

<b>PATENT ASSIGNMENT COVER SHEET</b>
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Electronic Version v1.1  
 Stylesheet Version v1.2

EPAS ID: PAT4818465

<b>SUBMISSION TYPE:</b>	NEW ASSIGNMENT
<b>NATURE OF CONVEYANCE:</b>	SECURITY INTEREST

**CONVEYING PARTY DATA**

Name	Execution Date
BIONANO GENOMICS, INC.	02/09/2018

**RECEIVING PARTY DATA**

<b>Name:</b>	WESTERN ALLIANCE BANK
<b>Street Address:</b>	55 ALMADEN BOULEVARD, SUITE 100
<b>Internal Address:</b>	ATTN: LOAN OPERATIONS
<b>City:</b>	SAN JOSE
<b>State/Country:</b>	CALIFORNIA
<b>Postal Code:</b>	95113

**PROPERTY NUMBERS Total: 34**

Property Type	Number
Application Number:	12374141
Application Number:	14712816
Application Number:	15801081
Application Number:	12057987
Application Number:	14195474
Application Number:	15062622
Application Number:	13001697
Application Number:	13765353
Application Number:	15381787
Application Number:	12996410
Application Number:	15385302
Application Number:	13129634
Application Number:	14877818
Application Number:	13498846
Application Number:	14768422
Application Number:	14897213
Application Number:	15507416
Application Number:	14802659
Application Number:	15117689

PATENT

Property Type	Number
Application Number:	15123457
Application Number:	14928596
Application Number:	14952161
PCT Number:	US2007016408
PCT Number:	US2008058671
PCT Number:	US2009049244
PCT Number:	US2009046427
PCT Number:	US2009064996
PCT Number:	US2010050362
PCT Number:	US2014041568
PCT Number:	US2015019027
PCT Number:	US2015047688
PCT Number:	US2015017356
PCT Number:	US2015016194
PCT Number:	US2014014501

**CORRESPONDENCE DATA**

**Fax Number:** (858)638-5130

*Correspondence will be sent to the e-mail address first; if that is unsuccessful, it will be sent using a fax number, if provided; if that is unsuccessful, it will be sent via US Mail.*

**Phone:** 619-699-2700

**Email:** susan.reynholds@dlapiper.com

**Correspondent Name:** DLA PIPER LLP (US)

**Address Line 1:** 401 B STREET, SUITE 1700

**Address Line 4:** SAN DIEGO, CALIFORNIA 92101

**NAME OF SUBMITTER:** MATT SCHWARTZ

**SIGNATURE:** /s/ Matt Schwartz

**DATE SIGNED:** 02/09/2018

**Total Attachments: 13**

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## INTELLECTUAL PROPERTY SECURITY AGREEMENT

This INTELLECTUAL PROPERTY SECURITY AGREEMENT, dated as of February 9, 2018, (the "Agreement") between WESTERN ALLIANCE BANK, an Arizona corporation ("Lender") and BIONANO GENOMICS, INC., a Delaware corporation ("Grantor") is made with reference to that certain Loan and Security Agreement, dated as of March 8, 2016 (as amended from time to time, the "Loan Agreement"), between Lender and Grantor. Terms defined in the Loan Agreement have the same meaning when used in this Agreement.

For good and valuable consideration, receipt of which is hereby acknowledged, Grantor hereby covenants and agrees as follows:

To secure the Obligations under the Loan Agreement, Grantor grants to Lender, at all times after the occurrence of the IP Trigger Event, a security interest in all right, title, and interest of Grantor in any of the following, whether now existing or hereafter acquired or created in any and all of the following property (collectively, the "Intellectual Property Collateral"):

- (a) copyright rights, copyright applications, copyright registrations and like protections in each work or authorship and derivative work thereof, whether published or unpublished and whether or not the same also constitutes a trade secret, now or hereafter existing, created, acquired or held (collectively, the "Copyrights"), including the Copyrights described in Exhibit A;
- (b) trademark and servicemark rights, whether registered or not, applications to register and registrations of the same and like protections, and the entire goodwill of the business of Borrower connected with and symbolized by such trademarks (collectively, the "Trademarks"), including the Trademarks described in Exhibit B;
- (c) patents, patent applications and like protections including without limitation improvements, divisions, continuations, renewals, reissues, extensions and continuations-in-part of the same (collectively, the "Patents"), including the Patents described in Exhibit C;
- (d) mask work or similar rights available for the protection of semiconductor chips or other products (collectively, the "Mask Works");
- (e) trade secrets, and any and all intellectual property rights in computer software and computer software products;
- (f) design rights;
- (g) claims for damages by way of past, present and future infringement of any of the rights included above, with the right, but not the obligation, to sue for and collect such damages for said use or infringement of the intellectual property rights identified above;
- (h) licenses or other rights to use any of the Copyrights, Patents, Trademarks, or Mask Works, and all license fees and royalties arising from such use to the extent permitted by such license or rights;
- (i) amendments, renewals and extensions of any of the Copyrights, Trademarks, Patents, or Mask Works; and
- (j) proceeds and products of the foregoing, including without limitation all payments under insurance or any indemnity or warranty payable in respect of any of the foregoing.

