less than 1% of outstanding shares.

- (1) Assumes the sale of all shares of common stock registered pursuant to this prospectus, although the selling stockholder is under no obligation known to us to sell any shares of common stock at this time.
- (2) Aspire Capital Partners LLC (“Aspire Partners”) is the Managing Member of Aspire Capital Fund LLC (“Aspire Fund”). SGM Holdings Corp (“SGM”) is the Managing Member of Aspire Partners. Mr. Steven G. Martin (“Mr. Martin”) is the president and sole shareholder of SGM, as well as a principal of Aspire Partners. Mr. Erik J. Brown (“Mr. Brown”) is the president and sole shareholder of Red Cedar Capital Corp (“Red Cedar”), which is a principal of Aspire Partners. Mr. Christos Komissopoulos (“Mr. Komissopoulos”) is president and sole shareholder of Chrisko Investors Inc. (“Chrisko”), which is a principal of Aspire Partners. Mr. William F. Blank, III (“Mr. Blank”) is president and sole shareholder of WML Ventures Corp. (“WML Ventures”), which is a principal of Aspire Partners. Each of Aspire Partners, SGM, Red Cedar, Chrisko, WML Ventures, Mr. Martin, Mr. Brown, Mr. Komissopoulos and Mr. Blank may be deemed to be a beneficial owner of common stock held by Aspire Fund. Each of Aspire Partners, SGM, Red Cedar, Chrisko, WML Ventures, Mr. Martin, Mr. Brown, Mr. Komissopoulos and Mr. Blank disclaims beneficial ownership of the common stock held by Aspire Fund.
- (3) As of the date hereof, 341,923 shares of our common stock have been acquired by Aspire Capital under the Purchase Agreement, consisting of the 69,444 Commitment Shares we issued to Aspire Capital as a commitment fee and the 272,479 Initial Purchase Shares sold to Aspire Capital. We may elect in our sole discretion to sell to Aspire Capital up to an additional 1,676,348 shares under the Purchase Agreement but Aspire Capital does not presently beneficially own those shares as determined in accordance with the rules of the SEC.

PLAN OF DISTRIBUTION

The common stock offered by this prospectus is being offered by Aspire Capital, the selling stockholder. The common stock may be sold or distributed from time to time by the selling stockholder directly to one or more purchasers or through brokers, dealers, or underwriters who may act solely as agents at market prices prevailing at the time of sale, at prices related to the prevailing market prices, at negotiated prices, or at fixed prices, which may be changed. The sale of the common stock offered by this prospectus may be effected in one or more of the following methods:

- ordinary brokers' transactions;
- transactions involving cross or block trades;
- through brokers, dealers, or underwriters who may act solely as agents;
- "at the market" into an existing market for the common stock;
- in other ways not involving market makers or established business markets, including direct sales to purchasers or sales effected through agents;
- in privately negotiated transactions; or
- any combination of the foregoing.

In order to comply with the securities laws of certain states, if applicable, the shares may be sold only through registered or licensed brokers or dealers. In addition, in certain states, the shares may not be sold unless they have been registered or qualified for sale in the state or an exemption from the registration or qualification requirement is available and complied with.

The selling stockholder may transfer the shares of common stock by other means not described in this prospectus.

Brokers, dealers, underwriters, or agents participating in the distribution of the shares as agents may receive compensation in the form of commissions, discounts, or concessions from the selling stockholder and/or purchasers of the common stock for whom the broker-dealers may act as agent. Aspire Capital has informed us that each such broker-dealer will receive commissions from Aspire Capital which will not exceed customary brokerage commissions.

Aspire Capital is an "underwriter" within the meaning of the Securities Act.

Neither we nor Aspire Capital can presently estimate the amount of compensation that any agent will receive. We know of no existing arrangements between Aspire Capital, any other stockholder, broker, dealer, underwriter, or agent relating to the sale or distribution of the shares offered by this prospectus. At the time a particular offer of shares is made, a prospectus supplement, if required, will be distributed that will set forth the names of any agents, underwriters, or dealers and any compensation from the selling stockholder, and any other required information.

We will pay all of the expenses incident to the registration, offering, and sale of the shares by Aspire Capital to the public other than commissions or discounts of underwriters, broker-dealers, or agents. We have agreed to indemnify Aspire Capital and certain other persons against certain liabilities in connection with the offering of shares of common stock offered hereby, including liabilities arising under the Securities Act or, if such indemnity is unavailable, to contribute amounts required to be paid in respect of such liabilities. Aspire Capital has agreed to indemnify us against liabilities under the Securities Act that may arise from certain written information furnished to us by Aspire Capital specifically for use in this prospectus or, if such indemnity is unavailable, to contribute amounts required to be paid in respect of such liabilities.

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Insofar as indemnification for liabilities arising under the Securities Act may be permitted to our directors, officers, and controlling persons, we have been advised that in the opinion of the SEC this indemnification is against public policy as expressed in the Securities Act and is therefore, unenforceable.

Aspire Capital and its affiliates have agreed not to engage in any direct or indirect short selling or hedging of our common stock during the term of the Purchase Agreement.

We have advised Aspire Capital that while it is engaged in a distribution of the shares included in this prospectus it is required to comply with Regulation M promulgated under the Securities Exchange Act of 1934, as amended. With certain exceptions, Regulation M precludes the selling stockholder, any affiliated purchasers, and any broker-dealer or other person who participates in the distribution from bidding for or purchasing, or attempting to induce any person to bid for or purchase any security which is the subject of the distribution until the entire distribution is complete. Regulation M also prohibits any bids or purchases made in order to stabilize the price of a security in connection with the distribution of that security. All of the foregoing may affect the marketability of the shares offered hereby this prospectus.

