

**UNITED STATES
SECURITIES AND EXCHANGE COMMISSION**

Washington, D.C. 20549

Form 10-K

(Mark One)

ANNUAL REPORT PURSUANT TO SECTION 13 OR 15(d) OF THE SECURITIES EXCHANGE ACT OF 1934
For the fiscal year ended December 31, 2019

OR

TRANSITION REPORT PURSUANT TO SECTION 13 OR 15(d) OF THE SECURITIES EXCHANGE ACT OF 1934

For the transition period from _____ to _____

001-35061

(Commission File No.)

Neophotonics Corporation

(Exact name of Registrant as specified in its charter)

Delaware
(State or other jurisdiction
of incorporation or organization)

94-3253730
(I.R.S. Employer
Identification No.)

3081 Zanker Road
San Jose, California 95134

(Address of principal executive offices, zip code)

Registrant's telephone number, including area code:
+1 (408) 232-9200

Securities registered pursuant to Section 12(b) of the Act:

Title of Each Class
Common Stock, par value \$0.0025 per share

Trading symbol:
NPTN

Name of Exchange on Which Registered
New York Stock Exchange

Securities registered pursuant to Section 12(g) of the Act:
None

Indicate by check mark if the Registrant is a well-known seasoned issuer, as defined in Rule 405 of the Securities Act of 1933. Yes No

Indicate by check mark if the Registrant is not required to file reports pursuant to Section 13 or Section 15(d) of the Act. Yes No

Indicate by check mark whether the Registrant (1) has filed all reports required to be filed by Section 13 or 15(d) of the Exchange Act of 1934 during the preceding 12 months (or for such shorter period that the Registrant was required to file such reports), and (2) has been subject to such filing requirements for the past 90 days. Yes No

Indicate by check mark whether the Registrant has submitted electronically every Interactive Data File required to be submitted pursuant to Rule 405 of Regulation S-T (§ 232.405 of this chapter) during the preceding 12 months (or for such shorter period that the Registrant was required to submit such files). Yes No

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

Large accelerated filer

Accelerated filer

Non-accelerated filer

Small 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 13(a) of the Exchange Act.

Indicate by check mark whether the Registrant is a shell company (as defined in Rule 12b-2 of the Act). Yes No

As of June 30, 2019, the approximate aggregate market value of voting stock held by non-affiliates of the Registrant, based upon the last sale price of the Registrant's common stock on the last business day of the Registrant's most recently completed second fiscal quarter, June 30, 2019 (based upon the closing sale price of the Registrant's common stock on the New York Stock Exchange), was approximately \$193,407,000. This calculation excludes 882,276 shares held by directors, executive officers and stockholders affiliated with our directors and executive officers.

As of February 21, 2020, the Registrant had 48,636,526 outstanding shares of Common Stock.

DOCUMENTS INCORPORATED BY REFERENCE

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The Registrant has incorporated by reference into Part III of this Annual Report on Form 10-K portions of its Proxy Statement for its 2019 Annual Meeting of Stockholders to be filed pursuant to Regulation 14A. The Proxy Statement will be filed within 120 days of Registrant's fiscal year ended December 31, 2019.

NEOPHOTONICS CORPORATION
ANNUAL REPORT ON FORM 10-K
For the Fiscal Year Ended December 31, 2019
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PART I

ITEM 1. BUSINESS

FORWARD-LOOKING STATEMENTS

You should read the following discussion in conjunction with our Consolidated Financial Statements and the related “Notes to Consolidated Financial Statements” and “Financial Statements and Supplementary Data” included in this Annual Report on Form 10-K. This discussion contains forward-looking statements including statements concerning our possible or assumed future results of operations, business strategies, competitive position, industry environment, potential growth opportunities and the effects of competition. Such statements are based upon our management’s beliefs and assumptions and on information currently available to us. Forward-looking statements include statements that are not historical facts and can be identified by terms such as “anticipates,” “believes,” “could,” “seeks,” “estimates,” “expects,” “intends,” “may,” “plans,” “potential,” “predicts,” “projects,” “should,” “will,” “would” or similar expressions. Forward-looking statements involve known and unknown risks, uncertainties and other factors that may cause our actual results, performance or achievements to be materially different from any future results, performance or achievements expressed or implied by the forward-looking statements. These risks, uncertainties and other factors in this Annual Report on Form 10-K are discussed in greater detail under the heading “Risk Factors.” Given these uncertainties, you should not place undue reliance on these forward-looking statements. Also, forward-looking statements represent our management’s beliefs and assumptions only as of the date of this Annual Report on Form 10-K. You should read this Annual Report on Form 10-K completely and with the understanding that our actual future results may be materially different from what we expect. Except as required by law, we assume no obligation to update these forward-looking statements, or to update the reasons actual results could differ materially from those anticipated in these forward-looking statements, even if new information becomes available in the future.

CONVENTIONS THAT APPLY IN THIS ANNUAL REPORT ON FORM 10-K

The conventions and terms used in this Report relate to the following categories in our industry:

Communications Technologies	Optical Materials Platforms	Lasers, Coherent Components and Modules	Speed	Transmission Reach or Distance	Data Center	Modulations
<ul style="list-style-type: none"> • 4G • 5G • CDC • Coherent • Contentionless • CWDM • Disaggregation • DWDM • Long Haul • LTE • Metro • MPEG • PIC • PLC • PSM • WDM 	<ul style="list-style-type: none"> • III-V • II-VI • Active Silicon • Advanced Hybrid Photonic Integration • GaAs • InP • SiGe • Silicon Photonics 	<ul style="list-style-type: none"> • CDM • CFP or CFPx • COSA • DCO • Drop Modules • ECL • EML • Flex Coherent • ICR • I/Q • MCS • NLW • OSFP • QSFP-DD • ROADM • WSS 	<ul style="list-style-type: none"> • 10G • 100G • 200G • 400G • 600G • 800G • 1T • Gbaud • Gbps • Tbps 	<ul style="list-style-type: none"> • DR • ER • FR • LR • SR • ZR 	<ul style="list-style-type: none"> • Cloud • DCI • IOT • IP 	<ul style="list-style-type: none"> • BPSK • PAM • QAM • QPSK

Unless otherwise indicated, references in this Annual Report on Form 10-K to:

- “4G” refers to fourth-generation wireless architecture;
- “5G” refers to fifth-generation wireless architecture supporting IoT, or Internet of Things;
- “10G” refers to 10 Gbps;
- “100G products” collectively refers to all products sold by us designed for use at 100Gbps (“100G”), and in coherent transmission systems designed for use at 100Gbps or higher data rates. Some customers may use

components designed for use at 100G at lower speeds. Our 100G products include both coherent transmission products and 100G network products that are not coherent;

- “400G products” collectively refers to all products sold by us designed for use at 400Gbps (“400G”), and in coherent transmission systems designed for use at 400Gbps or higher data rates;
- “400G”, “600G”, “800G” or “1T” refers to data rates at 400Gbps (“400G”) to 800Gbps or 1Tbps transmission;
- “III-V compound semiconductors” refers to compound semiconductor materials made from group III and group V elements of the periodic table, such as Indium Phosphide and Gallium Arsenide;
- “Active Silicon” refers to state-of-the-art integration of Indium Phosphide laser and amplifier gain devices into silicon photonics circuits to create full transceiver transmit capability from a silicon device;
- “Advanced Hybrid Photonic Integration” refers to state-of-the-art integration of multi-platform materials and devices;
- “BPSK” refers to binary phase shift keying;
- “CDC” refers to Colorless, Directionless, and Contentionless;
- “CDM” refers to a Coherent Driver Modulator which integrates a coherent I/Q modulator and drivers;
- “CFP” or “CFPx” refers to CFP Multi-Source Agreement, or CFP MSA, industry standard for hundred Gigabits per second and higher (C), form factor (F), pluggable (P) modules;
- “Cloud” refers to a large and geographically dispersed network of computing platforms, servers and interconnecting communications that can be accessed by users from any location to perform tasks and access information while operating as a combined ecosystem;
- “Coherent” refers to optical transmission systems that encode information in the phase of an optical signal and decode such information through comparison with an independent laser at the receiver and digital signal processing;
- “Contentionless” refers to the ability to switch two or more channels of the same wavelength or color from different directions through the same switch, such as a Multi-Cast Switch (MCS);
- “COSA” refers to a silicon photonics coherent optical sub-assembly that can combine multiple discrete devices such as a modulator and a receiver;
- “CWDM” refers to Coarse Wavelength Division Multiplexing;
- “DCI” refers to Data Center Interconnect;
- “DCO” refers to a Digital Coherent Optical module;
- “Design win” refers to a confirmation by a customer that a product or group of products may be used as part of a customer’s product and we have a purchase order for such products;
- “Disaggregation” refers to the trend in optical communications to separate software and hardware platforms so that different parts of a system can be supplied by different vendors;
- “DR” refers to transmission over a reach of 500 meters;
- “Drop Modules” refers to wavelength multiplexer modules;

- “DWDM” refers to Dense Wavelength Division Multiplexing;
- “ECL” refers to External Cavity Laser;
- “EML” refers to Electro-absorptively Modulated Laser;
- “ER” refers to transmission over a reach of 40 kilometers;
- “Flex Coherent” to a class of 100G transceivers and line cards in which the modulation format, and hence the reach and data-rate, can be altered by software command such that the same optical hardware can be used for metro, long-haul or, in some cases, data center interconnect applications;
- “FR” refers to transmission over a reach of 2 kilometers;
- “GaAs” refers to Gallium Arsenide, a III-V component semiconductor material;
- “Gbaud” refers to symbol rate measure in baud or gigabaud;
- “Gbps” refers to gigabits per second;
- “High Speed Products” refers to transmitter and receiver products as well as switching and other component products for 100G optical transmission applications over distances of 2 to 2,000 kilometers. Our high speed 100G and beyond products are based on our Advanced Hybrid Photonic Integration technology. These technologies support encoding 100 gigabits or more per second of information for transmitting over a single channel and decoding the information at the receiver;
- “ICR” refers to Integrated Coherent Receiver;
- “IP” refers to Internet Protocol;
- “I/Q” refers to quadrature communication signals used in radio frequency (RF) applications. The “in-phase” or reference signal is referred to as “I,” and the signal that is shifted by 90 degrees (the signal in quadrature) is referred to as “Q”;
- “ITLA” refers to Integrable Tunable Laser Assembly;
- “IoT” refers to the Internet of Things;
- “Long Haul” refers to fiber optic communications between central offices in different cities, where distances range from a few hundred to two thousand kilometers;
- “Low Speed Transceiver Products” refers to our access and low speed transceiver product lines;
- “LR” refers to transmission over a reach of 10 kilometers;
- “LTE” refers to Long-Term Evolution wireless architecture;
- “Metro” refers to fiber optic communications between central offices within and around cities, with distances up to a few hundred kilometers;
- “MCS” refers to Multi-Cast Switch;
- “MPEG-2” refers to the Moving Picture Experts Group standard for compressed coding of moving pictures and associated audio information;
- “Network Products and Solutions” collectively refers to all products sold by us for use in optical communications networks and a variety of other applications that are designed for use at data rates that are

less than 100Gbps, including 40G, 10G and lower data rates. These products include certain passive products that do not explicitly have a data rate specification, but that are most commonly used in networks at these data rates;

- “NLW” refers to Narrow Line Width;
- “OSFP” refers to Octal Small Form Factor Pluggable;
- “PAM” or “PAM4” refers to Pulse Amplitude Modulation or PAM with four amplitude levels;
- “PIC” refers to Photonic Integrated Circuit;
- “PLC” refers to Planar Lightwave Circuit;
- “PSM” or “PSM4” refers to Parallel Single Mode or PSM with four parallel lanes or fibers;
- “QAM” refers to Quaternary Amplitude Modulation; a means to code digital data on a coherent light signal;
- “QPSK” refers to quadrature phase shift keying;
- “QSFP” refers to 40G and 100G Quad Small Form-factor modules that are pluggable into standard industry interfaces for switches, routers and other telecommunications equipment;
- “QSFP-DD” or “DD-QSFP” modules that are quad small form factor double density pluggable into standard industry interfaces for switches, routers and other telecommunications equipment;
- “ROADM” refers to Reconfigurable Optical Add Drop Multiplexer;
- “SiGe” refers to Silicon Germanium, a III-V component semiconductor material;
- “Silicon Photonics” or “SiPho” or “Sipho” refers to Photonic Integrated Circuits manufactured using Silicon waveguides on Silicon wafers;
- “SR” refers to transmission over a reach of 100 meters;
- “Telecom” refers to the networks of the Public Telecommunications Operators (PTOs);
- “Tbps or T” refers to terabits per second. One terabit is one trillion bits;
- “U.S. GAAP” refers to generally accepted accounting principles in the United States;
- “WDM” refers to Wavelength-Division Multiplexing and is a technology that combines multiple channels onto a single fiber using different wavelengths, or colors, of light;
- “well-characterized” refers to the ability to predict the outcome of manufacturing processes based upon known statistics of various manufacturing inputs;
- “WSS” refers to Wavelength Selective Switch; and
- “ZR” refers to transmission over a reach of 80 kilometers.

Unless the context indicates otherwise, we use the terms “NeoPhotonics,” “we,” “us,” “our” and “the Company” in this Annual Report on Form 10-K to refer to NeoPhotonics Corporation and, where appropriate, its subsidiaries.

Overview

We develop, manufacture and sell optoelectronic products that transmit, receive and switch high-speed digital optical signals for Cloud and hyper-scale data center internet content provider and telecom networks. This is key to continuing to manage the explosive data traffic growth in Cloud and hyper-scale data centers.

We specialize in products that operate at the highest speed over distance, for 100 Gigabits per Second ("G"), 200G, and 400G and beyond data rates, such as at 600G and 800G. Our products have the speed, size, low power consumption and interoperability to directly transmit data using industry standard Internet Protocol coding, or IP over DWDM wavelengths, greatly simplifying data networks.

We are the world's primary supplier of tunable lasers that emit the ultra-pure light that is required for the highest speed over distance fiber optic communications links.

We forward integrate our lasers and our high performance coherent optical components into transmit/receive modules, or transceivers. Our high speed transceiver modules, which can operate at 400G and above, drive down costs, extend reach and directly interconnect with switches and routers.

We believe we are well positioned to achieve world market leadership in these laser, component and module products based on our leadership in the ultra-pure lasers which power them and our comprehensive capabilities in designing and producing the highest performance Silicon Photonics and Indium Phosphide devices based on our Advanced Hybrid Photonic Integration.

We also believe that because of our laser and component technologies, we have been the first to deliver commercial mass production volumes for each of the highest speed advances in components since the advent of coherent optics for transmission ten years ago in 2010, as maximum speeds have advanced for each wavelength, or color, from 100G to 200G, 400G and now 800G. With adoption of coherent transmission using pluggable high speed optical modules in Cloud and hyper-scale data centers, we believe our total available market is rapidly expanding.

Our Industry Position

Our high-speed optical communications technologies encode information to optical signals from electronic signals for transmission and decode it for receiving. We achieve these ultra-high speeds with coherent technology that encodes phase, amplitude and polarization on an optical wavelength, packing in far more information than simple on/off encoding. We believe we are a global leader in coherent transmission technology, based on our achieved speeds, leadership in ultra-pure color lasers and optical integration for miniaturization and low power consumption.

Coherent is becoming the technology of choice for high speed data transmission in Cloud infrastructure and data center interconnection, in addition to telecom networks, where the highest speeds over distance were first developed. Moreover, we are the most significant producer of the pure light lasers that deliver data at the highest speeds, as we have delivered approximately 1.5 million lasers used by the approximately 2 million coherent ports deployed by the industry over the past 10 years (each port may use either one or two lasers).

Our High Speed Products for data rates of 100G, 200G and 400G were 91% of our 2019 revenues and were 86% of our 2018 revenues. Products capable of data rates of 400G and above have accounted for more than 10 percent of our revenue since 2018. Our sales concentration in High Speed Products has been increasing each year for more than 10 years.

Our High Speed Products use our Silicon Photonics Integration and our Advanced Hybrid Photonic Integration technologies, which optimize performance by combining different materials platforms so that the most appropriate material is used for each function. We believe that these technologies are an important competitive differentiator as they allow optimizing the cost and performance of our products.

Narrow line width and low phase noise are essential for the lasers that power the highest speed modulations. As data rates increase over distance with advanced modulations, our ultra-pure light lasers are essential. The challenges of these highest data rates increasingly require the highest performance, the most compact and lowest power consumption components, and particularly the purest light lasers.

We have grown our business by delivering the highest speed over distance for the Long Haul and Metro segments of the Telecom market. In recent years the Data Center Interconnect (DCI) market has become an increasing part of our revenue as the DCI market adopts high speed coherent optical technologies.

Until recently our largest customers, Huawei Technologies, together with its affiliate HiSilicon Technologies Co. Ltd. (collectively “Huawei”), and Ciena Corporation, have been suppliers of network equipment primarily focused on the Telecom market. Other leading customers include makers of telecom network equipment suppliers, such as Cisco, Nokia and ZTE.