The rights and remedies of Lender with respect to the security interests granted hereunder are in addition to those set forth in the Loan Agreement, and those which are now or hereafter available to Lender as a matter of law or equity. Each right, power and remedy of Lender provided for herein or in the Loan Agreement, or now or hereafter existing at law or in equity shall be cumulative and concurrent and shall be in addition to every right, power or remedy provided for herein, and the exercise by Lender of any one or more of such rights, powers or remedies does not preclude the simultaneous or later exercise by Lender of any other rights, powers or remedies.

*[Balance of Page Intentionally Left Blank]*

IN WITNESS WHEREOF, the parties have executed this Agreement as of the date first written above.

**GRANTOR:**

BIONANO GENOMICS, INC.

By: 

Name: Robert Erik Holmlin

Title: Chief Executive Officer

Address for Notices:

Attn: Robert Erik Holmlin, Ph.D., CEO  
9640 Towne Centre Dr., #100  
San Diego, CA 92121

**LENDER:**

WESTERN ALLIANCE BANK, an Arizona corporation

By: \_\_\_\_\_

Name: \_\_\_\_\_

Title: \_\_\_\_\_

Address for Notices:

Attn: Loan Operations  
55 Almaden Blvd. Ste. 100  
San Jose, CA 95113  
Tel: (408) 423-8500  
Fax: (408) 423-8520

*[Signature Page to Intellectual Property Security Agreement]*

IN WITNESS WHEREOF, the parties have executed this Agreement as of the date first written above.

**GRANTOR:**

BIONANO GENOMICS, INC.

By: .....

Name: .....

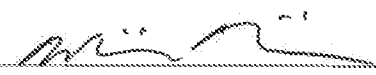
Title: .....

Address for Notices:

Attn: Robert Erik Holmlin, Ph.D., CEO  
9640 Towne Centre Dr., #100  
San Diego, CA 92121

**LENDER:**

WESTERN ALLIANCE BANK, an Arizona corporation

By: 

Name: Bill Wickline

Title: VP, Director of Portfolio mgmt

Address for Notices:

Attn: Loan Operations  
55 Almaden Blvd. Ste. 100  
San Jose, CA 95113  
Tel: (408) 423-8500  
Fax: (408) 423-8520

*[Signature Page to Intellectual Property Security Agreement]*

EXHIBIT A  
COPYRIGHTS

Please Check if No Copyrights Exist

<u>Type of Work:</u>	<u>Title:</u>	<u>International Standard Serial Number (ISSN):</u>	<u>Registration Number:</u>	<u>Filing Date:</u>	<u>Preregistered?</u>

Exhibit B  
TRADEMARKS

Please Check if No Trademarks Exist

<u>Mark / Title:</u>	<u>U.S. Serial No.:</u>	<u>U.S. Registration No.:</u>	<u>USPTO Reference No.:</u>	<u>Filing Date:</u>
SAPHYR CHIP	87314787	N/A		1/26/17
SAPHYR	87314801	N/A		1/26/17
BIONANO ACCESS	87375426	N/A		3/17/17
BIONANO GENOMICS	86361387	5076021		8/8/14
BIONANO GENOMICS	86050497	5045903		8/28/13
IRYSSOLVE	86400672	4708378		9/19/14
BIONANO GENOMICS	86975215	4646747		8/28/13
IRYSPREP	85677075	4502412		7/13/12
IRYSCHIP	85677063	4502411		7/13/12
IRYSVIEW	85677059	4452118		7/13/12
BIONANO GENOMICS	85677046	4518478		7/13/12
IRYS	85677024	4544066		7/13/12