We may suspend the sale of shares by Aspire Capital pursuant to this prospectus for certain periods of time for certain reasons, including if the prospectus is required to be supplemented or amended to include additional material information.

This offering as it relates to Aspire Capital will terminate on the date that all shares offered by this prospectus have been sold by Aspire Capital.

LEGAL MATTERS

The validity of the securities offered hereby is being passed upon for us by Cooley LLP, San Diego, CA.

EXPERTS

The consolidated financial statements, incorporated in this prospectus by reference from our Annual Report on Form 10-K for the year ended December 31, 2018 have been audited by Deloitte & Touche LLP, an independent registered public accounting firm, as stated in their report, which is incorporated herein by reference (which report expresses an unqualified opinion on the consolidated financial statements and includes an explanatory paragraph referring to our ability to continue as a going concern). Such financial statements have been so incorporated in reliance upon the report of such firm given upon their authority as experts in accounting and auditing.

WHERE YOU CAN FIND MORE INFORMATION

We have filed with the SEC a registration statement on Form S-1 under the Securities Act, with respect to the securities being offered by this prospectus. This prospectus does not contain all of the information in the registration statement and its exhibits. For further information with respect to us and the securities offered by this prospectus, we refer you to the registration statement and its exhibits. Statements contained in this prospectus as to the contents of any contract or any other document referred to are not necessarily complete, and in each instance, we refer you to the copy of the contract or other document filed as an exhibit to the registration statement. Each of these statements is qualified in all respects by this reference.

We are subject to the information and periodic reporting requirements of the Exchange Act, and we file periodic reports, proxy statements and other information with the SEC. You can read our SEC filings, including the registration statement, over the Internet at the SEC's website at www.sec.gov. You may also request a copy of these filings, at no cost, by writing us at 9540 Towne Centre Drive, Suite 100, San Diego, California 92121 or telephoning us at (858) 888-7600. We also maintain a website at www.bionanogenomics.com, at which you may access these materials free of charge after they are electronically filed with, or furnished to, the SEC. The information contained in, or that can be accessed through, our website is not incorporated by reference in, and is not part of, this prospectus.

INCORPORATION OF CERTAIN INFORMATION BY REFERENCE

The SEC allows us to "incorporate by reference" information from other documents that we file with it, which means that we can disclose important information to you by referring you to those documents. The information incorporated by reference is considered to be part of this prospectus.

We incorporate by reference into this prospectus and the registration statement of which this prospectus form a part the information or documents listed below that we have filed with the SEC, and any future filings we will make with the SEC under Sections 13(a), 13(c), 14, or 15(d) of the Exchange Act after the date of the initial filing of the registration statement of which this prospectus is a part and prior to effectiveness of such registration statement, and until the termination of the offering of the shares covered by this prospectus (other than information furnished under Item 2.02 or Item 7.01 of Form 8-K):

- our Annual Report on Form 10-K for the year ended December 31, 2018 filed on March 14, 2019;
- our Current Reports on Form 8-K (other than information furnished rather than filed) filed on January 25, 2019, March 14, 2019 and March 22, 2019; and

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- the description of our common stock which is registered under Section 12 of the Exchange Act, in our registration statement on Form 8-A, filed on August 17, 2018, including any amendment or reports filed for the purposes of updating this description.

Any statement contained in this prospectus or in a document incorporated or deemed to be incorporated by reference into this prospectus will be deemed to be modified or superseded for purposes of this prospectus to the extent that a statement contained in this prospectus or any other subsequently filed document that is deemed to be incorporated by reference into this prospectus modifies or supersedes the statement. Any statements so modified or superseded shall not be deemed, except as so modified or superseded, to constitute a part of this prospectus.

We will furnish without charge to you, on written or oral request, a copy of any or all of the documents incorporated by reference in this prospectus, including exhibits to these documents. You should direct any requests for documents to Bionano Genomics, Inc. 9540 Towne Centre Drive, Suite 100, San Diego, California 92121; telephone: (858) 888-7600.

You also may access these filings on our website at www.bionanogenomics.com. We do not incorporate the information on our website into this prospectus or any supplement to this prospectus and you should not consider any information on, or that can be accessed through, our website as part of this prospectus or any supplement to this prospectus (other than those filings with the SEC that we specifically incorporate by reference into this prospectus).

DISCLOSURE OF COMMISSION POSITION ON INDEMNIFICATION FOR SECURITIES ACT LIABILITY

Insofar as indemnification for liabilities arising under the Securities Act may be permitted to our directors, officers, and controlling persons, we have been advised that in the opinion of the SEC this indemnification is against public policy as expressed in the Securities Act and is therefore, unenforceable.