As we look out over the next three years we expect Cloud and hyper-scale data center operators, such as Alibaba, Amazon, Apple, Facebook, Google, Microsoft and Tencent, could become significant customers as they increasingly link-up hyper-scale data centers regionally. These operators need the highest speeds at reaches up to 120 kilometers, defining a market sector where we excel and have fundamental technology advantages.

The Cloud and hyper-scale data center markets are adopting coherent technology to achieve lower cost per bit of data transmitted, lower power consumption and, as a result, scalability. We believe the Cloud and hyper-scale data center markets will become more important in our sales mix, we expect our typical annual revenue growth rate to benefit versus recent years, both from our further penetration of this market and from the higher growth rate of this market relative to Telecom.

Moreover, we believe that our laser technology will increase our share of coherent modules operating at the highest data rates of 400G and above that are critical to interconnect hyper-scale data centers.

The Emerging Information Age

Rapid technology advances are allowing the digitizing of minute realms of knowledge, and of economic, social and information-focused life. Vast new areas of human activity are being virtualized with digital systems and with almost unimaginable amounts of data. This requires a massive infrastructure of hyper-scale data centers for processing and a massive network of optical interconnections. This infrastructure, i.e. the “Cloud”, is still in the early stages of transforming our way of life.

There are more than 500 hyper-scale data centers around the world, each housing 100,000 or more micro-processors. Each hyper-scale data center is surrounded by many more enterprise level data centers. New applications requiring massive data manipulation are emerging continually, such as autonomous cars, virtual reality, smart homes, tele-medicine, genomics, artificial intelligence and machine learning. We believe such vast proliferation of data applications will continue to drive growth in hyper-scale and enterprise data centers for decades to come.

The ability to generate and process data requires that the data be transported to where it is needed. Thus, the second major element of the Cloud is the communications interconnections between data centers and consumers and between the data centers themselves.

Today total annual IP data traffic will reach 4.8 Zettabytes by 2022, or 4.8 trillion billion bytes (which is roughly equivalent to 200 million times the data in the Library of Congress) according to the Cisco Visual Networking Index. Total data traffic is forecast to nearly double over the next three years, with nearly all of this data being carried over fiber optic data links. Optical communications is becoming the bottleneck in the growth of the Cloud. We have been a pioneer for new technology of “Coherent” communications powered by lasers and Photonic Integrated Circuits, or PICs, which are fueling this continued expansion while transforming telecommunications.

Networks operating at 400G and beyond data rates have adopted coherent transmission technology because of its ability to increase data rates and lower costs. These high speed networks are among the highest growth segments of the optical communications market, and support the rapid expansion of telecom backbone, hyper-scale data center and content provider networks, accommodating increased mobile traffic.

We expect growth in the 400G and beyond segment to be driven primarily by increased adoption of our high speed products in the much larger Cloud infrastructure market, the Metro market sector and in the high speed data center interconnect, or DCI, market.

Distance Matters in Communications Networks

It is more challenging and expensive to transmit a signal several thousand kilometers across a continent than it is to send the same information a few hundred meters across a data center or campus network.

Specific technologies have been developed for communications inside the data center and between data centers themselves as well as between data centers and consumers. We believe our solutions are often unique in their ability to provide high integrity signals across longer distances. But with advances in our silicon photonics technology and hybrid photonic integration technology, used in conjunction with advanced modulation and digital signal processing, the costs of high speed coherent transmission are becoming more competitive at shorter reaches including distances of 80 kilometers, 40 kilometers and approaching 10 kilometers. These shorter reaches include applications where interconnect volumes are much larger, and where we historically have not sold our products directly. Thereby shorter reaches offer us further major growth opportunities.

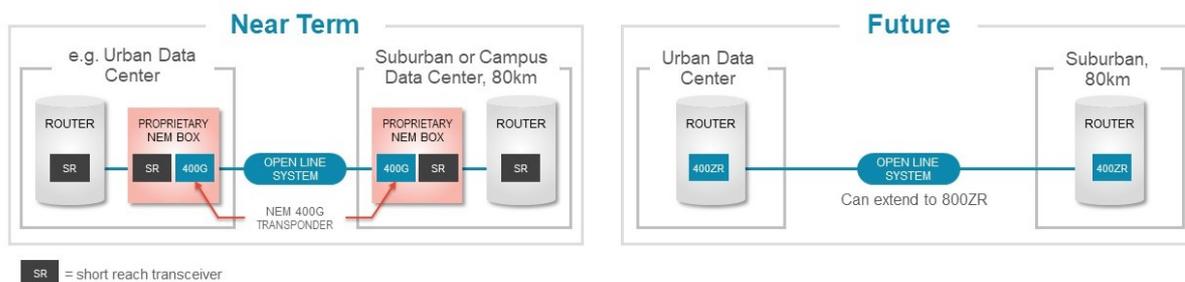
For distances of 80 kilometers to 2000 kilometers, or from ZR reaches to long haul, very different technologies are needed. The benefits of coherent transmission have made it the preferred technology for these state-of-the-art high speed networks, and we believe that our Silicon Photonics Integration and Advanced Hybrid Photonic Integration technologies effectively address the challenges inherent in precision and high volume manufacturing of optical components for coherent transmission at these longer distances.

Emerging Change in Network Architecture

We believe the changes at 400G and above data rates portend a coming significant change in high speed network architectures to more efficiently implement the 400G and above technologies provided by us. Today, a data center or central office equipment rack contains complex circuit boards or line cards or so-called “pizza boxes”, usually supplied by a separate network equipment manufacturer, or NEM, to provide the fiber optic link. However, this results in a complex and costly architecture.

We believe our coherent techniques and PICs will enable this forecasted significant change in network architecture. These technologies make it possible for long distance transmission by pluggable transceiver modules that connect directly into switches and routers inside data centers that have thus far been used only for short reach connections within data centers. Such dis-aggregated Open Line Systems can manage optical signals *between* data centers, sometimes called “IP over DWDM”, with all needed channel management, amplification, traffic planning and monitoring functions. Connections between data centers then become as simple as connections *within* data centers - a breakthrough benefit to the network operator.

To illustrate, a 400 Gigabit connection between two routers in different data centers 80 kilometers apart can be made by plugging our new 400ZR OSFP pluggable transceiver into each router and connecting the fibers through an “Open Line System” DWDM wavelength multiplexer, also made by us. Similarly a distance of 400 kilometers or more can be accommodated using our new 400ZR+ modules.



New Architecture Supported by 400ZR Interconnects

This new architecture eliminates two complex network equipment boxes and four short reach data center transceivers and consequently reduces the cost per bit of the optical link by as much as 80 percent. The architecture is possible because coherent technology, driven by ultra-pure lasers and coupled with our highly integrated photonic chips, packages the long distance transmission capability of the NEM line card into a small form factor pluggable transceiver that is plug-compatible with standard short reach data center transceivers and with acceptable power consumption. For example, a NeoPhotonics 400ZR OSFP or QSFP-DD capable of 80 kilometer transmission plugs into the same slot on a router that also accommodates a 400G DR4 OSFP or QSFP-DD data center transceiver capable of only 500 meters transmission.

We believe that over the next few years, this connection architecture will become the mainstay of new installations, moving a significant portion of the capital expenditures from network equipment supplied DWDM proprietary boxes to

disaggregated direct 400ZR interconnections. This new approach of IP over DWDM moves Internet Protocol traffic from switches and routers directly over an Open Line system DWDM channel without passing through a proprietary network equipment transmission box.

Our Solutions

Three critical optical components are required to make a coherent transceiver: (1) a laser with a very narrow linewidth for very pure light; (2) a coherent modulator capable of changing both the intensity and phase of the optical signal to code data onto it; and (3) a coherent receiver capable of detecting both the intensity and phase of the received optical signal to “interpret” its content, plus an electronic digital signal processor IC (DSP).

We have been a leading volume supplier of these optical components since coherent systems were first deployed in volume for telecommunications networks a decade ago, in 2010. We are now the leading supplier of narrow linewidth tunable lasers and coherent receivers to the coherent market, and we have introduced new high speed coherent modulators for 400G, 600G and above applications.

We believe our Silicon Photonics and our Advanced Hybrid Photonic Integration technologies are well positioned to serve the highest speed next-generation 200G, 400G, 600G and 800G and beyond products and applications. Using these core technologies we produce photonic integrated circuits, or PICs, that comprise both arrayed and individual photonic functional elements using optimized materials systems and processes from Silicon Photonics, Indium Phosphide, Gallium Arsenide and Silicon Germanium. These individual PICs are combined using our hybrid integration technology to make complete products, such as our Coherent Optical Sub-assembly (“COSA”), our Integrated Coherent Receiver (“ICR”) and our Coherent Driver-Modulator (“CDM”), and our ultra-narrow linewidth (“NLW”) tunable laser for 400G and beyond coherent transport, Metro and DCI applications. Moreover, high performance optics and ultra-pure lasers reduce the need in some systems for DSP algorithms to correct less pure optical signals, thereby improving performance, cost and power consumption.

In parallel, commercial DSP development has followed Moore’s Law to achieve the performance and low power necessary for 400ZR and 400ZR+ coherent modules. The latest generation of DSPs incorporate forward error correction software recently standardized by the Optical Internetworking Forum (OIF) so that they can interoperate with each other. This means that the data traffic can remain in IP format and be directly communicated between switches and routers without passing through a proprietary network equipment box, thereby accelerating IP over DWDM. We combine our unique high performance coherent COSA and Narrow Linewidth Laser with a commercially available DSP to manufacture 400ZR modules, including 400G CFP2, OSFP and DD-QSFP digital coherent optical (“DCO”) transceivers for Cloud, data center interconnect and telecom wireline and wireless networks.

We have pioneered developing and commercializing Silicon Photonics products for fiber communications, beginning with Silica on Silicon passive products and progressing into Silicon on Insulator active products. We have demonstrated Silicon Photonics coherent modulators operating at 600G per wavelength and with active product development for Silicon Photonics coherent modulators for 800G and above. We combine all of the optics necessary for DCI and Metro coherent transmission in compact packages that fit inside standard data center transponder form factors, such as our 400G OSFP and QSFP-DD transceiver modules.

We further combine coherent transmission technologies to maximize interconnect bandwidth capacity. For example, our new C++ LASERTM ITLA, C++ CDM™ Modulator and C++ ICR™ Receiver are uniquely capable of increasing fiber capacity up to 50 percent and to deliver up to 32 Tbits bits of capacity over a single fiber. This approach leverages our 75- to 100GHz-spaced PLC multiplexers for Open Line Systems. We believe that these unique solutions will continue to provide lower cost-per-bit for Cloud and hyper scale applications as well as for 5G and telecom networks.

The capabilities of coherent optics continue to grow with increasing photonic integration for higher performance and smaller size, and open further opportunities for us in adjacent markets. Outside of communications, coherent technology improves sensitivity and performance for a variety of applications including inter-satellite communication links including for low earth orbit (LEO) satellites, plus industrial applications, 3D sensing for autonomous vehicle navigation, and medical imaging.

Our Core Technologies in Silicon Photonics and Hybrid Photonic Integration

We believe we have all the capabilities required for producing the highest performance Advanced Hybrid Photonic Integrated optoelectronic and silicon photonics devices for the highest speed and most stringent performance requirements. Our core technologies are a unique multi-material platform that includes:

Advanced Hybrid Photonic Integration is our core technology and drives our ability to design, develop and produce industry leading, unique and differentiated high speed optoelectronics products. We utilize a set of proprietary integration platforms that provide optoelectronic functionality on Silicon and other integrated compound semiconductor substrates including Indium Phosphide, Gallium Arsenide and Silicon Germanium. Complete advanced photonics integration capability requires integrated combinations of these platforms to achieve optimal performance and cost. The integration of more than one material substrate is called hybrid integration, and our Advanced Hybrid Photonic Integration is used in our 100G and beyond products.

Silicon Photonics Integration and Active Silicon: Silicon is efficient for electronics and versatile for integration, while being very inefficient in generating or detecting light in the telecom wavelength window. Consequently, Silicon Photonics integrated circuits must be designed to be easily integrated with lasers fabricated from Indium Phosphide, detectors based on germanium doped silicon, or other functions and materials through Hybrid Photonic Integration. We design Silicon Photonics modulators, receivers, coherent optical subassemblies and laser subassemblies and fabricate the Silicon wafers in commercial Silicon foundries. We co-packages these Silicon Photonics chips with lasers made from Indium Phosphide to form Active Silicon elements.

Indium Phosphide (InP): Indium Phosphide is used to produce efficient lasers, sensitive photodetectors and modulators in the wavelength window typically used for telecommunications. As a compound semiconductor bandgap material, InP is the most important material for the generation of laser signals and the detection and conversion of those signals back to electronic form. We design and manufacture laser and detector chips in our own Indium Phosphide fabs and integrate them with silicon photonics circuits using Advanced Hybrid Photonic Integration. InP-based modulators and detectors are also used for demanding applications such as long-haul and undersea systems.

Silicon Planar Lightwave Circuits: Silicon is a multi-attribute material and waveguides of Silicon or doped Silicon Dioxide (silica) have very low optical loss and are ideal for switching, filtering or interferometric applications. We design and manufacture doped silica photonic chips in our own fabs and integrate them with other photonic circuits using Advanced Hybrid Photonic Integration.

Gallium Arsenide (GaAs): Gallium Arsenide operates at very high speeds due to its high electron mobility and is used to make analog integrated circuit drivers for high speed lasers and modulators. We design and manufacture GaAs ICs in our own fab for integrate them with our lasers and modulators.

Silicon Germanium (SiGe): Silicon Germanium is used to manufacture mixed signal and analog integrated circuits for high speed driver and trans-impedance amplifiers used in 100G and beyond systems. We make SiGe devices using standard silicon processing techniques in commercial foundries.

Laser Technologies: We specialize in the design, manufacture and control of lasers. Our principle products include ultra-narrow linewidth tunable lasers, electro-absorptively modulated lasers (EMLs) and distributed feedback lasers (DFB). We design and fabricate laser chips in our fabs and we integrated them with our control circuitry.

This ability to combine specific functional elements out of optimized materials results in very compact and low power consumption components.

Optoelectronic engineering and integration. As we create complex integrated optoelectronic devices, we design and build electronic control algorithms and devices, signal processing methodologies, hardware and software routines and protocols, and device level ASICs that function to control and manage the highest performance features and capabilities of these integrated optoelectronic devices and systems. For example, our coherent modules are well characterized and controlled to deliver the full operating range and performance of our Advanced Hybrid Photonic Integration platform.

Hardware and firmware integration. We also sell our products as modules and subsystems which contain electronic hardware and firmware controls that interface directly with our customers' systems. We design the electronic hardware and develop the firmware for control of our optical products and subsystems.

Devices, Components, Modules and Subsystems. We design and manufacture modules and subsystems that combine our products with other elements to offer customers a complete solution. We sell products at each level of product utility and can achieve the highest performance and capture the greatest value. We utilize contract manufacturers for assembly operations where it is efficient to do so.

Our Strategy

Key elements of our strategy include:

- *Continue to lead in the most advanced ultra-pure laser technology and manufacturing, and state-of-the-art integrated coherent receivers, modulators and modules.* We continue to invest in and develop highest speed products in each of the components required for coherent transmission and related applications.
- *Continue innovating to develop industry-leading comprehensive technology for Silicon Photonics and Advanced Hybrid Photonic Integration.* We have strengthened and expanded our technology platforms for comprehensive advanced photonic integration, in part from acquisitions and also from internally funded development, to design and produce the highest performance optical signal processing solutions.
- *Capture major customer share for the most advanced modules and components serving the top users of state-of-the-art communications solutions.* We intend to deepen our relationships with customers by increasing design wins for their systems, including Arista Networks, Ciena, Cisco, Huawei, Infinera, Nokia and ZTE, as well as major Cloud and hyper-scale data center operators.
- *Offer complete optoelectronic solutions for 100G to 800G and beyond for the highest speed Cloud, data center and Telecom market segments.* We have introduced Coherent Transmitter, Modulator and Receiver components and Transceiver Modules optimized for the highest speeds and are aligned with leading trends in Open Line System architectures.
- *Address additional segments of the network and similar or related applications that leverage our core technology and state-of-the-art products and that will benefit from high speed or high sensitivity performance.*

Our Products

Our ultra-narrow linewidth tunable lasers are core to our coherent communications strategy, and our other coherent components and modules provide industry leading performance and are forward integrations of our lasers.

We produce transmitter and receiver components and modules, as well as switching products, for 100G and beyond transmission over distances of 2 to 2,000 kilometers. We integrate transmitter and receiver components into next generation pluggable transceiver modules.

All of our high speed 100G and beyond products are based on our Silicon Photonics technology or our Advanced Hybrid Photonic Integration technology. These technologies support encoding 400 Gigabits or more per second of information for transmitting over a single channel and decoding the information at the receiver, and enable smaller, more compact and more highly integrated designs for the individual elements and integrated COSAs.