EXHIBIT C

PATENTS

Please Check if No Patents Exist

<u>Title:</u>	<u>Patent Number:</u>	<u>Application Serial Number:</u>	<u>Issued or Published</u>	<u>Issue Date:</u>
Nanonozzle device arrays: their preparation and use for macromolecular analysis	US9061901	12/374,141	Issued	6/23/15
Nanonozzle device arrays: their preparation and use for macromolecular analysis		14/712816 US20150323518	Allowed	
Nanonozzle device arrays: their preparation and use for macromolecular analysis		US15/801081	Pending	
Nanonozzle device arrays: their preparation and use for macromolecular analysis		PCT/US07/16408 WO/2008/079169	Published	
Nanonozzle device arrays: their preparation and use for macromolecular analysis	AU2007338862	2007338862	Issued	5/24/14
Nanonozzle device arrays: their preparation and use for macromolecular analysis	CA2658122	CA2658122	Issued	9/2/14
Nanonozzle device arrays: their preparation and use for macromolecular analysis	ZL201310054745.1	CN103203256	Issued	2/20/13
Nanonozzle device arrays: their preparation and use for macromolecular analysis		EP2007872156 EP2049262	Published	
Nanonozzle device arrays: their preparation and use for macromolecular analysis	JP6030599	2014-089510	Issued	10/28/16
Nanonozzle device arrays: their preparation and use for macromolecular analysis	SG173,398	2011-05244-6	Issued	7/19/07
Methods of macromolecular analysis using nanochannel arrays	US8722327	12/057,987	Issued	5/13/14

<b><u>Title:</u></b>	<b><u>Patent Number:</u></b>	<b><u>Application Serial Number:</u></b>	<b><u>Issued or Published</u></b>	<b><u>Issue Date:</u></b>
Methods of macromolecular analysis using nanochannel arrays	US9310376	14/195,474	Issued	4/12/16
Methods of macromolecular analysis using nanochannel arrays		15/062622 US20160289756	Published	
Methods of macromolecular analysis using nanochannel arrays		PCT/US2008/058671 WO/2008/121828	Published	
Methods of macromolecular analysis using nanochannel arrays	AU2008232616	AU2008232616	Issued	11/20/14
Methods of macromolecular analysis using nanochannel arrays	CA2682275	CA2,682,275	Issued	5/9/17
Methods of macromolecular analysis using nanochannel arrays		CA2964611	Pending	
Methods of macromolecular analysis using nanochannel arrays	ZL2008800017550.70	CN200880017550.7	Issued	6/5/13
Methods of macromolecular analysis using nanochannel arrays		CN201310189106.6	Pending	
Methods of macromolecular analysis using nanochannel arrays	EP2136922	EP2008-744609.2	Issued	12/5/12
Methods of macromolecular analysis using nanochannel arrays		EP2013150068.8 EP2604344	Published	
Methods of macromolecular analysis using nanochannel arrays		HK10104929.6	Pending	
Methods of macromolecular analysis using nanochannel arrays	JP5491378	JP2010-501259	Issued	3/7/14
Methods of macromolecular analysis using nanochannel arrays	JP5860574	JP2013-258107	Issued	12/25/15
Methods of macromolecular analysis using nanochannel arrays	KR10-1522741	KR10-2009-7022447	Issued	5/18/15
Methods and devices for single molecule whole genomic analysis	US8,628,919	13/001,697	Issued	1/14/14
Methods and devices for single molecule whole genomic analysis	US9536041	13/765,353	Issued	1/3/2017
Methods and devices for single molecule whole genomic analysis		15/381,787 US20170226567	Published	

<b><u>Title:</u></b>	<b><u>Patent Number:</u></b>	<b><u>Application Serial Number:</u></b>	<b><u>Issued or Published</u></b>	<b><u>Issue Date:</u></b>
Methods and devices for single molecule whole genomic analysis		PCT/US2009/049244 WO/2010/002883	Published	
Methods and devices for single molecule whole genomic analysis	AU2009267086	AU2009267086	Issued	4/12/16
Methods and devices for single molecule whole genomic analysis		AU201602242	Published	
Methods and devices for single molecule whole genomic analysis		CA2729159	Published	
Methods and devices for single molecule whole genomic analysis		CN2009-80125335.30	Pending	
Methods and devices for single molecule whole genomic analysis		EP20090774334 EP2318547	Published	
Methods and devices for single molecule whole genomic analysis		EP13179160.0 EP2664677	Published	
Methods and devices for single molecule whole genomic analysis		CN2012-105208.3	Pending	
Methods and devices for single molecule whole genomic analysis	JP5730762	JP2011-516813	Issued	4/17/2015
Methods and devices for single molecule whole genomic analysis		2015078505 JP2015163073	Allowed	
Integrated analysis devices, fabrication methods and analysis techniques	US9533879	12/996,410	Issued	1/3/17
Nanofluidic Chips and Nanochannel Patterns		15/385302 US20170313580	Published	
Integrated nanofluidic analysis devices, fabrication methods and analysis techniques		PCT/US2009/046427 WO/2009/149362	Published	
Integrated nanofluidic analysis devices, fabrication methods and analysis techniques	AU2009256064	AU2009256064	Issued	8/13/15
Integrated nanofluidic analysis devices, fabrication methods and analysis techniques		AU2015205826	Allowed	
Integrated nanofluidic analysis devices, fabrication methods and analysis techniques		CA2727095	Pending	