2,018,271 Shares

Common Stock



PROSPECTUS

, 2019

PART II
INFORMATION NOT REQUIRED IN PROSPECTUS

Item 13. Other Expenses of Issuance and Distribution

The following table sets forth the expenses to be incurred in connection with the offering described in this registration statement, all of which will be paid by the registrant. All amounts are estimates except the SEC registration fee.

| | <u>Amount</u> |
|-------------------------------|-----------------|
| SEC registration fee | \$ 984 |
| Accounting fees and expenses | 25,000 |
| Legal fees and expenses | 50,000 |
| Printing and related expenses | 5,000 |
| Miscellaneous | 5,016 |
| Total expenses | <u>\$86,000</u> |

Item 14. Indemnification of Directors and Officers

We are incorporated under the laws of the State of Delaware. Section 145 of the Delaware General Corporation Law provides that a Delaware corporation may indemnify any persons who were, are, or are threatened to be made, parties to any threatened, pending or completed action, suit or proceeding, whether civil, criminal, administrative or investigative (other than an action by or in the right of such corporation), by reason of the fact that such person is or was an officer, director, employee or agent of such corporation, or is or was serving at the request of such corporation as an officer, director, employee or agent of another corporation or enterprise. The indemnity may include expenses (including attorneys' fees), judgments, fines and amounts paid in settlement actually and reasonably incurred by such person in connection with such action, suit or proceeding, provided that such person acted in good faith and in a manner he or she reasonably believed to be in or not opposed to the corporation's best interests and, with respect to any criminal action or proceeding, had no reasonable cause to believe that his or her conduct was illegal. A Delaware corporation may indemnify any persons who were, are, or are threatened to be made, a party to any threatened, pending or completed action or suit by or in the right of the corporation by reason of the fact that such person is or was a director, officer, employee or agent of such corporation, or is or was serving at the request of such corporation as a director, officer, employee or agent of another corporation or enterprise. The indemnity may include expenses (including attorneys' fees) actually and reasonably incurred by such person in connection with the defense or settlement of such action or suit provided such person acted in good faith and in a manner he or she reasonably believed to be in or not opposed to the corporation's best interests except that no indemnification is permitted without judicial approval if the officer or director is adjudged to be liable to the corporation. Where an officer or director is successful on the merits or otherwise in the defense of any action referred to above, the corporation must indemnify him or her against the expenses (including attorneys' fees) actually and reasonably incurred.

Our amended and restated certificate of incorporation and amended and restated bylaws provide for the indemnification of our directors and officers to the fullest extent permitted under the Delaware General Corporation Law.

Section 102(b)(7) of the Delaware General Corporation Law permits a corporation to provide in its certificate of incorporation that a director of the corporation shall not be personally liable to the corporation or its stockholders for monetary damages for breach of fiduciary duties as a director, except for liability for any:

- transaction from which the director derives an improper personal benefit;
- act or omission not in good faith or that involves intentional misconduct or a knowing violation of law;
- unlawful payment of dividends or redemption of shares; or
- breach of a director's duty of loyalty to the corporation or its stockholders.

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Our amended and restated certificate of incorporation includes such a provision. Expenses incurred by any officer or director in defending any such action, suit or proceeding in advance of its final disposition will be paid by us upon delivery to us of an undertaking, by or on behalf of such director or officer, to repay all amounts so advanced if it shall ultimately be determined that such director or officer is not entitled to be indemnified by us.

Section 174 of the Delaware General Corporation Law provides, among other things, that a director who willfully or negligently approves of an unlawful payment of dividends or an unlawful stock purchase or redemption, may be held liable for such actions. A director who was either absent when the unlawful actions were approved or dissented at the time may avoid liability by causing his or her dissent to such actions to be entered in the books containing minutes of the meetings of the board of directors at the time such action occurred or immediately after such absent director receives notice of the unlawful acts.

As permitted by the Delaware General Corporation Law, we have entered into, and continue to enter, into separate indemnity agreements with each of our directors and executive officers that require us to indemnify such persons against any and all costs and expenses (including attorneys', witness or other professional fees) actually and reasonably incurred by such persons in connection with any action, suit or proceeding (including derivative actions), whether actual or threatened, to which any such person may be made a party by reason of the fact that such person is or was a director or officer or is or was acting or serving as an officer, director, employee or agent of ours or any of our affiliated enterprises. Under these agreements, we are not required to provide indemnification for certain matters, including:

- indemnification beyond that permitted by the Delaware General Corporation Law;
- indemnification for any proceeding with respect to the unlawful payment of remuneration to the director or officer;
- indemnification for certain proceedings involving a final judgment that the director or officer is required to disgorge profits from the purchase or sale of our stock;
- indemnification for proceedings involving a final judgment that the director's or officer's conduct was in bad faith, knowingly fraudulent or deliberately dishonest or constituted willful misconduct or a breach of his or her duty of loyalty, but only to the extent of such specific determination;
- indemnification for proceedings or claims brought by an officer or director against us or any of our directors, officers, employees or agents, except for (1) claims to establish a right of indemnification or proceedings, (2) claims approved by our board of directors, (3) claims required by law, (4) when there has been a change of control as defined in the indemnification agreement with each director or officer, or (5) by us in our sole discretion pursuant to the powers vested to us under the Delaware General Corporate Law;
- indemnification for settlements the director or officer enters into without our consent; or
- indemnification in violation of any undertaking required by the Securities Act of 1933, as amended, or the Securities Act, or in any registration statement we file.

The indemnification agreements also set forth certain procedures that will apply in the event of a claim for indemnification thereunder.

There is at present no pending litigation or proceeding involving any of our directors or executive officers as to which indemnification is required or permitted, and we are not currently aware of any threatened litigation or proceeding that may result in a claim for indemnification.

We have an insurance policy in place that covers our officers and directors with respect to certain liabilities, including liabilities arising under the Securities Act or otherwise.

Any underwriting agreement that we may enter into may provide that the underwriters are obligated, under some circumstances, to indemnify our directors, officers and controlling persons against specified liabilities, including liabilities under the Securities Act.