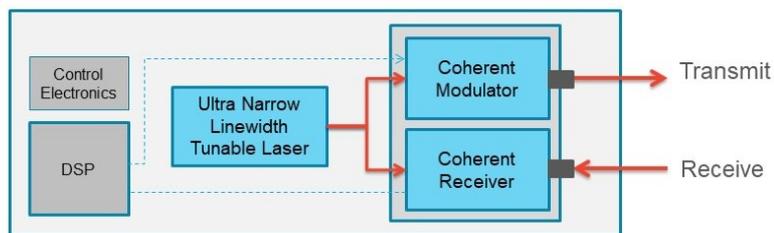
Coherent transmission can only be accomplished in practice using advanced photonic integration to intimately couple functional elements. Coherent systems manipulate light to encode ten times to forty times or more the amount of information on the same wavelength channel than is possible with traditional methods.

Our Coherent Products include Ultra-Narrow Linewidth Tunable Lasers (NLW-TL), which generate the ultra-pure wavelength, or color, necessary for coherent transmission; coherent modulators which encode the electronic information based on the polarization, phase and amplitude of the optical beam; and Integrated Coherent Receivers (ICRs), which decode the phase and polarization of the encoded coherent optical signal.

Our coherent optoelectronic modules, which integrate our components, provide complete transmit and receive functions including variable modulation capability to adjust data rates. Compact integration of our “transceiver” modules allows them to be pluggable and to reduce costs by replacing traditional much larger and more complex boxes.

We sell our components separately to network equipment manufacturers in addition to using them in our own modules. We expect to sell our modules to Cloud and hyper-scale data center operators and to network equipment manufacturers.

Each of our module products incorporates one each of our component lasers, integrated coherent receivers and modulators. Further, to minimize size, we often integrate the receiver and modulator into a single component, a coherent optical subassembly, or COSA. In addition, each transceiver module has a digital signal processor (DSP) as an Application Specific Integrated Circuit (ASIC). These four elements, three components and the DSP, comprise most of the bill of materials for a module, and are roughly comparable in value.



Elements of a Coherent Transceiver DCO Module

We believe we are the primary world supplier of ultra-narrow linewidth lasers that are essential for the highest speed modules and components in coherent communications.

We develop and manufacture Transmitter Products, Receiver Products and Switch Products that are used in ultra-high speed digital optical communications, high speed switching and provisioning. We combine our transmitter and receiver products into Transceiver modules. Our Switching Products, such as Multi-Cast Switches, are used primarily in ROADM nodes that dynamically and efficiently allocate bandwidth to adjust for fast changing traffic patterns and for provisioning software defined optical networks. Our products can be categorized into groups, including High Speed Products for 100G, 400G, 600G, 800G and beyond applications, including in coherent networks, and Network Products and Solutions, for lower speed networks and other telecom wavelength management and instrumentation products.

Our Coherent Module Products

400G Pluggable Coherent Transceivers: We produce industry leading pluggable coherent transceivers operating at speeds from 100G to 400G. We have introduced new pluggable coherent modules which combine our ultra-narrow linewidth laser with our coherent receiver and with our high performance coherent modulator or integrated COSA.

Our 400ZR OSFP and our new QSFP-DD transceivers both provide 400G connections over a DCI reach of up to 125 kilometer in a standard client side pluggable form factor. These modules support OIF standard error correction software and can interoperate with other transceivers using the same standardized software, enabling direct IP over DWDM.

Our 400G capable CFP2-DCO transceiver is the industry's first transceiver module that can deliver as much as 32 Terabits of capacity per fiber. Our internal optics support 85 channels of 64 Gbaud data at 75 GHz wavelength channel spacing. This CFP2-DCO modules supports long haul, metro and DCI network applications. Our 100G CFP provides metro reach connections in a standard CFP form factor.

Our Laser Products

Ultra-Narrow Linewidth Tunable Laser Products: We produce industry leading tunable laser products based on an external cavity design (ECL). Due to their longer cavity length, ECLs generate a much purer "color," or narrower "linewidth," which is critical with new higher order modulation techniques and higher baud rates, and thereby carry significantly more information. In addition to a standard Micro-ITLA form factor, we also offer a Nano-ITLA that achieves comparable ultra-narrow linewidth, low frequency phase noise and the low power consumption in a compact package approximately one half the size of our standard Micro-ITLA.

Further extending our world leadership in lasers for the highest speed and highest capacity communications links, we also provide ultra-narrow line width lasers with wider tuning ranges which support more channels or higher speeds. For high baud rate, high capacity per wavelength systems, the Micro Ultra-Narrow Linewidth Tunable lasers are available in a C++ LASER™ configuration, which has a tuning range of 6 THz, covering the full "Super C-band." This is 50 percent more spectrum than a standard 80 channel, 50 GHz spaced laser. The C++ LASER™ ITLA can tune over 120 channels with 50 GHz per channel spacing or 80 channels with 75 GHz per channel spacing. For example, this fully captures the increase in fiber capacity

generated by these newer modulation approaches when combined with our C++ ICR™ Receivers and C++ CDM™ Modulators,

High Performance Laser Products: For applications inside data centers and in connecting antennas for 5G wireless networks, we also design and manufacture electro-absorptively modulated lasers (EML) and high power distributed feedback lasers (DFB) as well as driver ICs for these lasers.

We manufacture and sell 100G products for data center applications, including 28 Gbaud EMLs, laser drivers, modulator drivers and photodiode receivers.

We are developing ultra-high-speed 53 Gbaud EML lasers and laser driver for single wavelength PAM4 100G applications and subsequently four wavelength 400G intra-data center transmission.

For hyper-scale data center applications, we have introduced high power laser diode array products for short reach Silicon Photonics based 100G intra-data center interconnections which use parallel single-mode architectures, or PSM4, as well as coarse wavelength division multiplexing, or CWDM architectures.

Our Coherent Component Products

High Speed Products: We produce transmitter and receiver products for 100G and beyond optical transmission applications over distances of up to 2,000 kilometers. These products include our integrated coherent receiver (ICR) and coherent driver modulator (CDM), which also support baud rates of up to 96 Gbaud and can operate over the C++ wavelength band covering 6 THz. We have integrated transmitter and receiver functions into a single integrated component called a COSA (Coherent Optical Sub Assembly), which has an ultra-small form factor designed to fit into the next generation pluggable transceivers such as OSFP and QSFP-DD. Our technologies support encoding 100 to 800 Gigabits or more per second of information for transmitting over a single channel and decoding the information at the receiver, as well as enabling smaller, more compact and more highly integrated designs for the individual elements and integrated COSAs.

Our Wavelength Management Products

We develop and manufacture wavelength management products that are used in ultra-high speed digital optical communications, high speed switching and provisioning. Our Switching Products, Multi-Cast Switches, are used primarily in ROADMs nodes to allocate bandwidth dynamically and efficiently, adjusting for fast changing traffic patterns and provisioning and supporting software defined optical networks.

Multi-cast Switch Modules: We provide a proprietary switching solutions for 100G and above coherent systems embodied in our Multi-Cast Switch (MCS) product line. Our 4x16, 8x16 and 12x16 modules for CDC ROADMs efficiently allocate bandwidth and route signals in 100G and higher data rate coherent networks. The Multi-Cast Switch provides scalable contentionless operation to achieve the highest traffic management efficiency, optimizing traffic flows in coherent transmission systems. Our MCS uses our PLC photonic integration platform and consists of a complex array of switches, waveguides, taps, crossings and other functional elements manufactured on Silicon wafers using standard semiconductor processing equipment. Our PLC technology exhibits very low loss and extends the Multi-Cast Switch to higher port count.

Network Products and Solutions: We design and manufacture other wavelength management products including arrayed wavelength gratings (AWGs), multiplexers and filters used in Dense Wavelength Division Multiplexing (DWDM) systems. NeoPhotonics is a leading integrated manufacturer of AWGs and has shipped more than half a million AWGs to the market world-wide.

We design and manufacture wavelength management products for high capacity coherent systems operating at 800G or higher. We have introduced new AWGs for advanced coherent systems that offer channel spacing from 75 GHz to 150 GHz and channel counts from 40 to 85 channels, covering the 6 THz C++ band, supporting new coherent systems operating in the range from 60 to 128 Gbaud.

Our Infrastructure, Intellectual Properties and Our Employees

We have product development and product sustaining engineering teams in Silicon Valley (San Jose and Fremont, California), Ottawa, Canada, Tokyo, Japan and Shenzhen and Wuhan, China. In our Silicon Valley and Tokyo facilities we conduct research, product development and product roadmap definitions, including for our Silicon Photonics and Advanced Hybrid Photonic Integration PIC products. In our Shenzhen facilities, we conduct new product development, manufacturing and process engineering, quality control, continuous improvement and cost reduction relating to product manufacturing, assembly and test. In our Wuhan, China and Ottawa, Canada facilities we conduct new device, component and product development.

We seek to establish and maintain proprietary rights in our technology and products through the use of patents, copyrights and trade secret laws in each of the locations in which we do business. We have filed applications for patents to protect certain of our intellectual property in the U.S. and in other countries, including Australia, Canada, Japan, Korea, Hong Kong, China, Russia, India, Taiwan and several European Union countries. As of December 31, 2019 we had approximately 496 issued patents, expiring between 2020 and 2038 covering various aspects of our technologies.

We have manufacturing operations in the U.S., Japan, China and Thailand. Our wafer fabrication operations are located in our San Jose and Fremont, California facilities, as well as in our Japan facilities, and include chip design, clean room fabrication, integration and related facilities for chip-level devices and PICs. Our manufacturing, assembly and test operations are located in our Shenzhen and Dongguan, China facilities, in Thailand and in Silicon Valley, California.

As of December 31, 2019, we had 1,690 employees and non-employee contractors, of which 261 were based in the U.S., 1,268 in China, 144 in Japan and 17 in the rest of the world.

None of our U.S. or Canadian employees are represented by a labor union. Chinese law allows that all employees be members of a union that is overseen by the Chinese government. The majority of the employees in our Japanese subsidiary are also members of a union. We have not experienced employment-related work stoppages and we consider our employee relations to be good.

Our Customers

In 2019, 2018 and 2017, our five largest customers accounted for 84%, 87% and 78% of our total revenue, respectively. In 2019, customers of 10% or more revenue were Huawei Technologies, together with its affiliate HiSilicon Technologies Co. Ltd. (collectively "Huawei"), and Ciena Corporation, which accounted for 41% and 29% of our total revenue, respectively. In 2018, customers of 10% or more revenue were Huawei and Ciena, which accounted for 46% and 24% of our total revenue, respectively. In 2017, Huawei and Ciena accounted for 40% and 16% of our total revenue, respectively.

On May 16, 2019, the U.S. Commerce Department's Bureau of Industry and Security ("BIS") added Huawei and certain affiliates to the BIS Entity List ("Entity List"), with an effective date of May 21, 2019. This denies Huawei the ability to purchase products, software and technology that are subject to U.S. Export Administration Regulations (EAR). As Huawei has been our largest customer in recent quarters, this had a material impact on the revenue and profitability we had forecasted prior to the BIS action. As a result, we have adjusted capital expenditures, operating expenditures, project plans and incoming materials for changing demand levels to mitigate risks associated with the Entity List and intend to continue to manage with such actions in place while the denial remains in place.

Our Sales and Marketing

We operate a sales model that focuses on alignment with our customers through coordination of our sales, product application engineering and manufacturing teams. Our sales cycles typically require a significant amount of time and a substantial expenditure of resources before we can realize revenue from the sale of products. The length of our sales cycle, from initial request to design win, is typically 6 to 12 months for an existing product and 12 to 18 months or longer for a new product.

We use a global direct sales force based in North America, Europe and Asia, including China, Japan, Korea and Taiwan. These individuals work with our product application engineers, and product marketing and sales operations teams, in an integrated approach to address our customers' current and future needs. We have very deep technical relationships. We believe that these collaborative engineering activities provide us insight into our customers' broader and longer-term needs. We view our technical sales capability and our technical relationships with customers are important parts of our value delivery to our strategic customers.

Our marketing team focuses on product strategy, product development, roadmap development, new product introduction processes, program management, product demand stimulation and assessment, and competitive analysis. Our marketing team also seeks to educate the market about our products by communicating our value proposition and product differentiation in direct customer interactions and presentations and at industry tradeshows and at technical conferences. It is important that these teams are engaged in both industry forums such as MSA (multi supplier agreement) Committees, as well as direct customer and end-user engagements.

Our Research and Development

We have invested and expect to continue to invest significant time and capital into our research and development operations. Our research and development activities continue to push the performance leadership boundaries in high speed digital optics, silicon photonics and hybrid photonic integration, optoelectronics control and in signal processing.

Research and development expenses were \$57.6 million, \$53.8 million and \$58.3 million in 2019, 2018 and 2017, respectively.

We have research and development and wafer fabrication facilities in San Jose and Fremont, California and in Tokyo, Japan that coordinate with our research and development and manufacturing facilities in Dongguan, Shenzhen and Wuhan, China and Ottawa, Canada. We use proprietary design tools and design-for-manufacturing techniques to align our design process with our precision nanoscale, vertically integrated manufacturing and testing. We believe we are one of the highest volume manufacturers of PICs in the world and that we can further expand our manufacturing capacity to meet market needs.

Our Suppliers

We use suppliers from the U.S., China, Japan and other locations. Although there are multiple sources for most of the component parts of our products, some components are sourced from single or, in some cases, limited sources, which can increase risks of materials availability for production. We typically do not have written agreements with the majority of these component manufacturers to guarantee the supply of the components used in our products. We also use contract manufacturers in Thailand, China, Japan and other Asia locations for the back-end manufacturing of certain of our products.

As a supply philosophy we generally maintain long term relationships with leading suppliers who can meet our stringent technical requirements at the same time as being cost competitive. We believe that as the industry scales the entire supply chain is working to scale. As a result, we work closely with our suppliers to understand their business as we grow together. This requires our continuing close management.

We also work to develop new companies as suppliers for new technologies, innovations and for purposes of managing costs over time. We examine our supply chain for their performance, quality, technology and technology roadmaps, service, engineering talent, labor practices and environmental sustainability.

We promote long term relationships with suppliers that we believe have the elements for long term success and managements that exercise good practices for both their long term success and our long term success and competitiveness.

Our Backlog

Sales of our products generally are made pursuant to purchase orders, often with short lead times. These purchase orders are typically made without deposits and may be subject to revision or cancellation. The quantities actually purchased by our customers, as well as the shipment schedules, are frequently revised to reflect changes in our customers' needs and in our supply of products.

Certain of our customers use vendor managed inventory (VMI) arrangements under which we manufacture at a customer's request, then ship to its facility or a designated contract manufacturer for the customer, to be held until it is used by the customer. We maintain title to vendor managed inventory until the customer uses the inventory. At that time the customer takes title to the products, it reports the consumption to us and we recognize the revenue for the product sale.

Our direct sales force works our customers in an integrated approach to understand current and future needs. Because we operate a sales model that focuses on alignment with our customers there is the possibility of changes in delivery or acceptance schedules, cancellations, modifications or price reductions with limited or no penalties.

BIS added Huawei and certain affiliates to the Entity List with an effective date of May 21, 2019. As Huawei has been the Company's largest customer in recent quarters, this has a material impact on the forecasted revenue and profitability for the Company. As a result, the Company ceased using VMI arrangements with Huawei to mitigate risks associated with the Entity

List. As a result, most of our business today is conducted with direct purchase orders instead of operating through VMI as in the past.

We are committed to EAR compliance in each of the locations in which we do business. We determined that certain of our products are not subject to EAR regulations and may be lawfully sold to Huawei. During 2018, non-EAR products were over half of our Huawei revenue and shipments to Huawei of many of these products continue. Further, we have applied for licenses for certain technology subject to EAR, and at the time of the filing of this Annual Report on Form 10-K we have been granted a license to ship limited (not material) volumes of US-manufactured lasers to Huawei.

Seasonality

Historically, our first quarter revenue is generally seasonally lower than the rest of the year primarily due to lower capacity utilization during the annual new-year holidays in China and the impact of typical price negotiations conducted at the end of each calendar year and impacting shipments during this period. This historical pattern is important in recognizing the typical annual distribution of revenue from quarter to quarter through the year. That said, our first quarter revenue varies markedly year to year so should not be considered a reliable indicator of our future revenue or financial performance.

As a business practice we seek longer term agreements with customers, especially for projects and for larger international tenders, whenever possible. We actively bridge product and backlog to manage the seasonality against our production cycles, and we carefully work to match and balance end user demand with direct customer demand.

Customer Inventory

The business cycle, as well as international trade discussion between countries including US and China, require that we carefully monitor and adjust product levels in line with end user demand to minimize impacts of inventory overstocking by direct customers. To mitigate risks of excess inventory we seek to align our product volumes with that of end users by conducting end user surveys each quarter. We have placed increased focus on managing inventory levels in light of the BIS actions regarding Huawei, as demand from Huawei has remained strong for product not subject to the EAR restrictions.