<b><u>Title:</u></b>	<b><u>Patent Number:</u></b>	<b><u>Application Serial Number:</u></b>	<b><u>Issued or Published</u></b>	<b><u>Issue Date:</u></b>
Integrated nanofluidic analysis devices, fabrication methods and analysis techniques	ZL200980154567.1	2009-80130482	Issued	11/26/14
Integrated nanofluidic analysis devices, fabrication methods and analysis techniques		CN201410462892.7 CN104359874	Published	
Integrated nanofluidic analysis devices, fabrication methods and analysis techniques		EP2009759520	Pending	
Integrated nanofluidic analysis devices, fabrication methods and analysis techniques		HK11109208.6	Pending	
Integrated nanofluidic analysis devices, fabrication methods and analysis techniques		HK15107980	Pending	
Integrated nanofluidic analysis devices, fabrication methods and analysis techniques	SG2010-08920-9	SG2010-08920-9	Issued	7/31/13
Integrated nanofluidic analysis devices, fabrication methods and analysis techniques		KR10-2016-7001826	Allowed	1/21/16
Polynucleotide mapping and sequencing	US9181578	13/129634 2011/0306504	Issued	11/10/15
Polynucleotide mapping and sequencing		14/877818 US20160097092	Published	
Polynucleotide mapping and sequencing		PCT/US2009/064996 WO/2010/059731	Published	
Polynucleotide mapping and sequencing	AU2009316628	AU2009316628	Issued	6/16/16
Polynucleotide mapping and sequencing		CA2744064	Published	
Polynucleotide mapping and sequencing	ZL20098015456.7	CN2009-80154567.10	Issued	9/24/14
Polynucleotide mapping and sequencing		CN201610248998.6 CN105930689	Published	
Polynucleotide mapping and sequencing	EP2370594	EP2009-760398.9	Granted	1/8/14
Polynucleotide mapping and sequencing	EP2370594 Registered in GB	EP2009-760398.9	Granted	1/8/14
Polynucleotide mapping and sequencing	EP2370594 Registered in FR	EP2009-760398.9	Granted	1/8/14
Polynucleotide mapping and sequencing	EP2370594 Registered in DE	EP2009-760398.9	Granted	1/8/14
Polynucleotide mapping and sequencing	HK1166107	HK12105207.4	Granted	

<b><u>Title:</u></b>	<b><u>Patent Number:</u></b>	<b><u>Application Serial Number:</u></b>	<b><u>Issued or Published</u></b>	<b><u>Issue Date:</u></b>
Polynucleotide mapping and sequencing		15108141.4 HK1207404A	Published	
Polynucleotide mapping and sequencing	JP5846703	JP2011537585	Issued	1/20/16
Polynucleotide mapping and sequencing	SG171,325	2011-03550-8	Issued	11/29/13
Nanoanalyzer Systems and Methods	AU2011316989	AU2011316989	Issued	5/2/13
Systems and methods for assessing biomolecule characteristics	ZL201180060380.2	CN103443290A CN201180060380.2	Issued	6/8/16
Systems and methods for assessing biomolecule characteristics		CN20160365650.5 CN106048000A	Published	
Systems and methods for assessing biomolecule characteristics	HK1192287	HK14105511.3	Issued	9/1/17
Systems and methods for assessing biomolecule characteristics		HK( new)	Pending	
Systems and methods for assessing biomolecule characteristics		SG201302736-2	Pending	
Nanochannel arrays and near-field illumination devices for polymer analysis and related methods	US9725315	13/498846 2012/0244635	Issued	8/8/2017
Nanochannel arrays and near-field illumination devices for polymer analysis and related methods		PCT/US2010/050362 WO/2011/038327	Published	
Nanochannel arrays and near-field illumination devices for polymer analysis and related methods		HK13102315.9 HK1175215A	Published	
Nanochannel arrays and near-field illumination devices for polymer analysis and related methods	ZL201080043518.3	CN2010-80043518.3	Issued	9/5/17
Methods for single-molecule analysis		2015/0368706	Published	
Methods for single-molecule analysis		PCT/US2014/014501 WO2014/123822	Published	
Methods for single-molecule analysis		AU2014215586	Published	
Methods for single-molecule analysis		CA2900054	Published	