Item 15. Recent Sales of Unregistered Securities

Set forth below is information regarding shares of common stock and preferred stock issued, and options granted, by us since January 1, 2016 that were not registered under the Securities Act of 1933, as amended (the Securities Act). Also included is the consideration, if any, received by us for such shares and options and information relating to the section of the Securities Act, or rule of the Securities and Exchange Commission, under which exemption from registration was claimed.

(a) Issuances of Securities

On March 14, 2019, we entered into the Common Stock Purchase Agreement with Aspire Capital Fund, LLC, or Aspire Capital. Pursuant to the terms of this agreement, Aspire Capital purchased 272,479 shares of our common stock at \$3.67 per share and we issued 69,444 shares of our common stock to Aspire Capital in consideration for entering into the agreement.

On March 14, 2019, we entered into a Loan and Security Agreement (the “Innovatus Loan Agreement”) with Innovatus Life Sciences Lending Fund I, LP (“Innovatus”), a Delaware limited partnership, as collateral agent and the Lenders listed on Schedule 1.1 thereto, including East West Bank, pursuant to which Innovatus agreed, among other things, to make a first term loan of \$17,500,000 to us (the “Term A-1 Loan”), a second term loan of \$2,500,000 to us (the “Term A-2 Loan”) and a third term loan of \$5,000,000 to us, each upon satisfaction of certain funding conditions as set forth in the Innovatus Loan Agreement. In connection with the funding of any of the term loans, we agreed to issue warrants to Innovatus to purchase shares of our common stock. The warrants will be issued on the funding date of each tranche and will expire ten (10) years from such issue date.

On March 22, 2019, in connection with the receipt of funding with respect to the Term A-1 Loan and Term A-2 Loan, we issued to Innovatus a warrant to purchase up to 161,987 shares of our common stock at an exercise price of \$4.63 per share. The foregoing description is subject to, and qualified in its entirety by, the Loan and Security Agreement and the form of Warrant to Purchase Common Stock filed as exhibits hereto and incorporated herein by reference.

In connection with the Innovatus Loan Agreement, on March 14, 2019, we entered into a Common Stock Purchase Agreement (the “Innovatus Purchase Agreement”) with certain entities affiliated with Innovatus (the “Innovatus Investors”), pursuant to which we agreed to issue and sell 406,504 shares of common stock at \$3.69 per share for proceeds of \$1.5 million (the “Innovatus Shares”). The issuance of the Innovatus Shares to the Innovatus Investors under the Innovatus Purchase Agreement is exempt from registration under the Securities Act, pursuant to the exemption for transactions by an issuer not involving any public offering under Section 4(a)(2) of the Securities Act. The foregoing description is subject to, and qualified in its entirety by, the Innovatus Purchase Agreement filed as an exhibit hereto and incorporated herein by reference.

On November 19, 2018, we entered into an Amendment Agreement (the “Amendment Agreement”) with Western Alliance Bank, an Arizona corporation (the “Holder”), in order to amend (i) that certain Warrant to Purchase Stock, dated March 8, 2016, (ii) that certain Warrant to Purchase Stock, dated December 9, 2016 ((i) and (ii) collectively, the “Bank Warrants”) and (iii) that certain Loan and Security Agreement, dated as of March 8, 2016, as amended (the “Loan Agreement”). Pursuant to the Amendment Agreement, the exercise price of the Bank Warrants was decreased from \$20.56 per share to \$6.99 per share. The foregoing description is subject to, and qualified in its entirety by, the Amendment Agreement filed as an exhibit hereto and incorporated herein by reference.

On November 19, 2018, we issued (i) to LifeSci Capital, LLC, a warrant to purchase 44,183 shares of our common stock, and (ii) to Russell Creative Group, a warrant to purchase 3,311 shares of our common stock (together, the “Service Provider Warrants”), each having an exercise price of \$8.25 per share of our common stock and a term of five years. The Service Provider Warrants were issued in full satisfaction of our obligations to pay (i) to LifeSci Capital, LLC an aggregate of \$150,000 for capital advisory and investor relations services and (ii) to Russell Creative Group an aggregate of \$15,000 for branding and marketing services. LifeSci Capital,

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LLC and Russell Creative Group are accredited investors and the issuance of the Service Provider Warrants was exempt from registration under the Securities Act in reliance on an exemption provided by Section 4(a)(2) of the Securities Act. The description of the Service Provider Warrants is qualified in its entirety by the form of Warrant to Purchase Common Stock filed as an exhibit hereto and incorporated herein by reference.

On August 23, 2018, in connection with the underwriting agreement related to our IPO, we issued (i) to Roth Capital Partners, a warrant to purchase 68,040 shares of our common stock, (ii) to Maxim Partners LLC, a warrant to purchase 22,680 shares of our common stock and (iii) to LifeSci Capital LLC, a warrant to purchase 10,080 shares of our common stock (together, the "Underwriter Warrants"), each having an exercise price of \$9.1875 per share of our common stock and a term of five years. On August 30, 2018, pursuant to the exercise of the underwriters' over-allotment option, we issued (i) to Roth Capital Partners, a warrant to purchase 10,206 shares of our common stock, (ii) to Maxim Partners LLC, a warrant to purchase 3,402 shares of our common stock and (iii) to LifeSci Capital LLC, a warrant to purchase 1,512 shares of our common stock (together, the "Over-Allotment Warrants"), each having an exercise price of \$9.1875 per share of our common stock and a term of five years. The description of the Underwriter Warrants and the Over-Allotment Warrants is qualified in its entirety by the form of Warrant to Purchase Common Stock issued to the underwriters, filed as an exhibit hereto and incorporated herein by reference.