Financial Information by Geographic Region

Our leading customers use contract manufacturers for much of their manufacturing needs. Such major contract manufacturers are in Mexico, China, Thailand, Malaysia and Singapore. These are our “ship to” destinations. We have historically reported quarterly revenue by geographic territory, i.e. Americas, China, and Rest of World. The use of contract manufacturers by our customers means that our geographic sales do not represent end-use locations by either our customers or by their respective customers.

For information regarding our revenue and property, plant and equipment by geographic region, see Note 3 and Note 19 to the Consolidated Financial Statements. For risks relating to our operations see “Item 1A. Risk Factors” and particularly the risks under the caption “Risks related to our operations in China” and the risk factors “Our future results of operations may be subject to volatility as a result of exposure to fluctuations in foreign exchange rates, primarily the Chinese Renminbi (RMB) and Japanese Yen (JPY) exchange rates”, “Risks associated with international sales and operations could adversely affect our business and financial results.”, and “We are dependent on Huawei Technologies Co., Ltd. and its affiliate HiSilicon Technologies Co., Ltd. and on four other customers for a large portion of our revenue and the loss of, or a significant reduction in orders in any period from any of these major customers may reduce our revenue and adversely impact our results of operations.”

Competition

The market for optical communications systems is highly competitive. While no single company competes with us across all of our product areas, our competitors range from large international companies offering a wide range of products to smaller companies specializing in narrow markets. We believe the principal competitive factors in this market are:

- ability to provide leading edge technologies for high speed communications, including ultra-narrow linewidth lasers;
- ability to design and manufacture high quality, reliable products, including customized solutions;
- breadth of product solutions;
- price to performance characteristics;

- ability to quickly and consistently produce in high volume and high quality;
- ability to meet customers' specific requirements including technology requirements;
- ability to meet customer lead time demands;
- financial stability; and
- depth of relationships with and proximity to customers globally.

We believe we compete favorably with respect to these factors. We believe our principal competitors include:

- Acacia Communications, Inc., Furukawa Co., Ltd., Fujitsu Optical Components Limited, NTT Electronics Corporation, Sumitomo Electric Industries, Ltd ("SEI"), II-VI Incorporated, Lumentum Holdings Inc. (formerly JDS Uniphase Corporation), and others in lasers and coherent products;
- Accelink Technologies Co., Ltd., Lumentum, II-VI, Molex Incorporated and NTT Electronics Corporation in wavelength management and switching.

Our competitors may have substantially greater name recognition and technical, financial and marketing resources than we do. Some of our competitors have greater resources to develop products or pursue acquisitions, and more experience in developing or acquiring new products and technologies and in creating market awareness for these products and technologies than we do. In addition, a number of our competitors have the financial resources to offer competitive products at below market pricing levels that could prevent us from competing effectively and which could adversely affect our financial performance.

We also face competition from some of our customers, including Huawei and Ciena, who evaluate our capabilities against the merits of manufacturing products internally. These customers may have the ability to manufacture competitive products at a lower cost than we would charge as a result of their higher levels of integration. As a result, these customers may purchase less of our products and there would be additional pressure to lower our selling prices which, accordingly, would negatively impact our revenue and gross margin.

Environmental, Health and Safety Matters

Our research and development and manufacturing operations and our products are subject to a variety of environmental, health and safety laws and regulations in the jurisdictions in which we operate. These regulations govern, among other things, the discharge of pollutants to air, water, and soil; the remediation of soil and groundwater contamination; the use, handling and disposal of hazardous materials; employee health and safety; and the hazardous material content and recycling of our products. We use, store and dispose of hazardous materials in our manufacturing operations and as components in our products. We incur costs to comply with existing environmental, health and safety requirements, and any failure to comply, or the identification of contamination for which we are found liable, could cause us to incur additional costs, including cleanup costs, monetary fines, or civil or criminal penalties, or result in the curtailment of our operations.

We concertedly comply with all regulations in each place in which we do business. In addition, we concern ourselves and our supply chain with environmental sustainability. Environmental, health and safety requirements have become more stringent over time, and changes to existing requirements could restrict our ability to expand our facilities, require us to acquire costly pollution control equipment, or cause us to incur other significant expenses or to modify our manufacturing processes or the contents of our products. Some jurisdictions in which we operate or sell our products have enacted requirements regarding the recycling of waste electronic equipment, and/or the packaging and hazardous material content of certain products. For example, jurisdictions including China and the European Union, among a growing number of jurisdictions, have placed restrictions on the use of lead, among other chemicals, in electronic products, which affects the composition and packaging of our products. The passage of such requirements in additional jurisdictions, or the tightening of standards or elimination of certain exemptions in jurisdictions where our products are already subject to such requirements, could cause us to incur significant expenditures to make our products compliant with new requirements, or could limit the markets into which we may sell our products.

Operating facilities and procedures support local initiatives for clean water, for factory emissions and for other sensitive materials and compliance needs including conflict minerals and management of waste streams. We are fully compliant with current RoHS requirements and we similarly pursue best practices in our owned factories and with our subcontractor manufacturing partners.

Additionally, increasing efforts to control emissions of greenhouse gases, or GHG, may also impact us. For example, our semiconductor manufacturing operations in California use perfluorocarbons, which are classified as a high global warming potential greenhouse gas. Under California's Global Warming Solutions Act, we designed and installed additional pollution control equipment at our San Jose, California, manufacturing plant to reduce our perfluorocarbon emissions beginning in 2012. Since the end of 2012 our San Jose and Fremont, California, manufacturing facilities have maintained compliance with the Global Warming Solutions Act through the monitoring and reviewing of our Greenhouse Gas Emissions including permits issued locally by the Bay Area Air Quality Management District, and we have submitted reports annually to verify such compliance. In the U.S., the Environmental Protection Agency has announced a finding relating to GHG emissions that may result in promulgation of federal GHG air quality standards that could also affect us.

Available Information

We have been known as NeoPhotonics Corporation since 2002. We were incorporated in the State of Delaware in October 1996 as NanoGram Corporation, and we changed our name to NeoPhotonics Corporation in 2002. Our principal offices are located at 3081 Zanker Road, San Jose, CA 95134, USA and our telephone number is +1 (408) 232-9200. Our website address is www.neophotonics.com. Information found on, or accessible through, our website is not a part of, and is not incorporated into, this Annual Report on Form 10-K.

We file electronically with the U.S. Securities and Exchange Commission, or SEC, our annual reports on Form 10-K, quarterly reports on Form 10-Q, current reports on Form 8-K, and amendments to those reports filed or furnished pursuant to Section 13(a) or 15(d) of the Securities Exchange Act of 1934, as amended. We make available on our website at www.neophotonics.com, free of charge, copies of these reports as soon as reasonably practicable after filing these reports with, or furnishing them to, the SEC.

ITEM 1A. RISK FACTORS

Risks Associated with Our Business

We are dependent on Huawei Technologies Co., Ltd. and its affiliate HiSilicon Technologies Co., Ltd. and on four other customers for a large portion of our revenue and the loss of, or a significant reduction in orders in any period from any of these major customers may reduce our revenue and adversely impact our results of operations.

The telecommunications systems market is concentrated with approximately ten global network equipment manufacturing companies having collectively more than 90% market share. In the years ended December 31, 2019, 2018 and 2017 Huawei Technologies Co. Ltd., together with its affiliate HiSilicon Technologies Co., Ltd. (collectively "Huawei") accounted for approximately 41%, 46% and 40% of our revenue, respectively. Revenue generated from one other customer in the years ended December 31, 2019, 2018 and 2017 was greater than 10% of our revenue. We have generated most of our revenue from a limited number of customers. In the years ended December 31, 2019, 2018 and 2017, our top five customers represented 84%, 87%, and 78% of our revenue respectively. The loss of, or a significant reduction in orders from, any of these major customers would materially and adversely affect our revenue and results of operations.

We are subject to governmental export and import controls that could subject us to liability, impair our ability to compete in international markets, or restrict our sales to certain customers. In particular, U.S. governmental export control actions have impacted our sales to Huawei, which has had (and may continue to have) a material adverse effect on our business, financial condition and results of operations.

We are subject to export and import control laws, trade regulations and other trade requirements that limit which products we sell and where and to whom we sell our products. In some cases, it is possible that export licenses would be required from the U.S. or other government agencies outside the U.S. such as, but not limited to, Japan or China for some of our products in accordance with various statutes or regulations. In addition, various countries regulate the export or import of certain technologies and have enacted laws that could limit our ability to distribute our products. Failure to comply with these and similar laws on a timely basis, or at all, or any limitation on our ability to export or sell our products or to obtain any required licenses would adversely affect our business, financial condition and results of operations.

In May 2019, the U.S. Commerce Department's Bureau of Industry and Security, or BIS, added Huawei and certain affiliates to the BIS Entity List ("Entity List"). Absent a license, this action prevents Huawei from purchasing products, software and technology that are subject to U.S. Export Administration Regulations (EAR). To ensure compliance, we immediately suspended shipments to Huawei and began a systematic assessment of our products sold to Huawei to determine

how these products are, or are not, subject to the restrictions resulting from the Entity List. This suspension had an immediate impact on our products shipments to Huawei in the second quarter of 2019, which significantly affected our revenue for the second quarter and the remainder of 2019. We have consulted closely with legal and technical experts, in order to determine which of our products and associated technology, notably our foreign-manufactured products, are not subject to EAR or have de minimis content subject to EAR and may be lawfully sold to Huawei and its affiliates. Each product and associated technology must be reviewed individually in a detailed, specific and time consuming process. Consequently, we have reset our business approach with and shipments to Huawei to consist of only products that have been determined to be not subject to the EAR regulations or that have de minimis content subject to EAR regulations.

On or shortly after June 29, 2019, U.S. government officials allowed companies to apply for temporary export licenses for products subject to EAR and that these licenses might be granted if the product was deemed not to be a risk to national security. We have submitted license applications for certain products and associated technology having elements subject to EAR; to date, we have received a license for limited, but not material, volumes of U.S. origin lasers. There can be no assurance as to which products or technology may qualify for a license, or that any such licenses will be granted in a timely manner or at all. Furthermore, there can be no assurance that the U.S. government will not challenge our determination of which products and associated technology are not subject to the EAR regulations.

Even if licenses are obtained, or if the EAR restrictions are lifted or modified to allow us to sell the same types of products we have sold historically, Huawei may decide not to purchase these products for various reasons, including to reduce its own risks of being exposed to disruptions of its supply chain.

A significant reduction in orders from Huawei as a result of these U.S. export control actions would materially and adversely affect our business, financial condition, and results of operations.

We face intense competition which could negatively impact our results of operations and market share.

The communications networks industry is highly competitive. Our competitors range from large international companies offering a wide range of products to smaller companies specializing in niche products.

Some of our competitors have substantially greater name brand recognition, technical, financial, and marketing resources, and greater manufacturing capacity, as well as better-established relationships with customers, than we do. Some of our competitors have more resources to develop or acquire, and more experience in developing or acquiring, new products and technologies. Some of our competitors may be able to develop new products more quickly than us and may be able to develop products that are more reliable or which provide more functionality than ours. In addition, some of our competitors have the financial resources to offer competitive products at below-market pricing levels that could prevent us from competing effectively and result in a loss of sales or market share or cause us to lower prices for our products.

We also face competition from some of our customers who evaluate our capabilities against the merits of manufacturing products internally, including Huawei. Due to the fact that such customers are not seeking to make a comparable profit directly from the manufacture of these products or for other reasons, they may have the ability to provide competitive products at a lower total cost than we would charge such customers. As a result, these customers may purchase less of our products and there would be additional pressure to lower our selling prices which, accordingly, would negatively impact our revenue and gross margin.

In December 2017, the Chinese Government Ministry of Industry and Information Technology announced a five-year optical component technology roadmap with the aim to reduce China's dependency on non-domestic companies for high-end optical chips and sub-components, including some products manufactured and sold by us. This announcement continues an ongoing trend in China to build domestic industry in this area and, while we believe local Chinese component suppliers do not currently have the capability to supply the highest performance optical chips and sub-components, those companies may over time develop such capability and negatively impact our revenue and financial performance if we do not continue to innovate and maintain our lead in the highest speed and performance optical components. This trend may accelerate as a result of the current Huawei listing on the Entity List and U.S.-China trade tensions.

We are subject to risks and uncertainties related to our revenue growth outlook in China.

Fiber optics telecommunication growth in China is an important contributor to our success. We expect a major portion of our revenue to come from companies supporting China infrastructure spending in wireline and wireless networks, notably from the three largest China telecom carriers, China Mobile Communications Corporation, China Telecommunications Corporation and China United Network Communications Group Co., Ltd. If the anticipated Chinese spending and carrier tender

awards do not increase as anticipated, or if there are further unanticipated and/or prolonged delays in the Chinese initiative, our business, financial condition, results of operations and prospects would be further adversely affected.

Continued tension in U.S.-China trade relations may adversely impact our business and operating results.

Beyond the BIS actions affecting our sales to Huawei, the U.S. government has taken certain actions that change U.S. trade policies, including recently-imposed tariffs affecting certain products manufactured in China. Some products manufactured by our Chinese affiliates are subject to tariffs if imported into the United States. In addition, the China government has taken certain reciprocal actions, including recently imposed tariffs affecting certain products manufactured in the United States. Certain of our products manufactured in our U.S. operations have been included in the tariffs imposed on imports into China from the United States. Going forward, we expect these tariffs, as currently applied, will increase our cost of goods sold by about one percentage point for as long as the tariffs remain in place. It is unknown whether and to what extent additional new tariffs (or other new laws or regulations) will be adopted that increase the cost of importing products to or from the United States, or from China to the United States. Further, it is unknown what effect that any such new tariffs or retaliatory actions would have on us or our industry and customers. As additional new tariffs, legislation and/or regulations are implemented, or if existing trade agreements are renegotiated or if China or other affected countries take retaliatory trade actions, such changes could have a material adverse effect on our business, financial condition, results of operations or cash flows.

Natural disasters, major health events, terrorist attacks or other catastrophic events could harm our operations and our financial results.

Our worldwide operations could be subject to natural disasters, major health events and other business disruptions, which could harm our future revenue and financial condition and increase our costs and expenses. For example, our corporate headquarters and wafer fabrication facility in Silicon Valley, California and our Tokyo, Japan facility are located near major earthquake fault lines, and our manufacturing facilities are located in Shenzhen and Dongguan, China, areas that are susceptible to typhoons. Our operations in China, as well as our R&D center in Wuhan, could be impacted by the novel coronavirus. We are not insured against many natural disasters, including earthquakes, or against major public health events.

Similarly, our worldwide operations could be subject to secondary effects of natural disasters, major health events or other catastrophic events. Even if our facilities are not directly affected, any of these types of events could substantially disrupt the business of our suppliers or customers, which could have a material adverse effect on us.

Any outbreaks of contagious diseases and other adverse public health developments in countries where we operate could have a material and adverse effect on our business and results of operations. For example, the recent outbreak of a novel strain of coronavirus first identified in Wuhan, Hubei Province, China, has resulted in significant governmental measures being implemented to control the spread of the virus, including restrictions on manufacturing and the movement of employees in many regions of the country. This has affected our manufacturing facilities in China as well as the facilities of our suppliers and customers. The extent to which the coronavirus will impact our business and our financial results will depend on future developments, which are uncertain and cannot be predicted.

We may need to raise additional capital in order to pursue our business strategies or maintain our operations, and we may not be able to obtain capital when desired on favorable terms, if at all, or without dilution to our stockholders.

We believe that our existing cash and cash equivalents, and cash flows from our operating activities and funds available under our credit facilities will be sufficient to meet our anticipated cash needs for at least the next 12 months. However, we operate in an industry that makes our prospects difficult to evaluate. It is possible that we may not generate sufficient cash flow from operations or otherwise have the capital resources to meet our future capital needs. If this occurs, we may need additional financing to continue operations or execute on our current or future business strategies, including to:

- invest in our research and development efforts, including by hiring additional technical and other personnel;
- maintain and expand our operating or manufacturing infrastructure;
- acquire complementary businesses, products, services or technologies; or
- otherwise pursue our strategic plans and respond to competitive pressures.

We do not know with certainty what forms of financing, if any, will be available to us. If financing is not available on acceptable terms, if and when needed, our ability to fund our operations, enhance our research and development and sales and marketing functions, develop and enhance our products, respond to unanticipated events, including unanticipated opportunities, or otherwise respond to competitive pressures could be adversely impacted.

If we incur additional indebtedness through arrangements such as credit agreements or term loans, such arrangements may impose restrictions and covenants that limit our ability to respond appropriately to market conditions, make capital investments or take advantage of business opportunities. In addition, any additional debt arrangements we may enter into would likely require us to make regular interest payments, which could adversely affect our results of operations.

Our future results of operations may be subject to volatility as a result of exposure to fluctuations in foreign exchange rates, primarily the Chinese Renminbi (RMB) and Japanese Yen (JPY) exchange rates.