<u>Title:</u>	<u>Patent Number:</u>	<u>Application Serial Number:</u>	<u>Issued or Published</u>	<u>Issue Date:</u>
Methods for single-molecule analysis		201480007595.1 CN105143462	Published	
Methods for single-molecule analysis		HK16105786.9	Pending	
Methods for single-molecule analysis		EP14748636.9	Pending	
Methods for single-molecule analysis		JP2015-556985	Pending	
Characterization of Molecules in Nanofluidics	US9809855	14/768422 US2016/0046992	Issued	11/7/17
Characterization of Molecules in Nanofluidics		US15/795847	Pending	10/24/17
Characterization of Molecules in Nanofluidics		AU2014219001	Pending	2/19/14
Characterization of Molecules in Nanofluidics		CA2901460	Pending	2/19/14
Characterization of Molecules in Nanofluidics		EP14753475.4	Pending	2/19/14
Characterization of Molecules in Nanofluidics		CN105229168	Pending	2/19/14
Characterization of Molecules in Nanofluidics		HK16107465.3	Pending	6/27/16
Characterization of Molecules in Nanofluidics		JP2016510590	Pending	2/19/14
System for Nanoanalysis	RU142580	RU2013140977	Issued	5/27/14
Analysis of Polynucleotides		14/897213 US20160201147	Published	
Analysis of Polynucleotides		PCT/US14/41568 WO2014/200926	Published	
Analysis of Polynucleotides		CN201480044219.X	Pending	
Analysis of Polynucleotides		HK16113120.8 HK1225072A	Published	
Analysis of Polynucleotides		CN2016-519575	Pending	
Processing of Polynucleotides		15/123457 US20170073666	Published	
Processing of Polynucleotides		PCT/US2015/019027 WO2015/134785	Published	
Processing of Polynucleotides		CN201580012473.6	Pending	
Processing of Polynucleotides		EP15710388.8	Pending	
Improved Methods of Determining Nucleic Acid Structural Information		PCT/US2015/016194 WO2015126840	Published	
Improved Methods of Determining Nucleic Acid Structural Information		US15/11769	Pending	8/9/16
Improved Methods of Determining Nucleic Acid Structural Information		CN201580009351.1	Pending	

<b><u>Title:</u></b>	<b><u>Patent Number:</u></b>	<b><u>Application Serial Number:</u></b>	<b><u>Issued or Published</u></b>	<b><u>Issue Date:</u></b>
Improved Methods of Determining Nucleic Acid Structural Information		HK(new)	Pending	
Photocleavage method and apparatus to clean fluidic devices		PCT/US2015/047688 WO2016036647	Pending	
Photocleavage method and apparatus to clean fluidic devices		15/507,416 US20170282181	Published	2/28/17
Photocleavage method and apparatus to clean fluidic devices		15763711.7	Pending	
Photocleavage method and apparatus to clean fluidic devices		CN201580055371.2 CN107073472	Published	
Photocleavage method and apparatus to clean fluidic devices	New	HK (New)	Pending	New
Photocleavage method and apparatus to clean fluidic devices		SG11201702707Q	Pending	
Isolation of Megabase DNA from plant and animal tissue		14/802,659 US20160017316	Published	
Reduction of bias in genomic coverage measurement		PCT/US2015/017356 WO2015130696	Published	
Reduction of bias in genomic coverage measurement		15/117,689 US20160355873	Published	
Reduction of bias in genomic coverage measurement		EP15708652.1-1403	Pending	
Reduction of bias in genomic coverage measurement		CN201580016272.3	Pending	
Processing of Polynucleotides	15/123457 US20170073666	15/123457 US20170073666	Published	
Processing of Polynucleotides	PCT/US2015/019027 WO2015/134785	PCT/US2015/019027 WO2015/134785	Published	
Processing of Polynucleotides	CN201580012473.6	CN201580012473.6	Pending	
Processing of Polynucleotides	EP15710388.8	EP15710388.8	Pending	
Improved Methods of Determining Nucleic Acid Structural Information		PCT/US2015/016194 WO2015126840	Published	
Improved Methods of Determining Nucleic Acid Structural Information		US15/11769	Pending	
Embedded Noble Metal Electrodes in Microfluidics		14/928,596	Pending	

<b><u>Title:</u></b>	<b><u>Patent Number:</u></b>	<b><u>Application Serial Number:</u></b>	<b><u>Issued or Published</u></b>	<b><u>Issue Date:</u></b>
Embedded Noble Metal Electrodes in Microfluidics		14/952,161	Allowed	