The offers, sales and issuances of the securities described in this section (a) of Item 15 were deemed to be exempt from registration under the Securities Act in reliance on Section 4(a)(2) of the Securities Act and Rule 506 promulgated under Regulation D promulgated thereunder as transactions by an issuer not involving a public offering. The recipients of securities in each of these transactions acquired the securities for investment only and not with a view to or for sale in connection with any distribution thereof and appropriate legends were affixed to the securities issued in these transactions. Each of the recipients of securities in these transactions was an accredited investor within the meaning of Rule 501 of Regulation D under the Securities Act and had adequate access, through employment, business or other relationships, to information about the Company. No underwriters were involved in these transactions.

(b) Stock Option and Restricted Stock Grants

Since January 1, 2016, we have granted stock options to purchase an aggregate of 1,866,184 shares of our common stock, with exercise prices ranging from \$1.30 to \$64.22 per share, of which 133,523 stock options have been forfeited and 50,334 stock options have been exercised as of March 20, 2019. Since January 1, 2016, we have granted 0 restricted stock units, of which 0 have been forfeited and 0 have been released as of March 20, 2019.

The securities described in this section (b) of Item 15 were deemed to be exempt from registration under the Securities Act in reliance on Rule 701 in that the transactions were under compensatory benefit plans and contracts relating to compensation as provided under Rule 701. The recipients of such securities were the Registrant's employees, directors or bona fide consultants and received the securities under the Company's 2006 Equity Incentive Plan and 2018 Equity Incentive Plan. Appropriate legends were affixed to the securities issued in these transactions. Each of the recipients of securities in these transactions had adequate access, through employment, business or other relationships, to information about the Company.

Item 16. Exhibits and Financial Statement Schedules

- (a) The exhibits to the registration statement are listed in the Exhibit Index attached hereto and incorporated by reference herein.
- (b) No financial statement schedules are provided because the information called for is not required or is shown either in the financial statements or notes.

Item 17. Undertakings

- (a) The undersigned registrant hereby undertakes:
- (1) To file, during any period in which offers or sales are being made, a post-effective amendment to this registration statement:
 - (i) To include any prospectus required by Section 10(a)(3) of the Securities Act of 1933;
 - (ii) To reflect in the prospectus any facts or events arising after the effective date of the registration statement (or the most recent post-effective amendment thereof) which, individually or in the aggregate, represent a fundamental change in the information set forth in the registration statement. Notwithstanding the foregoing, any increase or decrease in volume of securities offered (if the total dollar value of securities offered would not exceed that which was registered) and any deviation from the low or high end of the estimated maximum offering range may be reflected in the form of prospectus filed with the Commission pursuant to Rule 424(b) if, in the aggregate, the changes in volume and price represent no more than a 20% change in the maximum aggregate offering price set forth in the "Calculation of Registration Fee" table in the effective registration statement; and
 - (iii) To include any material information with respect to the plan of distribution not previously disclosed in the registration statement or any material change to such information in the registration statement;
 - (2) That, for the purpose of determining any liability under the Securities Act of 1933, each such post-effective amendment shall be deemed to be a new registration statement relating to the securities offered therein, and the offering of such securities at that time shall be deemed to be the initial bona fide offering thereof.
 - (3) To remove from registration by means of a post-effective amendment any of the securities being registered which remain unsold at the termination of the offering.
 - (4) That, for the purpose of determining liability under the Securities Act of 1933 to any purchaser, each prospectus filed pursuant to Rule 424(b) as part of a registration statement relating to an offering, other than registration statements relying on Rule 430B or other than prospectuses filed in reliance on Rule 430A, shall be deemed to be part of and included in the registration statement as of the date it is first used after effectiveness; provided, however, that no statement made in a registration statement or prospectus that is part of the registration statement or made in a document incorporated or deemed incorporated by reference into the registration statement or prospectus that is part of the registration statement will, as to a purchaser with a time of contract of sale prior to such first use, supersede or modify any statement that was made in the registration statement or prospectus that was part of the registration statement or made in any such document immediately prior to such date of first use.
- (b) The undersigned registrant hereby undertakes to deliver or cause to be delivered with the prospectus, to each person to whom the prospectus is sent or given, the latest annual report to security holders that is incorporated by reference in the prospectus and furnished pursuant to and meeting the requirements of Rule 14a-3 or Rule 14c-3 under the Securities Exchange Act of 1934; and, where interim financial information required to be presented by Article 3 of Regulation S-X are not set forth in the prospectus, to deliver, or cause to be delivered to each person to whom the prospectus is sent or given, the latest quarterly report that is specifically incorporated by reference in the prospectus to provide such interim financial information.
- (c) Insofar as indemnification for liabilities arising under the Securities Act of 1933 may be permitted for our directors, officers and controlling persons of the Registrant pursuant to our Articles of Incorporation or Amended and Restated Bylaws, or otherwise, the registrant has been advised that in the opinion of the Securities and Exchange Commission such indemnification is against public policy

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as expressed in the 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 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 the registrant is against public policy as expressed in the Act and will be governed by the final adjudication of such issue.