We are exposed to foreign exchange risks. Foreign currency fluctuations may adversely affect our revenue and our costs and expenses, and hence our results of operations. A substantial portion of our business is conducted through our subsidiaries based in China, whose functional currency is the RMB and Japan, whose functional currency is the JPY. The value of the RMB against the U.S. dollar and other currencies and the value of the JPY against the U.S. dollar and other currencies fluctuate and are affected by, among other things, changes in political and economic conditions.

To the extent that transactions by our subsidiaries in China and Japan are denominated in currencies other than the RMB and JPY, we bear the risk that fluctuations in the exchange rates of the RMB and JPY in relation to other currencies could decrease our revenue or increase our costs and expenses, therefore having an adverse effect on our future results of operations.

While we generate a significant portion of our revenue in U.S. dollars, a significant portion of our cost of goods sold are in RMB and JPY. Therefore appreciation in RMB and JPY against the U.S. dollar would negatively impact our cost of goods sold upon translation to U.S. dollars.

From mid-2016 to mid-2018, we entered into hedging transactions to reduce the short-term impact of foreign currency fluctuations. During the second half of 2018, we discontinued entering into foreign currency forward contracts. This may increase the risks to us arising from the short-term impact of foreign currency fluctuations. If we resume using hedging transactions to reduce our risks in this area, the availability and effectiveness of these hedging transactions may be limited and we may not be able to successfully hedge our exposure. In addition, our currency exchange variations may be magnified by Chinese exchange control regulations that restrict our ability to convert RMB into foreign currency.

Manufacturing problems and supply constraints could impact manufacturing yields or result in delays in product shipments to customers and could adversely affect our revenue, competitive position and reputation.

We may experience delays, disruptions or quality control problems in our manufacturing operations or supply chain constraints, which could adversely impact manufacturing volumes, yields or delay product shipments. As a result, we could incur additional costs that would adversely affect our gross margin, and product shipments to our customers could be delayed beyond the shipment schedules requested by our customers, which would negatively affect our revenue, competitive position and reputation.

Additionally, manufacturing of new products and manufacturing yields more generally depend on a number of factors, including the stability and manufacturability of the product design, manufacturing improvements gained over cumulative production volumes, the quality and consistency of component parts and the nature and extent of customization requirements by customers. Capacity constraints, raw materials shortages, logistics issues, labor shortages, volatility in utilization of manufacturing operations, supporting utility services and other manufacturing supplies, the introduction of new product lines, rapid increases in production demands and changes in customer requirements, manufacturing facilities or processes, or those of some third party contract manufacturers and suppliers of raw materials and components have historically caused, and may in the future cause, reduced manufacturing yields, negatively impacting the gross margin on, and our production capacity for, those products.

Our ability to maintain sufficient manufacturing yields is particularly challenging with respect to PICs due to the complexity and required precision of a large number of unique manufacturing process steps. Manufacturing yields for PICs can also suffer if contaminated materials or materials that do not meet highly precise composition requirements are inadvertently utilized. Because a large portion of our PIC manufacturing costs are fixed, PIC manufacturing yields can have a substantial effect on our gross margin. Lower than expected manufacturing yields could also delay product shipments and decrease our revenue.

Further, our products contain purchased components including electronic components. It is possible that such purchased items could contain quality defects, manufacturing defects, performance problems or even counterfeit substitutes,

each of which could result in manufacturing issues. As a result, we could incur additional costs that would adversely affect our gross margin, and product shipments to our customers could be delayed beyond the shipment schedules requested by our customers, which would negatively affect our revenue, competitive position and reputation.

Customer demand is difficult to accurately forecast and, as a result, we may be unable to optimally match production with customer demand.

We make planning and spending decisions based on our estimates of customer requirements. The short-term nature of commitments by many of our customers, and the possibility of unexpected changes in demand for their products, reduce our ability to accurately estimate future customer requirements. A sudden reduction in customer demand due to market downturns or other reasons would have a material adverse effect on our operating results, as occurred in 2017, because many of our costs and operating expenses are relatively fixed.

On the other hand, on occasion, customers may require rapid increases in production, which can strain our resources, cause our manufacturing to be negatively impacted by materials shortages, necessitate higher or more restrictive procurement commitments, increase our manufacturing yield loss and scrapping of excess materials, result in delayed shipments and/or reduce our gross margins. We may not have sufficient capacity at any given time to meet the volume demands of our customers, and we may have difficulty expanding our manufacturing operations on a timely basis to meet increasing customer demand. Additionally, one or more of our suppliers may not have sufficient capacity at any given time to meet our volume demands. Any inability to meet customer demands for rapid increases in production in the future could have a material adverse effect on our business, financial condition, results of operations and prospects.

We are under continuous pressure to reduce the prices of our products, which has adversely affected, and may continue to adversely affect, our gross margins.

The communications networks industry has been characterized by declining product prices over time as technological advances increase price and performance and put pressure on existing products. We have reduced the prices of many of our products in the past, most often during annual end-of-year price negotiation. We expect pricing pressure for our products to continue, including from our major customers. To maintain or increase their market share, our competitors also reduce prices of their products each year. In addition, our customers may seek to internally develop and manufacture competing products at a lower cost than we would otherwise charge, which would add additional pressure on us to lower our selling prices. If we are unable to offset any future reductions in our average selling prices by increasing our sales volume, reducing our costs or introducing new products, our gross margin would be adversely affected.

If we fail to retain our key personnel or if we fail to attract additional qualified personnel, we may not be able to achieve our anticipated growth and our business could suffer.

Our success and ability to implement our business strategy depends upon the continued contributions of our senior management team and others, including senior management in foreign subsidiaries and our technical and operations employees in all locations. Our future success depends, in part, on our ability to attract and retain key personnel, including our senior management and others. The loss of services of members of our senior management team or key personnel or the inability to continue to attract and retain qualified personnel could have a material adverse effect on our business. Competition for highly skilled technical and operations people where we operate is extremely intense, and we continue to face challenges identifying, hiring and retaining qualified personnel in many areas of our business.

We have had a history of losses which may recur in the future.

We have had a history of losses and we may incur additional losses in future periods. As of December 31, 2019, our accumulated deficit was \$414.5 million. We continue to review our expenditures related to the ongoing operations of our business for their effectiveness. These include expenditures related to the sales, marketing and development of our products and to maintain our manufacturing facilities and research and development operations. Operations and assets that are deemed to be less effective may be subject to restructuring, which could lead to increased operating losses in future periods when and if restructuring charges are incurred.

We depend upon outside contract manufacturers for a portion of the manufacturing process for some of our products. Our operations and revenue related to these products could be adversely affected if we encounter problems with any such contract manufacturer.

While many of our products are manufactured internally, we also rely upon contract manufacturers in Thailand, China, Japan and other Asia locations to provide back-end manufacturing and production of some of our products. Our reliance on contract manufacturers for some of our products makes us vulnerable to possible production capacity constraints, reduced control over their supply chains, delivery schedules, manufacturing yields, manufacturing quality/controls and costs. If one of our contract manufacturers is unable to meet all of our customer demand in a timely fashion, whether due to their direct operating control or due to their supply chain, this could have a material adverse effect on the revenue from our products.

The majority of our customer contracts do not commit customers to specified buying levels, and many of our customers may decrease, cancel or delay their buying levels at any time with little or no advance notice to us.

Our products are typically sold pursuant to individual purchase orders or by use of a vendor-managed inventory, or VMI, model, which is a process by which we ship agreed quantities of products to a customer-designated location and those products remain our inventory and we retain the title and risk of loss for those products until the customer takes possession of the products. Our customers are typically not contractually committed to buy any quantity of products beyond firm purchase orders. Many of our customers may increase, decrease, cancel or delay purchase orders already in place, which may impact our level of business.

We may be exposed to costs or losses from product lines that we intend to exit or may undertake divestiture of portions of our business that require us to continue providing substantial post-divestiture transition services and support, which may cause us to incur unanticipated costs and liabilities and adversely affect our financial condition and results of operations.

We have a strategy to exit products that have been declining in revenue and have lower gross margins than our other higher speed products. For instance, in January 2017, we completed the sale of assets and transfer of certain liabilities of our access network and low speed transceiver product lines (the “Low Speed Transceiver Products”) and in January 2019 we announced the end-of-life of certain client transceiver modules and discontinued the manufacture and sale of those products after completing final production in May 2019. We may incur additional costs in connection with the sale or end-of-life of these products, or other products and/or facilities in the future, and our revenues and net income could be negatively affected, particularly in the short term, in connection with the end-of-life or sales of such products and/or facilities. It is also possible that we could incur continued costs or liabilities after the end-of-life process is completed, which could have a material adverse effect on our financial condition or operating results.

Spending for communications networks is cyclical in nature, and any future downturn may reduce demand for our products and revenue.

Our future success as a provider of components, modules and subsystems to leading network equipment vendors depends on continued capital spending on global communications networks. Network traffic has experienced rapid growth driven primarily by bandwidth-intensive content, including cloud services, mobile video and data services, wireless 4G/LTE and now 5G services, social networking, video conferencing and other multimedia. This growth is intensified by the proliferation of fixed and wireless devices that are enabling consumers to access content at increasing data rates anytime and anywhere. Our future success depends on continued demand for high-bandwidth, high-speed communications networks and the ability of network equipment vendors and carrier data center operators to fulfill this demand. While we believe the long term prospects for growth in data traffic remain strong, especially in Cloud and data center markets, our business and financial results will suffer if growth does not occur as expected.

The markets for communications networks may be cyclical and characterized by rapid technological change, price erosion, evolving standards and wide fluctuations in product supply and demand. In the past, including recently to varying degrees in China, the U.S. and Europe, these markets have experienced significant downturns, often connected with, or in anticipation of, the maturation of product cycles for both manufacturers’ and their customers’ products or in response to over or under purchasing of inventory by our customers relative to ultimate carrier demand, and with declining general economic conditions. These downturns have been characterized by diminished product demand, production overcapacity, high inventory levels and accelerated erosion of average selling prices. Our historical results of operations have been subject to substantial fluctuations as a result of market downturns and changes in capital spending, and we may experience substantial period-to-period fluctuations in future results of operations.

Our solutions for the Cloud and data center market segments may not achieve broader market acceptance, which would prevent us from increasing our revenue and market share.

Part of our overall strategy is to continue to expand our optoelectronic solutions for the highest speed Cloud and data center market segments. If we fail to achieve broader acceptance of our products in the Cloud and data center markets, there would be an adverse impact on our ability to increase our revenue, gain market share and achieve and sustain profitability. Our ability to achieve broader market acceptance for our products will be impacted by a number of factors, but not limited to:

- our ability to produce optoelectronic solutions for 100G to 800G and beyond that compete favorably against other solutions on the basis of price, quality, reliability and performance;
- our ability to timely introduce and complete new designs and timely qualify and certify our products;
- whether major Cloud and hyper-scale data center operators will adopt our solutions, which are based on a new network architecture and have a limited history in these market segments;
- our ability to develop products that comply with applicable standards and regulatory requirements, as well as potential in-country manufacturing requirements; and;
- our ability to develop and maintain successful relationships with our customers and suppliers.

If the Cloud and data center market segments fail to grow as expected, or if demand for our solutions in these segments fails to materialize, our business, financial condition, results of operations and prospects would suffer.

Risks associated with international sales and operations could adversely affect our business and financial results.

We derive a significant portion of our revenue from international sales in various markets, and we have substantial operations in China, Japan and Thailand in addition to the U.S. Our international revenue and operations are subject to a number of material risks, including, but not limited to:

- difficulties in staffing, managing and supporting operations across different jurisdictions;
- difficulties in enforcing agreements and collecting receivables through foreign legal systems;
- fewer legal protections for intellectual property in foreign jurisdictions;
- international trade restrictions;
- difficulties in obtaining any necessary governmental authorizations for the export of our products to certain foreign jurisdictions;
- imposition of export restrictions on sales to any of our major foreign customers;
- fluctuations in foreign economies and fluctuations in the value of foreign currencies and interest rates;
- major health events, such as outbreaks of contagious disease;
- domestic and international economic or political changes, hostilities and other disruptions; and
- difficulties and increased expenses in complying with a variety of U.S. and foreign laws, regulations and trade standards, including the Foreign Corrupt Practices Act and international labor standards.

Negative developments in any of these areas in China, Japan, Thailand or other countries could result in a reduction in demand for our products, the cancellation or delay of orders already placed, difficulties in producing and delivering our products, threats to our intellectual property, difficulty in collecting receivables, higher labor costs and a higher cost of doing business.

In addition, although we maintain an anti-corruption compliance program throughout our company, violations of our compliance program may result in criminal or civil sanctions, including material monetary fines, penalties and other costs against us or our employees, and may have a material adverse effect on our business.

Our revenues and costs will fluctuate over time, making it difficult to predict our gross margins and future results of operations.

Our revenue, gross margin and results of operations have varied significantly and are likely to continue to vary from quarter to quarter due to a number of factors, many of which are not within our control. We may not be able to maintain or

improve our gross margins because of slow introductions of new products, pricing pressure from increased competition, failure to effectively reduce the cost of existing products, failure to improve our product mix, future macroeconomic or market volatility reducing sales volumes, changes in customer demand (including a change in product mix among different areas of our business) or other factors. Our gross margins can also be adversely affected for reasons including, but not limited to, fixed manufacturing costs that would not be expected to decrease in proportion to any decrease in revenues; unfavorable production yields or variances; increases in costs of input parts and materials; the timing of movements in our inventory balances; warranty costs and related returns; changes in foreign currency exchange rates; possible exposure to inventory valuation reserves; and other increases in our costs and expenses, including as a result of rising labor costs in China. Such significant increases in costs without corresponding increases in revenue would materially and adversely affect our business, our results of operations and our financial condition and our gross margins.

Our revenues are typically subject to seasonality.

Our first quarter revenue is typically seasonally lower than the rest of the year primarily due to annual price negotiations with customers that occur at the end of the prior year and lower capacity utilization during the annual new year holidays in China. This historical pattern typically adversely affects our revenues in the first quarter of each year and impacts the typical annual distribution of revenue from quarter to quarter through the year. That said, our first quarter revenue varies markedly year to year so should not be considered a reliable indicator of our future revenue or financial performance. In 2020, this seasonality may be even higher due to the China central government extending the annual new year holidays in China in an effort to contain impact of the novel coronavirus.

If our customers do not qualify our products for use, then our results of operations may suffer.

Prior to placing volume purchase orders with us, most of our customers require us to obtain their approval called qualification in our industry of our new and existing products, and our customers often audit our manufacturing facilities and perform other vendor evaluations during this process. The qualification process involves product sampling and reliability testing and collaboration with our product management and engineering teams in the design and manufacturing stages. If we are unable to qualify our products with customers, then our revenue would be lower than expected and we may not be able to recover the costs associated with the qualification process which would have an adverse effect on our results of operations.

In addition, due to evolving technological changes in our markets, a customer may cancel or modify a design project before we have qualified our product or begun volume manufacturing of a qualified product. It is unlikely that we would be able to recover the expenses for cancelled or unutilized custom design projects.

Covenants in our borrowing arrangements may limit our flexibility in responding to business opportunities and competitive developments and increase our vulnerability to adverse economic or industry conditions.

We have lending arrangements with several financial institutions, which generally require us to maintain certain financial covenants and limit our ability to take certain actions such as incurring some kinds of additional debt, paying dividends, or engaging in certain transactions like mergers and acquisitions, investments and asset sales without the lenders' consent. These restrictions may limit our flexibility in responding to business opportunities, competitive developments and adverse economic or industry conditions. In addition, a breach of any of these covenants, or a failure to pay interest or indebtedness when due under any of our credit facilities, could result in a variety of adverse consequences, including the acceleration of our indebtedness.

We may be involved in intellectual property disputes, which could divert management's attention, cause us to incur significant costs and prevent us from selling or using the challenged technology.

Participants in the markets in which we sell our products have experienced frequent litigation regarding patent and other intellectual property rights. Numerous patents in these industries are held by others, including our competitors. In addition, from time to time, we have been notified that we may be infringing certain patents or other intellectual property rights of others. Regardless of their merit, responding to such claims can be time consuming, divert management's attention and resources and may cause us to incur significant expenses. In addition, there can be no assurance that third parties will not assert infringement claims against us, whether or not such claims are valid. While we believe that our products do not infringe in any material respect upon intellectual property rights of other parties and/or meritorious defense would exist with respect to any assertions to the contrary, we cannot be certain that our products would not be found infringing the intellectual property rights of others.

In January 2010, Finisar Corporation, or Finisar (which was acquired by II-VI, Inc. in September 2019), filed a complaint in the U.S. District Court for the Northern District of California against us and three other co-defendants. In the complaint, Finisar alleged infringement of certain of its U.S. patents arising from the co-defendants' respective manufacture, importation, use, sale of or offer to sell certain optical transceiver products in the U.S. In March 2010, we filed an answer to the complaint and counterclaims, asserting two claims of patent infringement and additional claims asserting that Finisar has violated state and federal competition laws and violated its obligations to license on reasonable and non-discriminatory terms. In May 2010, the Court dismissed without prejudice all co-defendants (including us) except Source Photonics, Inc., on grounds that such claims should have been asserted in four separate lawsuits, one against each co-defendant. This dismissal without prejudice does not prevent Finisar/II-VI from bringing a new similar lawsuit against us. In May 2012, we and Finisar agreed to toll our respective claims until the refiling of certain of the previously asserted claims from this dispute. As a result, Finisar/II-VI is permitted to bring a new lawsuit against us if it chooses to do so, and we may bring new claims against Finisar upon seven days written notice prior to filing such claims.