Exhibit Index

| Exhibit Number | Description |
|-----------------------|--|
| 3.1(1) | Amended and Restated Certificate of Incorporation. |
| 3.2(1) | Amended and Restated Bylaws. |
| 4.1(2) | Form of Common Stock Certificate. |
| 4.2(2) | Form of Warrant to Purchase Series B-1 Preferred Stock issued to Square 1 Bank. |
| 4.3(2) | Form of Warrant to Purchase Series D Preferred Stock issued to Western Alliance Bank. |
| 4.4(2) | Warrant to Purchase Series D-1 Preferred Stock issued to Western Alliance Bank. |
| 4.5(2) | Form of Warrant to Purchase Series D-1 Preferred Stock issued to Midcap Financial Trust. |
| 4.6(2) | Form of Warrant to Purchase Common Stock Issued to Underwriters |
| 4.7(3) | Form of Warrant to Purchase Common Stock for Service Providers. |
| 4.8(4) | Form of Warrant to Purchase Common Stock for Innovatus. |
| 4.9(4) | Registration Rights Agreement, dated March 14, 2019, between the Company and Aspire Capital Fund, LLC. |
| 4.10(4) | Registration Rights Agreement, dated March 14, 2019, by and among the Company and the Innovatus Investors. |
| 5.1 | Opinion of Cooley LLP. |
| 10.1(2) | Fifth Amended and Restated Investors' Rights Agreement, dated August 5, 2016 as amended. |
| 10.2+ (2) | Bionano Genomics, Inc. Amended and Restated 2006 Equity Compensation Plan (the "2006 Plan"). |
| 10.3+ (2) | Forms of grant notice, stock option agreement and notice of exercise under the 2006 Plan. |
| 10.4+ (5) | Bionano Genomics, Inc. 2018 Equity Incentive Plan (the "2018 Plan"). |
| 10.5+ (2) | Forms of grant notice, stock option agreement and notice of exercise under the 2018 Plan. |
| 10.6+ (5) | Bionano Genomics, Inc. 2018 Employee Stock Purchase Plan. |
| 10.7+ (2) | Form of Indemnification Agreement by and between the Registrant and each director and executive officer. |
| 10.8+ (2) | Bionano Genomics, Inc. Non-Employee Director Compensation Policy. |
| 10.9(2) | Credit and Security Agreement by and between the Registrant, Midcap Financial Trust and the Lenders listed on the Schedule of Lenders attached thereto, dated June 29, 2018. |
| 10.10+ (2) | Employment Agreement by and between the Registrant and R. Erik Holmlin, Ph.D., dated November 7, 2017, as amended. |
| 10.11+ (2) | Employment Agreement by and between the Registrant and Han Cao, Ph.D., dated November 7, 2017, as amended. |
| 10.12+ (2) | Employment Agreement by and between the Registrant and Mike Ward, dated July 1, 2016. |
| 10.13+ (2) | Employment Agreement by and between the Registrant and Warren Robinson, dated November 7, 2017. |
| 10.14+ (2) | Employment Agreement by and between the Registrant and Mark Borodkin, dated November 7, 2017. |
| 10.15(2) | Loan and Security Agreement by and between the Registrant and Western Alliance Bank, dated March 8, 2016. |
| 10.16(2) | First Amendment to the Loan and Security Agreement by and between the Registrant and Western Alliance Bank, dated December 9, 2016. |

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| Exhibit Number | Description |
|-----------------------|--|
| 10.17(2) | <u>Second Amendment to the Loan and Security Agreement by and between the Registrant and Western Alliance Bank, dated May 2, 2017.</u> |
| 10.18(2) | <u>Third Amendment to the Loan and Security Agreement by and between the Registrant and Western Alliance Bank, dated November 20, 2017.</u> |
| 10.19(2) | <u>Forbearance and Fourth Amendment to the Loan and Security Agreement by and between the Registrant and Western Alliance Bank, dated February 9, 2018.</u> |
| 10.20(2) | <u>Lease by and between the Registrant and The Irvine Company LLC, dated January 16, 2012.</u> |
| 10.21(2) | <u>First Amendment to the Lease by and between the Registrant and The Irvine Company LLC, dated September 10, 2013.</u> |
| 10.22(2) | <u>Second Amendment to the Lease by and between the Registrant and The Irvine Company LLC, dated July 1, 2015.</u> |
| 10.23#(2) | <u>Master Services Agreement by and between the Registrant and Skorpis Technologies, Inc. (f/k/a Novati Technologies, Inc. and f/k/a SVTC Technologies, LLC), dated March 2, 2009, as amended.</u> |
| 10.24#(2) | <u>Manufacturing Services Agreement by and between the Registrant and Paramit Corporation, dated February 18, 2015.</u> |
| 10.25#(2) | <u>License Agreement by and between Princeton University and the Registrant, dated January 7, 2004.</u> |
| 10.26#(2) | <u>First Amendment to the License Agreement by and between Princeton University and the Registrant, dated December 17, 2004.</u> |
| 10.27#(2) | <u>Second Amendment to the License Agreement by and between Princeton University and the Registrant, dated February 25, 2010.</u> |
| 10.28#(2) | <u>Third Amendment to the License Agreement by and between Princeton University and the Registrant, dated October 17, 2011.</u> |
| 10.29#(2) | <u>Fourth Amendment License Agreement by and between Princeton University and the Registrant, dated February 9, 2012.</u> |
| 10.30#(2) | <u>Agreement by and between the Registrant and Berry Genomics Co., Ltd. dated August 2, 2016.</u> |
| 10.31#(2) | <u>Sublicense Agreement by and between the Registrant and Industry 3200 dated December 27, 2013.</u> |
| 10.32#(2) | <u>License Agreement by and between the Registrant and Q Biotechnology CV dated May 1, 2014.</u> |
| 10.33#(2) | <u>Amendment to Non-Exclusive Patent License Agreement by and between the Registrant and Q Biotechnology CV dated May 1, 2014.</u> |
| 10.34#(2) | <u>License Agreement by and between the Registrant and New York University dated November 4, 2013.</u> |
| 10.35#(2) | <u>Option and Sublicense Agreement by and between the Registrant and Pacific Biosciences of California, Inc. dated February 2, 2016.</u> |
| 10.36(2) | <u>Note Purchase Agreement by and among the Registrant and the Investors listed on Exhibit A thereto, dated February 9, 2018.</u> |
| 10.37(2) | <u>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.</u> |
| 10.38(2) | <u>Fifth Amendment to Loan and Security Agreement by and between the Registrant and Western Alliance Bank, dated June 13, 2018.</u> |
| 10.39#(2) | <u>Amendment to Patent Sublicense Agreement by and between the Registrant and Industry 3200, dated June 28, 2018.</u> |

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| Exhibit Number | Description |
|-----------------------|---|
| 10.40(2) | <u>Second Amendment to Note Purchase Agreement by and between the Registrant and the Investors listed on the Schedule of Investors attached thereto, dated June 29, 2018.</u> |
| 10.41(2) | <u>Omnibus Amendment to Convertible Promissory Notes by and among the Registrant and the Holders identified in the signature pages thereto, dated June 29, 2018.</u> |
| 10.42(2) | <u>Omnibus Amendment to Convertible Promissory Notes by and among the Registrant and the Holders identified in the signature pages thereto, dated August 14, 2018.</u> |
| 10.43(2) | <u>Omnibus Amendment to Warrants to Purchase Series B-1 Preferred Stock by and among the Registrant and the Holders identified in the signature pages thereto, dated August 14, 2018.</u> |
| 10.44(2) | <u>Omnibus Amendment to Warrants to Purchase Series D Preferred Stock by and among the Registrant and the Holders identified in the signature pages thereto, dated August 14, 2018.</u> |
| 10.45(3) | <u>Amendment Agreement, by and between the Registrant and Western Alliance Bank, dated November 19, 2018.</u> |
| 10.46(4) | <u>Common Stock Purchase Agreement, dated March 14, 2019, between the Registrant and Aspire Capital Fund, LLC.</u> |
| 10.47(4) | <u>Loan and Security Agreement, dated March 14, 2019, by and among the Company, Innovatus Life Sciences Lending Fund I, LP and the Lenders listed on Schedule 1.1 thereto.</u> |
| 10.48(4) | <u>Common Stock Purchase Agreement, dated March 14, 2019, by and among the Company and the Innovatus Investors.</u> |
| 21.1(2) | <u>Subsidiaries of the Registrant.</u> |
| 23.1 | <u>Consent of Deloitte & Touche LLP, independent registered public accounting firm.</u> |
| 23.2 | <u>Consent of Cooley LLP (included in Exhibit 5.1).</u> |
| 24.1 | <u>Power of Attorney (included on signature page)</u> |

+ Indicates management contract or compensatory plan.

Confidential treatment has been requested with respect to certain portions of this exhibit. Omitted portions have been filed separately with the SEC.

- (1) Incorporated by reference to the Registrant's Current Report on Form 8-K, filed with the SEC on August 24, 2018.
- (2) Incorporated by reference to the Registrant's Registration Statement on Form S-1 (File No. 333-225970), as amended.
- (3) Incorporated by reference to the Registrant's Current Report on Form 8-K, filed with the SEC on November 21, 2018.
- (4) Incorporated by reference to the Registrant's Current Report on Form 8-K, filed with the SEC on March 14, 2019.
- (5) Incorporated by reference to the Registrant's Registration Statement on Form S-8 (File No. 333-227073).

SIGNATURES

Pursuant to the requirements of the Securities Act of 1933, the Registrant has duly caused this registration statement to be signed on its behalf by the undersigned, thereunto duly authorized, in the City of San Diego, State of California on March 28, 2019.

Bionano Genomics, Inc.

By: /s/ R. Erik Holmlin, Ph.D.
R. Erik Holmlin, Ph.D.
President and Chief Executive Officer

POWER OF ATTORNEY

KNOW ALL PERSONS BY THESE PRESENTS, that each person whose signature appears below constitutes and appoints R. Erik Holmlin, Ph.D. and Mike Ward, and each and either of them, his or her true and lawful attorney-in-fact and agent, each with full power of substitution and resubstitution, for him or her and in his or her name, place, and stead, in any and all capacities, to (i) act on, sign and file with the Securities and Exchange Commission any and all amendments (including post-effective amendments) to this registration statement together with all schedules and exhibits thereto and any subsequent registration statement filed pursuant to Rule 462(b) under the Securities Act of 1933, as amended, together with all schedules and exhibits thereto, (ii) act on, sign and file such certificates, instruments, agreements and other documents as may be necessary or appropriate in connection therewith, (iii) act on and file any supplement to any prospectus included in this registration statement or any such amendment or any subsequent registration statement filed pursuant to Rule 462(b) under the Securities Act of 1933, as amended, and (iv) take any and all actions which may be necessary or appropriate to be done, as fully for all intents and purposes as he or she might or could do in person, hereby ratifying and confirming all that said attorney-in-fact and agent, or his or her substitute or substitutes, may lawfully do or cause to be done by virtue hereof.