Although we believe that we would have meritorious defenses to the infringement allegations and intend to defend any new similar lawsuit vigorously, there can be no assurance that we will be successful in our defense. Even if we are successful, we may incur substantial legal fees and other costs in defending the lawsuit. Further, a new lawsuit, if brought by either party, would be likely to divert the efforts and attention of our management and technical personnel, which could harm our business.

If we fail to protect our intellectual property and other proprietary rights, our business and results of operations could be materially harmed.

Our success depends to a significant degree on our ability to protect our intellectual property and other proprietary rights. We rely on a combination of patent, trademark, copyright, trade secret and unfair competition laws, as well as license agreements and other contractual provisions, to establish and protect our intellectual property and other proprietary rights. We have applied for patent registrations in the U.S. and in other foreign countries, some of which have been issued. We cannot guarantee that our pending applications will be approved by the applicable governmental authorities.

Similarly we must protect all company data as it pertains to customers, products and product designs, technology and technology related trade secrets, plus customer and supplier and personal data of suppliers, customers and personnel. We rely on a combination of these important data elements to establish and protect multiple aspects of our business, and loss of data, breaching of data or stealing of such data could harm the company.

Policing unauthorized use of our technology is difficult and we cannot be certain that the steps we have taken will prevent the misappropriation, unauthorized use or other infringement of our intellectual property rights. Further, we may not be able to effectively protect our intellectual property rights from misappropriation or other infringement in foreign countries where we have not applied for patent protections, and where effective patent, trademark, trade secret and other intellectual property laws may be unavailable, or may not protect our proprietary rights as fully as U.S. or Japan law. Particularly, our U.S. patents do not afford any intellectual property protection in China, Japan, Canada, Russia or other Asia locations.

In the future, we may need to take legal actions to prevent third parties from infringing upon or misappropriating our intellectual property or from otherwise gaining access to our technology. Protecting and enforcing our intellectual property rights and determining their validity and scope could result in significant litigation costs and require significant time and attention from our technical and management personnel. If we fail to protect our intellectual property and other proprietary rights, or if such intellectual property and proprietary rights are infringed or misappropriated, our business, results of operations or financial condition could be materially harmed.

We may be subject to disruptions or failures in information technology systems and network infrastructures that could have a material adverse effect on our business and financial condition.

We rely on the efficient and uninterrupted operation of complex information technology systems and network infrastructures to operate our business. A disruption, infiltration or failure of our information technology systems as a result of software or hardware malfunctions, system implementations or upgrades, computer viruses, cyber-attacks, third-party security breaches, employee error, theft or misuse, malfeasance, power disruptions, natural disasters or accidents could cause breaches of data security, loss of intellectual property and critical data and the release and misappropriation of sensitive competitive information and partner, customer and employee personal data. Any of these events could harm our competitive position, result in a loss of customer confidence, cause us to incur significant costs to remedy any damages and ultimately materially adversely affect our business and financial condition.

It could be discovered that our products contain defects that may cause us to incur significant costs, divert our attention, result in a loss of customers and result in product liability claims.

Our products are complex and undergo quality testing as well as formal qualification, both by our customers and by us. For various reasons, such as the occurrence of performance problems that are unforeseeable in testing or that are detected only when products age or are operated under peak stress conditions, our products may fail to perform as expected long after customer acceptance. Failures could result from faulty components or design, problems in manufacturing or other unforeseen reasons. As a result, we could incur significant costs to repair or replace defective products under warranty, particularly when such failures occur in installed systems. Any significant product failure could result in lost future sales of the affected product and other products, as well as customer relations problems and litigation, which could harm our business.

Further, our products contain purchased components including electronic components. It is possible that such purchased items could contain quality defects, manufacturing defects, performance problems or even counterfeit substitutes. Any significant product failure that is the result of such defects could result in lost future sales as well as customer relations problems and litigation, which could harm our business.

The communications networks industry has long product development cycles requiring us to incur product development costs without assurances of an acceptable investment return.

Large volumes of communications equipment and support structures are installed with considerable expenditures of funds and other resources, and long investment return period expectations. At the component supplier level, these cycles create considerable, typically multi-year, gaps between the commencement of new product development and volume purchases. Due to changing industry and customer requirements, we are constantly developing new products, including seeking to further integrate functions on PICs and developing and using new technologies in our products. These development activities necessitate significant investment of capital. Our new products often require a long time to develop because of their complexity and rigorous testing and qualification requirements. Accordingly, we and our competitors often incur significant research and development and sales and marketing costs for products that, initially, will be purchased by our customers long after much of the cost is incurred and, in some cases, may never be purchased due to changes in industry or customer requirements in the interim.

If we fail to obtain the right to use the intellectual property rights of others which are necessary to operate our business, and to protect their intellectual property, our business and results of operations will be adversely affected.

From time to time we may choose to, or be required to, license technology or intellectual property from third parties in connection with the development of our products. Failure to obtain a necessary third-party license required for our product offerings or to develop new products and product enhancements could adversely affect our business.

Similarly from time to time others may endeavor to infringe on our intellectual property or encroach on our trademarks or other intellectual property. Our failure to identify, recognize and/or action to protect such intellectual property could adversely affect our business.

Participation in standards setting organizations may subject us to intellectual property licensing requirements or limitations that could adversely affect our business and prospects.

In the course of our participation in the development of emerging standards for some of our present and future products, we may agree to grant to all other participants a license to our patents that are essential to the practice of those standards on reasonable and non-discriminatory, or RAND, terms. If we fail to limit to whom we license our patents, or fail to limit the terms of any such licenses, we may be required to license our patents or other intellectual property to others in the future, which could limit the effectiveness of our patents against competitors.

Any potential dispute involving our products, services or technology could also include our customers using our products, which could trigger our indemnification obligations to them and result in substantial expenses to us.

In any potential dispute involving allegations that our products, services or technology infringe the intellectual property rights of third parties, our customers could also become the target of litigation. Because we often indemnify our customers for intellectual property claims made against them for products incorporating our technology, any claims against our customers could trigger indemnification obligations in some of our supply agreements, which could result in substantial expenses such as increased legal expenses, product recalls, damages for past infringement or royalties for future use.

Rapidly changing standards and regulations could make our products obsolete, which would cause our revenue and results of operations to suffer.

We design our products to conform to regulations established by governments and to standards set by industry standards bodies worldwide, such as The American National Standards Institute, the European Telecommunications Standards Institute, the International Telecommunications Union and the Institute of Electrical and Electronics Engineers. Various industry organizations are currently considering whether and to what extent to create standards for elements used in 100Gbps and beyond systems. Because certain of our products are designed to conform to current specific industry standards, if competing or new standards emerge that are preferred by our customers, we would have to make significant expenditures to develop new products and our revenue and results of operations would suffer.

If we fail to maintain effective internal control over financial reporting in the future, the accuracy and timing of our financial reporting may be adversely affected.

Our management is responsible for establishing and maintaining adequate internal control over our financial reporting, as defined in Rule 13a-15(f) under the Securities Exchange Act of 1934, as amended, or the Exchange Act.

Preparing our consolidated financial statements involves a number of complex manual and automated processes, which are dependent upon individual data input or review and require significant management judgment. One or more of these elements may result in errors that may not be detected and could result in a material misstatement of our consolidated financial statements. If we fail to maintain the adequacy of our internal controls over financial reporting, our business and operating results may be harmed and we may fail to meet our financial reporting obligations. If material weaknesses in our internal control are discovered or occur, our consolidated financial statements may contain material misstatements and we could be required to restate our financial results.

Our internal control over financial reporting may not prevent or detect misstatements because of its inherent limitations, including the possibility of human error, the circumvention or overriding of controls, or fraud. Even effective internal controls can provide only reasonable assurance with respect to the preparation and fair presentation of financial statements. Any failure of our internal controls could adversely affect the results of the periodic management evaluations and annual independent registered public accounting firm attestation reports regarding the effectiveness of our internal control over financial reporting. If we cannot provide reliable financial reports or prevent fraud, our business and results of operations could be harmed, investors could lose confidence in our reported financial information, and the trading price of our stock may decline.

We may be unable to utilize our net operating loss carryforwards to reduce our income taxes, which could adversely affect our future financial results.

As of December 31, 2019, we had net operating loss, or NOL, carryforwards for U.S. federal and state tax purposes of \$290.4 million and \$52.1 million, respectively. As these net operating losses have not been utilized and may not be utilized prior to their expiration in the future. The utilization of the NOL and tax credit carryforwards are subject to a substantial limitation imposed by Section 382 of the Internal Revenue Code of 1986, as amended, or the Code, and similar state provisions. We recorded deferred tax assets, net of valuation allowance, for the NOL carryforwards currently available after considering the existing Section 382 limitation. If we incur an additional limitation under Section 382, then the NOL carryforwards, as disclosed, could be reduced by the impact of any future limitation that would result in existing NOL carryforwards and tax credit carryforwards expiring unutilized and increases in future tax liabilities.

We are subject to environmental, health and safety laws and regulations, which could subject us to liabilities, increase our costs, or restrict our business or operations in the future.

Our manufacturing operations and our products are subject to a variety of federal, state, local and international environmental, health and safety laws and regulations in each of the jurisdictions in which we operate or sell our products. Our failure to comply with present and future environmental, health or safety requirements, or the identification of contamination, could cause us to incur substantial costs, including cleanup costs, monetary fines, civil or criminal penalties, or curtailment of operations, which could have a material adverse effect on our business, financial condition and results of operations.

Additionally, increasing efforts to control emissions of greenhouse gases, or GHG, may also impact us. Additional climate change or GHG control requirements are under consideration at the federal level in the U.S. and in China. Additional restrictions, limits, taxes, or other controls on GHG emissions could increase our operating costs and, while it is not possible to

estimate the specific impact any final GHG regulations will have on our operations, there can be no assurance that these measures will not have significant additional impact on us.

Risks Related to Our Operations in China

Our business operations conducted in China are critical to our success. A significant portion of our revenue was recognized from customers for whom we shipped products to a location in China. Additionally, a substantial portion of our net property, plant and equipment, approximately 24% as of December 31, 2019, was located in China. We expect to make further investments in China in the foreseeable future. Therefore, our business, financial condition, results of operations and prospects are to a significant degree subject to economic, political, legal, and social events and developments in China.

Adverse changes in economic and political policies in China, or Chinese laws or regulations could have a material adverse effect on business conditions and the overall economic growth of China, which could adversely affect our business.

The Chinese government exercises significant control over China's economy by way of the allocation of resources, control over foreign currency-denominated obligations and monetary policy and provision of preferential treatment to particular industries or companies. Moreover, the laws, regulations and legal requirements in China, including the laws that apply to foreign-invested enterprises are relatively new and are subject to frequent changes. The interpretation and enforcement of such laws is uncertain. Any adverse changes to these laws, regulations and legal requirements, including tax laws, or their interpretation or enforcement, or the creation of new laws or regulations relating to our business, could have a material adverse effect on our business.

Furthermore, any slowdown or economic downturn, whether actual or perceived, in China could have a material adverse effect on our business, financial condition and results of operation.

Uncertainties with respect to China's legal system could adversely affect the legal protection available to us.

Our operations in China are governed by Chinese laws and regulations. Our subsidiaries in China are generally subject to laws and regulations applicable to foreign investments in China and, in particular, laws applicable to wholly foreign-owned enterprises. China has not developed a fully-integrated legal system to fully address its transition to a more market-oriented economy, and recently-enacted laws and regulations may not sufficiently cover all aspects of economic activities in China. Uncertainties in the Chinese legal system may impede our ability to enforce the contracts we have entered into with our distributors, business partners, customers and suppliers. In addition, protections of intellectual property rights and confidentiality in China may not be as effective as in the U.S. or other countries or regions with more developed legal systems. All of these uncertainties could limit the legal protections available to us and could materially and adversely affect our business and operations.

Changes in China's international trade policies may adversely impact our business and operating results.

The China government has recently made statements and taken certain actions that change trade policies, including recently-imposed tariffs affecting products manufactured in the U.S. Certain of our products manufactured in our U.S. operations have been included in the tariffs imposed on imports into China from the United States. We expect these tariffs, as currently applied, will increase our cost of goods sold by approximately one percentage point. It is unknown if any additional such tariffs or retaliatory actions will be imposed or what impact they would have on us or our industry and customers. As new tariffs, legislation and/or regulations are implemented, or if existing trade agreements are renegotiated between China and the U.S. or other affected countries, such changes could have a material adverse effect on our business, financial condition, results of operations or cash flows. Furthermore, in response to such trade tensions, the Chinese government and/or individual Chinese customers may take steps to reduce their supply chain dependence on products from U.S. suppliers through their own internal developments or the selection of non U.S. suppliers, placing us at a commercial disadvantage and potentially affecting our business.

A considerable portion of our business involves selling High Speed optical components in China and any move to local Chinese vendors for these products might adversely affect our results.

In December 2017, the Chinese Government Ministry of Industry and Information Technology has announced a five-year optical component technology roadmap with the aim to reduce China's dependency on non-domestic companies for high-end optical chips and sub-components, including some products manufactured and sold by us. This announcement continues an

ongoing trend in China to build domestic industry in this area. While we believe local Chinese component suppliers do not currently have the capability to supply the highest performance optical chips and sub-components, those companies may over time develop such capability and negatively impact our revenue and financial performance if we do not continue to innovate and maintain our lead in the highest speed and performance optical components.

Our subsidiaries in China may be subject to restrictions on dividend payments, on making other payments to us or any other affiliated company, and on borrowing or allocating tax losses among our subsidiaries.

Current Chinese regulations permit our subsidiaries in China to pay dividends only out of their accumulated profits, if any, determined in accordance with Chinese accounting standards and regulations, which are different than U.S. accounting standards and regulations. In addition, our subsidiaries in China are required to set aside at least 10% of their respective accumulated profits each year, if any, to fund their statutory common reserves until such reserves have reached at least 50% of their respective registered capital. As of December 31, 2019 and 2018, our Chinese subsidiaries' common reserves had not reached this threshold and, accordingly, these entities are required to continue funding such reserves with accumulated net profits. Accordingly, we may not be able to move our capital easily, which could harm our business.

Restrictions on currency exchange may limit our ability to use our cash effectively.

In China, the State Administration of Foreign Exchange, or SAFE, administers restrictions on currency exchange. These restrictions may limit our ability to use cash held in RMB to fund any business activities we may have outside China or to make dividend payments in U.S. dollars. SAFE or other Chinese regulatory authorities may impose more stringent restrictions on the convertibility of the RMB, especially with respect to foreign exchange transactions. If such restrictions are imposed, our ability to adjust our capital structure or engage in foreign exchange transactions may be limited.

If the Chinese government determines that we failed to obtain approvals of, or registrations with, the requisite Chinese regulatory authority with respect to our current and past import and export of technologies, or failed to obtain the necessary licenses to file patent applications outside China for inventions made in China, we could be subject to sanctions, which could adversely affect our business.

China imposes controls on technology import and export. The term "technology import and export" is broadly defined to include, without limitation, the transfer or license of patents, software and know-how, and the provision of services in relation to technology. Depending on the nature of the relevant technology, the import and export of technology to or from China requires either approval by or registration with, the relevant Chinese governmental authorities. Additionally, the Chinese government requires the patent application for any invention made at least in part in China to be filed first in China, then undergo a government secrecy review and obtain a license before such application is filed in other countries.

If the Chinese government determines that we failed to follow required procedures and obtain the appropriate license before filing a patent application outside China for an invention made at least in part in China, our China patents on such products may be invalidated, which could have a material and adverse effect on our business and operations.

China regulation of loans and direct investment by offshore holding companies to China entities may delay or prevent us from using our cash proceeds to make loans or additional capital contributions to our China subsidiaries.

From time to time, we may make loans or additional capital contributions to our China subsidiaries. We cannot assure that we will be able to obtain these government registrations or approvals on a timely basis, if at all, with respect to our future loans or capital contributions to our China subsidiaries. If we fail to receive such registrations or approvals, our ability to capitalize our China subsidiaries may be negatively affected, which could materially and adversely affect our liquidity and ability to fund and expand our business.

Dividends paid to us by our Chinese subsidiaries may be subject to Chinese withholding tax.

The Enterprise Income Tax Law and the implementation regulations provide that a 10% withholding tax may apply to dividends payable to investors that are "non-resident enterprises," to the extent such dividends are derived from sources within China and in the absence of any tax treaty that may reduce such withholding tax rate.