Pursuant to the requirements of the Securities Act of 1933, this Registration Statement has been signed by the following persons in the capacities indicated on the dates indicated.

| <u>Signature</u> | <u>Title</u> | <u>Date</u> |
|---|--|----------------|
| <u>/s/ R. Erik Holmlin, Ph.D.</u> R. Erik Holmlin, Ph.D. | Chief Executive Officer and Director (<i>Principal Executive Officer</i>) | March 28, 2019 |
| <u>/s/ Mike Ward</u> Mike Ward | Chief Financial Officer (<i>Principal Financial and Accounting Officer</i>) | March 28, 2019 |
| <u>/s/ David L. Barker, Ph.D.</u> David L. Barker, Ph.D. | Director | March 28, 2019 |
| <u>/s/ Darren Cai, Ph.D.</u> Darren Cai, Ph.D. | Director | March 28, 2019 |
| <u>/s/ Albert A. Luderer, Ph.D.</u> Albert A. Luderer, Ph.D. | Director | March 28, 2019 |
| <u>/s/ Junfeng Wang</u> Junfeng Wang | Director | March 28, 2019 |

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| <u>Signature</u> | <u>Title</u> | <u>Date</u> |
|--|--------------|----------------|
| <hr/> /s/ Christopher Twomey Christopher Twomey | Director | March 28, 2019 |
| <hr/> /s/ Quan Zhou Quan Zhou | Director | March 28, 2019 |

THOMAS A. COLL
+1 858 550 6013
collta@cooley.com

March 28, 2019

Bionano Genomics, Inc.
9540 Towne Centre Drive, Suite 100
San Diego, CA 92121

Ladies and Gentlemen:

You have requested our opinion, as counsel to Bionano Genomics, Inc., a Delaware corporation (the “**Company**”) in connection with the filing by the Company of a Registration Statement on Form S-1 (the “**Registration Statement**”) with the Securities and Exchange Commission, covering the registration for resale of (i) 341,923 shares (the “**Shares**”) of the Company’s common stock, par value \$0.0001, issued to Aspire Capital Fund, LLC (“**Aspire**”), and (ii) up to 1,676,348 shares of the Company’s common stock, par value \$0.0001 (the “**Agreement Shares**”) that may be issued from time to time pursuant to a common stock purchase agreement dated March 14, 2019 (the “**Purchase Agreement**”), by and between the Company and Aspire.

In connection with this opinion, we have examined and relied upon (a) the Registration Statement and related prospectus, (b) the Company’s Amended and Restated Certificate of Incorporation and the Company’s Amended and Restated Bylaws, each as currently in effect, (c) the Purchase Agreement and (d) the originals or copies certified to our satisfaction of such other records, documents, certificates, memoranda and other instruments as in our judgment are necessary or appropriate to enable us to render the opinion expressed below.

We have assumed the genuineness and authenticity of all documents submitted to us as originals, the conformity to originals of all documents submitted to us as copies, the accuracy, completeness and authenticity of certificates of public officials; and the due authorization, execution and delivery of all documents by all persons other than the Company where authorization, execution and delivery are prerequisites to the effectiveness of such documents. As to certain factual matters, including without limitation the receipt by the Company of the purchase price for the Shares as provided in the Purchase Agreement, we have relied upon a certificate of an officer of the Company and have not sought independently to verify such matters.

Our opinion is expressed only with respect to the General Corporation Law of the State of Delaware. We express no opinion to the extent any other laws are applicable to the subject matter hereof and express no opinion and provide no assurance as to compliance with any federal or state securities law, rule or regulation.

With regard to our opinion in clause (ii) below concerning the Agreement Shares, we have assumed that all Agreement Shares issuable pursuant to the Purchase Agreement are issued on the date hereof (notwithstanding any conditions or limitations restricting such exercise or issuance set forth in the Purchase Agreement).

COOLEY LLP 4401 EASTGATE MALL SAN DIEGO, CA 92121
T: (858) 550-6000 F: (858) 550-6420 COOLEY.COM

Bionano Genomics, Inc.
March 28, 2019
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On the basis of the foregoing, and in reliance thereon, we are of the opinion that (i) the Shares are validly issued, fully paid and non-assessable and (ii) upon issuance and delivery of the Agreement Shares by the Company in accordance with the terms of the Purchase Agreement, including, without limitation, the payment in full of the applicable consideration therefor, the Agreement Shares will be validly issued, fully paid and non-assessable.

We consent to the reference to our firm under the caption "Legal Matters" in the Registration Statement and in the related prospectus and to the filing of this opinion as an exhibit to the Registration Statement.

Sincerely,

Cooley LLP

By: /s/ Thomas A. Coll
Thomas A. Coll

COOLEY LLP 4401 EASTGATE MALL SAN DIEGO, CA 92121
T: (858) 550-6000 F: (858) 550-6420 COOLEY.COM

CONSENT OF INDEPENDENT REGISTERED PUBLIC ACCOUNTING FIRM

We consent to the incorporation by reference in this Registration Statement on Form S-1 of our report dated March 14, 2019, relating to the consolidated financial statements of Bionano Genomics, Inc. appearing in the Annual Report on Form 10-K of Bionano Genomics, Inc. for the year ended December 31, 2018 (which report expresses an unqualified opinion and includes an explanatory paragraph relating to substantial doubt about Bionano Genomics, Inc.'s ability to continue as a going concern), and to the reference to us under the heading "Experts" in the Prospectus, which is part of this Registration Statement.

/s/ DELOITTE & TOUCHE LLP

San Diego, California
March 28, 2019