Our contractual arrangements with our subsidiaries in China may be subject to audit or challenge by the Chinese tax authorities, and a finding that our subsidiaries in China owe additional taxes could substantially reduce our net income and the value of our stockholders' investment.

Under the applicable laws and regulations in China, arrangements and transactions among related parties may be subject to audit or challenge by the Chinese tax authorities. We would be subject to adverse tax consequences if the Chinese tax authorities were to determine that the contracts with or between our subsidiaries were not executed on an arm's length basis, and as a result the Chinese tax authorities could require that our Chinese subsidiaries adjust their taxable income upward for Chinese tax purposes. Such an adjustment could adversely affect us by increasing our tax expenses.

We may have difficulty maintaining adequate management, legal and financial controls in China, which we are required to do in order to comply with Section 404 of the Sarbanes-Oxley Act and securities laws, and which could cause a material adverse impact on our consolidated financial statements, the trading price of our common stock and our business.

Our subsidiaries in China are generally subject to our overall obligations to maintain strong corporate governance, internal controls and computer, financial and other control systems. We may have difficulty hiring and retaining employees in China with experience and expertise relating to accounting principles generally accepted in the U.S. and U.S. public-company reporting requirements. These issues could make it more difficult for us to establish and maintain adequate internal control over our financial reporting, which could then result in errors that could cause a material misstatement of our consolidated financial statements.

We may be exposed to liabilities under the FCPA and Chinese anti-corruption laws, and any determination that we violated these laws could have a material adverse effect on our business.

We are subject to the Foreign Corrupt Practices Act of 1977, or FCPA, and other laws that prohibit improper payments or offers of payments to foreign governments and their officials and political parties by U.S. persons and issuers as defined by the statute, for the purpose of obtaining or retaining business. We have operations, agreements with third parties and we make significant sales in China. China also strictly prohibits bribery of government officials. Our activities in China create the risk of unauthorized payments or offers of payments by our employees, consultants, sales agents or distributors, even though they may not always be subject to our control. Although we have implemented policies and procedures to discourage these practices by our employees, our existing safeguards and any future improvements may prove to be less than effective, and our employees, consultants, sales agents or distributors may engage in conduct for which we might be held responsible. Violations of the FCPA or anti-corruption laws in other countries may result in severe criminal or civil sanctions, and we may be subject to other liabilities, which could negatively affect our business, operating results and financial condition.

Risks Related to Ownership of Our Common Stock

Our stock price may be volatile due to fluctuation of our financial results from quarter-to-quarter and other factors.

Our quarterly revenue and results of operations have varied in the past and may continue to vary significantly from quarter to quarter. This variability may lead to volatility in our stock price as research analysts and investors respond to these quarterly fluctuations. These fluctuations are due to numerous factors, including:

- fluctuations in demand for our products;
- the timing, volume and product mix of sales of our products;
- changes in our pricing and sales policies, particularly in the first quarter of the year, or changes in the pricing and sales policies of our competitors;
- our ability to design, manufacture and deliver products to our customers in a timely and cost-effective manner and that meet customer requirements;
- quality control, yield or other output-related problems in our manufacturing operations;
- our ability to timely obtain adequate quantities of the components used in our products;
- length and variability of the sales cycles of our products;
- unanticipated increases in costs or expenses; and
- fluctuations in foreign currency exchange rates.

The foregoing factors are difficult to forecast, and these, as well as other factors, could materially adversely affect our quarterly and annual results of operations in the future. In addition, a significant amount of our operating expenses is relatively fixed in nature due to our internal manufacturing, research and development, sales and general administrative efforts. Any failure to adjust spending quickly enough to compensate for a revenue shortfall could magnify the adverse impact of such revenue shortfall on our results of operations. Moreover, our results of operations may not meet our announced financial

outlook or the expectations of research analysts or investors, in which case the price of our common stock could decrease significantly. There can be no assurance that we will be able to successfully address these risks.

The market price of our common stock could be subject to wide fluctuations in response to, among other things, the risk factors described in this section of this Annual Report on Form 10-K, and other factors beyond our control, such as fluctuations in the valuation of companies perceived by investors to be comparable to us.

The stock markets have experienced price and volume fluctuations that have affected and continue to affect the market prices of equity securities of many companies. These fluctuations often have been unrelated or disproportionate to the operating performance of those companies. These broad market and industry fluctuations, as well as general economic, political and market conditions, such as recessions, sovereign debt or liquidity issues, interest rate changes or international currency fluctuations, may negatively affect the market price of our common stock.

In the past, many companies that have experienced volatility in the market price of their stock have been subject to securities class action litigation. We may become the target of this type of litigation in the future. Securities litigation against us could result in substantial costs and divert our management's attention from other business concerns, which could seriously harm our business.

Our charter documents and Delaware law could prevent a takeover that stockholders consider favorable and could also reduce the market price of our stock.

Our amended and restated certificate of incorporation and our amended and restated bylaws contain provisions that could delay or prevent a change in control of our company. These provisions could also make it more difficult for stockholders to elect directors and take other corporate actions. These provisions include:

- providing for a classified board of directors with staggered, three-year terms;
- not providing for cumulative voting in the election of directors;
- authorizing our board of directors to issue, without stockholder approval, preferred stock rights senior to those of common stock;
- prohibiting stockholder action by written consent;
- limiting the persons who may call special meetings of stockholders; and
- requiring advance notification of stockholder nominations and proposals.

In addition, we are governed by the provisions of Section 203 of the Delaware General Corporate Law. These provisions may prohibit large stockholders, in particular those owning 15% or more of our outstanding common stock, from engaging in certain business combinations without approval of substantially all of our stockholders for a certain period of time.

These and other provisions in our amended and restated certificate of incorporation, our amended and restated bylaws and under Delaware law could discourage potential takeover attempts, reduce the price that investors might be willing to pay for shares of our common stock in the future and result in the market price being lower than it would be without these provisions.

ITEM 1B. UNRESOLVED STAFF COMMENTS

Not applicable.

ITEM 2. PROPERTIES

Our properties consist primarily of owned and leased office and manufacturing facilities. Our corporate headquarters are located in San Jose, California and our manufacturing facilities are primarily located in Shenzhen and Dongguan, China and Tokyo, Japan. The following schedule presents the approximate square footage of our facilities as of December 31, 2019.

Location	Square Feet	Commitment and Use
San Jose, California	103,314	Leased; 2 buildings used for corporate headquarters offices and wafer fabrication.
Fremont, California	19,175	Leased; 1 building used for wafer fabrication and research and development.
Shenzhen, China	236,853	Owned; 1 building and 1 floor of a building. The building is used for manufacturing, research and development, and sales and marketing. The owned floor of the building, representing 23,361 square feet, was leased continually to a tenant effective February 2014.
Shenzhen, China	17,147	Leased; 1 building used for staff dormitory.
Dongguan, China	88,587	Leased; 2 buildings used for manufacturing and for staff dormitory.
Tokyo, Japan	132,517	Owned; 1 building used for manufacturing, research and development and marketing.

In addition, we lease a number of smaller offices for warehousing, manufacturing, research and other functions.

ITEM 3. LEGAL PROCEEDINGS

From time to time, we are involved in litigation that we believe is of the type common to companies engaged in our line of business, including commercial disputes and employment issues. As of the date of this Annual Report on Form 10-K, other than as described below, we are not involved in any pending legal proceedings that we believe could have a material adverse effect on our financial condition, results of operations or cash flows. However, a certain dispute involves a claim by a third party that our activities infringe their intellectual property rights. This and other types of intellectual property rights claims generally involve the demand by a third party that we cease the manufacture, use or sale of the allegedly infringing products, processes or technologies and/or pay substantial damages or royalties for past, present and future use of the allegedly infringing intellectual property. Claims that our products or processes infringe or misappropriate any third-party intellectual property rights (including claims arising through our contractual indemnification of our customers) often involve highly complex, technical issues, the outcome of which is inherently uncertain. Moreover, from time to time, we may pursue litigation to assert our intellectual property rights. Regardless of the merit or resolution of any such litigation, complex intellectual property litigation is generally costly and diverts the efforts and attention of our management and technical personnel which could adversely affect our business.

For a discussion of our current legal proceedings, please refer to the information set forth under the "Litigation" section in Note 14, *Commitments and contingencies*, in Notes to Consolidated Financial Statements in Item 8 of Part II of this Annual Report on Form 10-K, which is incorporated herein by reference.

ITEM 4. MINE SAFETY DISCLOSURES

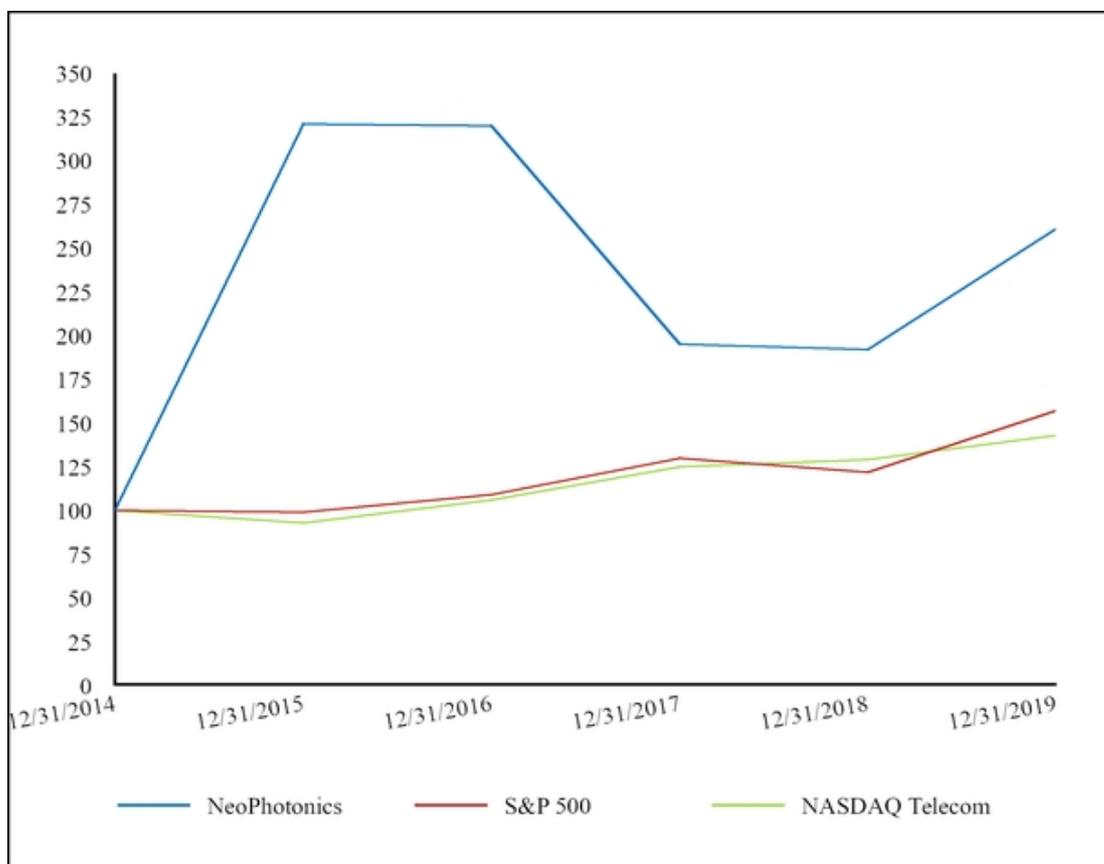
Not applicable.

PART II

ITEM 5. MARKET FOR REGISTRANT’S COMMON EQUITY, RELATED STOCKHOLDER MATTERS AND ISSUER PURCHASES OF EQUITY SECURITIES

Our common stock trades on the New York Stock Exchange under the symbol NPTN. As of February 21, 2020, there were approximately 57 holders of record of our common stock (not including beneficial holders of our common stock held in street names).

The graph below shows the cumulative total stockholder return of an investment of \$100 (and the reinvestment of any dividends thereafter) on 12/31/2014 in (i) our common stock, (ii) the S&P 500 Index and (iii) the NASDAQ Telecommunications Index. Our stock price performance shown in the graph below is not indicative of future stock price performance. The following graph and related information shall not be deemed “soliciting material” or be deemed to be “filed” with the SEC, nor shall such information be incorporated by reference into any future filing, except to the extent that we specifically state that such graph and related information are incorporated by reference into such filing.



	NeoPhotonics	S&P 500	NASDAQ Telecom
12/31/2014	\$ 100	\$ 100	\$ 100
12/31/2015	\$ 321	\$ 99	\$ 93
12/31/2016	\$ 320	\$ 109	\$ 106
12/31/2017	\$ 195	\$ 130	\$ 125
12/31/2018	\$ 192	\$ 122	\$ 129
12/31/2019	\$ 261	\$ 157	\$ 143

For equity compensation plan information refer to Item 12 of this Annual Report on Form 10-K.

ITEM 6. SELECTED FINANCIAL DATA

The following selected consolidated financial data should be read together with our consolidated financial statements and the related notes and “Management’s Discussion and Analysis of Financial Condition and Results of Operations” appearing elsewhere in this Annual Report on Form 10-K. The selected consolidated financial data in this section is not intended to replace our consolidated financial statements and the related notes.

We derived the consolidated statements of operations data for the years ended December 31, 2019, 2018 and 2017 and the consolidated balance sheet data as of December 31, 2019 and 2018 from our consolidated financial statements appearing elsewhere in this Annual Report on Form 10-K. The consolidated statements of operations data for the years ended December 31, 2016 and 2015 and the consolidated balance sheet data as of December 31, 2017, 2016 and 2015 are derived from our consolidated financial statements, which are not included in this Annual Report on Form 10-K. Our historical results are not necessarily indicative of our future results.

Consolidated Statements of Operations Data:	Years ended December 31,				
	2019	2018	2017	2016 ⁽¹⁾	2015 ⁽²⁾
	<i>(in thousands, except per share value)</i>				
Revenue	\$ 356,804	\$ 322,540	\$ 292,894	\$ 411,423	\$ 339,439
Cost of goods sold	267,991	256,367	231,415	294,290	240,358
Gross profit	88,813	66,173	61,479	117,133	99,081
Operating expenses	103,355	107,831	112,843	114,114	95,128
Income (loss) from operations	(14,542)	(41,658)	(51,364)	3,019	3,953
Interest and other income (expense), net	(901)	(650)	(1,060)	373	2,819
Provision for income taxes	(1,633)	(1,329)	(909)	(3,597)	(3,104)
Net income (loss)	\$ (17,076)	\$ (43,637)	\$ (53,333)	\$ (205)	\$ 3,668
Basic net income (loss) per share ⁽³⁾	\$ (0.36)	\$ (0.97)	\$ (1.23)	\$ —	\$ 0.10
Diluted net income (loss) per share ⁽³⁾	\$ (0.36)	\$ (0.97)	\$ (1.23)	\$ —	\$ 0.09

Consolidated Balance Sheet Data:	Years ended December 31,				
	2019	2018	2017	2016	2015
	<i>(in thousands)</i>				
Cash and cash equivalents	\$ 70,467	\$ 58,185	\$ 78,906	\$ 82,500	\$ 76,088
Short-term investments	7,638	7,481	12,311	19,015	23,294
Restricted cash and investments	10,972	11,053	2,658	4,085	2,660
Working capital ⁽⁴⁾	121,669	116,822	110,769	124,468	151,211
Total assets	334,679	340,576	402,953	390,887	341,878
Long-term debt (including current portion)	42,281	53,351	46,561	10,962	11,519
Common stock and additional paid-in capital ⁽⁵⁾	582,625	564,838	546,064	532,484	511,852
Total equity	160,206	160,240	194,451	225,405	211,656

(1) In 2016, our stock options and stock appreciation units with market condition were vested and we recognized approximately \$5.7 million in related stock-based compensation expense in the period.

(2) We acquired the tunable laser product lines of EMCORE Corporation on January 2, 2015 and the optical power monitoring business of EigenLight Corporation on November 2, 2015 and the results of operations from these acquisitions are included from the date of acquisition.

(3) See Note 2 to the Consolidated Financial Statements for a description of our calculation of net income (loss) per share.

- (4) Working capital is defined as total current assets less total current liabilities.
- (5) In connection with our follow-on public offering completed in 2015, we issued 6,866,689 shares of common stock at \$7.25 per share and raised approximately \$45.6 million, net of underwriting discounts and offering costs.

ITEM 7. MANAGEMENT'S DISCUSSION AND ANALYSIS OF FINANCIAL CONDITION AND RESULTS OF

OPERATIONS

You should read the following discussion and analysis by our management of our financial condition and results of operations in conjunction with our consolidated financial statements and the accompanying notes.

The following discussion contains forward-looking statements that involve risks and uncertainties, such as statements of our plans, objectives, expectations and intentions. Our actual results could differ materially from those discussed in the forward-looking statements. Please also see the cautionary language at the beginning of Part I of this Annual Report on Form 10-K regarding forward-looking statements. Factors that could cause or contribute to such differences include, but are not limited to, those discussed in "Risk Factors" of this Annual Report on Form 10-K.

Overview

We develop, manufacture and sell optoelectronic products that transmit, receive and switch high-speed digital optical signals for Cloud and hyper-scale data center internet content provider and telecom networks. Our solutions help network operators manage the explosive data traffic growth in Cloud and hyper-scale data centers.

We specialize in products that operate at the highest speed over distance, for 100 Gigabits per Second ("G"), 200G, 400G and beyond data rates, such as at 600G and 800G. Our products have the speed, size, low power consumption and interoperability to directly transmit data using industry standard Internet Protocol coding, or IP over, DWDM wavelengths, greatly simplifying data networks.

We are the world's primary supplier of tunable lasers that emit the ultra-pure light that is required for the highest speed over distance fiber optic communications links.

We integrate our lasers and our high performance coherent optical components into transmit/receive modules, or transceivers. Our high speed transceiver modules, which can operate at 400 G and above, drive down costs, extend reach and directly interconnect with switches and routers.

We believe we are well positioned to deliver these laser, component and module products based on our leadership in the ultra-pure lasers which power them and our comprehensive capabilities in designing and producing the highest performance Silicon Photonics and Indium Phosphide devices based on our Advanced Hybrid Photonic Integration.

We also believe that because of our laser and component technologies, we have been first to deliver commercial volumes for each of the highest speed advances in components since the advent of coherent optics for transmission ten years ago in 2010, as maximum speeds have advanced for each wavelength, or color, from 100G (Gigabits per second) to 200G, 400G and now 800G. With adoption of coherent transmission using pluggable high speed optical modules in Cloud and hyper-scale data centers, we believe our total addressable market is rapidly expanding.

Our high-speed optical communications technologies encode information to optical signals from electronic signals for transmission and decode it for receiving. We achieve these ultra-high speeds with coherent technology that encodes phase, amplitude and polarization of an optical wavelength, packing in far more information than simple on/off encoding. We believe we are a global leader in coherent transmission technology, based on our achieved speeds, leadership in ultra-pure color lasers and optical integration for miniaturization and low power consumption.

Coherent is becoming the technology of choice for high speed data transmission in Cloud infrastructure and data center interconnection, in addition to telecom networks, where the highest speeds over distance were first developed. Moreover, we are the most significant producer of the pure light lasers that deliver data at the highest speeds, as we have delivered approximately 1.5 million lasers used by the approximately 2 million coherent ports deployed by the industry over the past 10 years (each port may use either one or two lasers).

We have grown our business by delivering the highest speed over distance for the Long Haul and Metro segments of the Telecom market. In recent years the Data Center Interconnect (DCI) market has become an increasing part of our revenue as DCI market adopts high speed coherent optical technologies.

Until recently our largest customers, Huawei and Ciena, have been suppliers of network equipment primarily focused on the Telecom market. Other leading customers have also been telecom equipment suppliers, such as Cisco, Nokia and ZTE.

Our High Speed Products for data rates of 100G, 200G and 400G were 91% of our 2019 revenues and were 86% of our 2018 revenues. Products capable of data rates of 400G and above have accounted for more than 10 percent of our revenue since 2018. Our sales concentration in High Speed Products has been increasing each year for more than 10 years.

Networks operating at 400G and beyond data rates have adopted coherent transmission technology because of its ability to increase data rates and lower costs. These high speed networks are among the highest growth segments of the optical communications market, and support the rapid expansion of telecom backbone, hyper-scale data center interconnect content provider networks, accommodating increased wireline and mobile traffic.

We expect growth in the 400G and beyond segment of our business to be driven primarily by increased adoption of our high speed products in the much larger Cloud infrastructure market, the Metro market sector and in the high speed data center interconnect, or DCI, market.

Specific technologies have been developed for communications inside the data center and between data centers themselves as well as between data centers and consumers. We believe our solutions are often unique in their ability to provide high integrity signals across longer distances. However, high speed coherent transmission is becoming more competitive at shorter reaches, which include applications where interconnect volumes are much larger, and where we historically have not sold our products directly. Thereby we believe shorter reaches offer us further significant growth opportunities.

We believe the changes at 400G and above data rates portend a coming significant change in high speed network architectures to more efficiently implement the 400G and above technologies provided by NeoPhotonics. This forecasted sea change is enabled by coherent techniques and Photonic Integrated Circuits, which makes it possible for long distance transmission by pluggable transceiver modules that connect directly into switches and routers inside data centers and that have thus far been used only for short reach connections within data centers. Such dis-aggregated Open Line Systems can manage optical signals between data centers with all needed channel management, amplification, traffic planning and monitoring functions. Together coherent pluggable transceivers and Open Line fiber systems make IP over DWDM possible, that is for Internet Protocol data to be transmitted over long distances on an optical channel without translation into a proprietary equipment manufacturer's format. Connections between data centers then become as simple as connections within data centers - a breakthrough benefit to the network operator.

We believe that over the next few years, this connection architecture will become a mainstay of new installations, moving a significant portion of the capital expenditures from network equipment supplied DWDM proprietary boxes to disaggregated direct 400ZR interconnections. This new approach of IP over DWDM moves Internet Protocol traffic from switches and routers directly over an Open Line system DWDM channel without passing through a proprietary network equipment transmission box.

Our Solutions

Three critical optical components are required to make a coherent transceiver: (1) a laser with a very narrow linewidth for very pure light; (2) a coherent modulator capable of changing both the intensity and phase of the optical signal to code data onto it; and (3) a coherent receiver capable of detecting both the intensity and phase of the received optical signal to "understand" its content, plus an electronic digital signal processor IC (DSP).

We have been a leading volume supplier of these optical components since coherent systems were first deployed in volume for telecommunications networks a decade ago, in 2010. We are now the leading supplier of narrow linewidth tunable lasers and coherent receivers to the coherent market, and we have introduced new high speed coherent modulators for 400G, 600G and above applications.

The capabilities of coherent optics continue to grow with increasing photonic integration for higher performance and smaller size, and open further opportunities for us in adjacent markets. Outside of communications, coherent technology improves sensitivity and performance for a variety of applications including inter-satellite communication links including for low earth orbit (LEO) satellites, plus industrial applications, 3D sensing for autonomous vehicle navigation, and medical imaging.

In 2019, 2018 and 2017, our five largest customers accounted for 84%, 87% and 78% of our total revenue, respectively. In 2019, customers of 10% or more revenue were Huawei Technologies, together with its affiliate HiSilicon Technologies Co. Ltd. (collectively "Huawei"), and Ciena Corporation, which accounted for 41% and 29% of our total revenue, respectively. In 2018, customers of 10% or more revenue were Huawei and Ciena, which accounted for 46% and 24% of our total revenue, respectively. In 2017, Huawei and Ciena accounted for 40% and 16% of our total revenue, respectively.

We have invested and expect to continue to invest significant time and capital into our research and development operations. Our research and development activities continue to push the performance leadership boundaries in high speed digital optics, silicon photonics and hybrid photonic integration, optoelectronics control and in signal processing.

Research and development expenses were \$57.6 million, \$53.8 million and \$58.3 million in 2019, 2018 and 2017, respectively.

We have research and development and wafer fabrication facilities in San Jose and Fremont, California and in Tokyo, Japan that coordinate with our research and development and manufacturing facilities in Dongguan, Shenzhen and Wuhan, China and Ottawa, Canada. We use proprietary design tools and design-for-manufacturing techniques to align our design process with our precision nanoscale, vertically integrated manufacturing and testing. We believe we are one of the highest volume manufacturers of photonic integrated circuits ("PIC") in the world and that we can further expand our manufacturing capacity to meet market needs.

Due to tender awards by Chinese telecom carriers for provincial development and other smaller tender awards, we experienced a more normalized demand environment in China beginning in 2018 (after weaker demand in 2017) and continuing into 2019. Then, demand for certain of our High Speed Products that are used in metro and data center interconnect (DCI) applications in North America and Europe increased. DCI deployments in North America were particularly strong in 2019, and our products for these applications were shipped to contract manufacturers for our system manufacturer customers.

On May 16, 2019, the U.S. Commerce Department's Bureau of Industry and Security ("BIS") added Huawei and certain affiliates to the BIS Entity List ("Entity List"), with an effective date of May 21, 2019. This denies Huawei the ability to purchase products, software and technology that are subject to U.S. Export Administration Regulations (EAR). As Huawei has been our largest customer in recent quarters, this has had a material impact on the the revenue and profitability we had forecasted prior to the BIS action. As a result, we have adjusted capital expenditures, operating expenditures, project plans and incoming materials for changing demand levels to mitigate risks associated with the Entity List and intend to continue to implement actions to improve cash flow and profitability.

We are committed to EAR compliance in each of the locations in which we do business. We determined that certain of our products are not subject to EAR regulations and may be lawfully sold to Huawei. During 2018, prior to the denial order, non-EAR products were over half of our Huawei revenue and shipments to Huawei of many of these products continue. Further, we have applied for licenses for certain technology subject to EAR, and at the time of this filing we have been granted a license to ship limited, but not material, volumes of US-manufactured lasers to Huawei.

Revenue was \$356.8 million in the year ended December 31, 2019, compared to \$322.5 million in 2018 primarily due to volume growth from U.S. and European based customers, including shipments through their off-shore contract manufacturers, partially offset by a decrease in shipments to Huawei due to the elimination of shipments of products subject to EAR after Huawei's placement on the Entity List. Our gross profit was 24.9% of revenue in the year ended December 31, 2019, compared to 20.5% of revenue in 2018. Improvement resulted from favorable product mix, increased volume and cost reductions.

In the year ended December 31, 2019, High Speed Products represented approximately 91% of total revenue, or \$323.8 million and Network Products and Solutions represented approximately 9% of total revenue, or \$33.0 million. In the year ended December 31, 2018 High Speed Products were 86% of total revenue, or \$275.8 million and Network Products and Solutions represented approximately 14% of total revenue, or \$46.7 million. The High Speed Product market segment is growing at a much faster pace than Network Products and Solutions, certain products of which were also disproportionately impacted by the suspension of shipments due to Huawei's placement on the Entity List.

Critical accounting policies and estimates

Our discussion and analysis of our financial condition and results of operations are based upon our consolidated financial statements, which have been prepared in accordance with accounting principles generally accepted in the U.S. ("U.S. GAAP"). These principles require us to make estimates and judgments that affect the reported amounts of assets, liabilities, revenue, expenses and cash flow, and related disclosure of contingent assets and liabilities. Our estimates include those related to revenue recognition, stock-based compensation expense, impairment analysis of goodwill and long-lived assets, valuation of inventory, purchased intangibles, warranty liabilities and accounting for income taxes. We base our estimates on historical experience and on various other assumptions that we believe to be reasonable under the circumstances. Actual results may differ from these estimates. To the extent that there are material differences between these estimates and our actual results, our future financial statements will be affected.

We believe that of our significant accounting policies, which are described in Note 2 of Notes to Consolidated Financial Statements, the following accounting policies involve a greater degree of judgment and complexity. Accordingly, we believe these are the most critical to fully understand and evaluate our financial condition and results of operations.

Revenue recognition

Revenue is recognized upon transfer of control of promised products or services to customers in an amount that reflects the consideration we expect to receive in exchange for those products or services. We generally bears all cost, risk of loss or damage and retains title to the goods up to the point of transfer of control of promised products to customer. Revenue related to the sale of consignment inventories at customer vendor managed locations is not recognized until the products are pulled from consignment inventories by customers. In instances where acceptance of the product or solutions is specified by the customer, revenue is deferred until such required acceptance criteria have been met. Shipping and handling costs are included in the cost of goods sold. We present revenue net of sales taxes and any similar assessments.

Stock-based compensation expense

We grant stock options, stock appreciation units and restricted stock units to employees, directors and consultants. Stock purchase rights are granted to our employees. Stock-based awards are accounted for at fair value as of the measurement date using the Black-Scholes-Merton option-pricing model, the lattice-binominal option-pricing model or stock prices. For stock options and restricted stock units, the measurement date is the grant date and for employee stock purchase rights the measurement date is the first day of the offering period. Stock appreciation units are subject to re-measurement each reporting period.

We recognize the fair value over the period during which an employee is required to provide services in exchange for the award, known as the requisite service period (usually the vesting period) on a straight-line basis. Stock-based compensation expense includes the impact of estimated forfeitures. We estimate future forfeitures at the date of grant and revise the estimates, if necessary, in subsequent periods if actual forfeitures differ from those estimates.

Determining the appropriate fair value model and calculating the fair value of stock-based awards requires judgment, including estimating stock price volatility, forfeiture rates and expected life. If any of these assumptions, or the market price of our common shares, used in the option-pricing models change, our stock-based compensation expense could materially change our consolidated financial statements.

Business Combinations

We allocate the fair value of purchase consideration to the tangible and intangible assets acquired and liabilities assumed based on their estimated fair values. The excess of the fair value of purchase consideration over the fair values of these identifiable assets and liabilities is recorded as goodwill. When determining the fair values of assets acquired and liabilities assumed, management makes significant estimates and assumptions, especially with respect to intangible assets. Critical estimates in valuing certain intangible assets include but are not limited to discount rates, future expected cash flows from customer relationships and acquired patents and developed technology.

Fair value estimates are based on the assumptions management believes a market participant would use in pricing the asset or liability. Such assumptions are believed to be reasonable but are inherently uncertain and unpredictable and, as a result, actual results may differ from estimates.

Amounts recorded in a business combination may change during the measurement period, which is a period not to exceed one year from the date of acquisition, as additional information about conditions existing at the acquisition date becomes available.

Goodwill and long-lived assets

Our methodology for allocating the purchase price relating to purchase acquisitions is determined through established valuation techniques. Goodwill represents a residual value as of the acquisition date, which generally results in measuring goodwill as an excess of the purchase consideration transferred plus the fair value of any noncontrolling interest in the acquired company over the fair value of net assets acquired, including any contingent consideration.

We perform annual goodwill impairment test in the fourth fiscal quarter by reporting unit. We could be subject to additional goodwill impairment tests in the event of changes in industry and market conditions, our business and reporting structure. During the fourth quarter of fiscal 2019, we performed the first step of the two-step goodwill impairment test and a sensitivity analysis for goodwill impairment and determined that the estimated fair value substantially exceeded the carrying

value of the underlying goodwill and a hypothetical 10% decline in the fair value of the reporting unit would not result in an impairment of goodwill.

We assess the impairment of long-lived assets whenever events or changes in circumstances indicate that the carrying amount may not be recoverable. An impairment loss would be recognized when the sum of the future net cash flows expected to result from the use of the asset and its eventual disposition is less than its carrying amount. The estimated future cash flows are based upon, among other things, assumptions about expected future operating performance and may differ from actual cash flows. If our estimates regarding future cash flows derived from such assets were to change, we may record an impairment to the value of these assets.

Inventories

Our inventories consist of on-hand raw materials, work-in-progress inventories and finished goods. Raw materials and work-in-progress inventories are stored mainly on our premises. Finished goods are stored on our premises as well as on consignment at certain customer sites.

Inventories are stated at the lower of standard cost, which approximates actual cost determined on the weighted average basis, or net realizable value. Inventories are recorded using the first-in, first-out method. We routinely evaluate quantities and values of inventories in light of current market conditions and market trends, and records a write-down for quantities in excess of demand and product obsolescence. The evaluation may take into consideration historic usage, expected demand, anticipated sales price, new product development schedules, the effect new products might have on the sale of existing products, product obsolescence, customer concentrations, product merchantability and other factors. Market conditions are subject to change and actual consumption of inventory could differ from forecasted demand. We also regularly review the cost of inventories against their estimated market value and records a lower of cost or market write-down for inventories that have a cost in excess of estimated market value, resulting in a new cost basis for the related inventories which is not reversed. In 2019, 2018 and 2017, inventory write-down charges were approximately \$7.8 million, \$6.1 million and \$8.3 million, respectively.

Warranty liabilities

We provide warranties to cover defects in workmanship, materials and manufacturing of our products to meet stated functionality specifications. We test products against specified functionality requirements prior to delivery, but we nevertheless from time to time experience claims under our warranty guarantees. We accrue for estimated warranty costs under those guarantees based upon historical experience, and for specific items at the time their existence is known and the amounts are determinable. We charge a provision for estimated future costs related to warranty activities to cost of goods sold based upon historical product failure rates and historical costs incurred in correcting product failures. We recorded warranty expense of \$0.8 million, \$0.4 million and \$1.3 million for each of the years ended December 31, 2019, 2018 and 2017, respectively. If we experience an increase in warranty claims compared with our historical experience, or if the cost of servicing warranty claims is greater than expected, our gross margin and profitability would be adversely affected.

Accounting for income taxes

We record income taxes using the asset and liability method, which requires the recognition of deferred tax assets and liabilities for the expected future tax consequences of events that have been recognized in our consolidated financial statements or tax returns. In estimating future tax consequences, generally we consider all expected future events, other than enactments or changes in tax law or rates. We provide valuation allowances when necessary to reduce deferred tax assets to the amount expected to be realized.

We operate in various tax jurisdictions and are subject to audit by various tax authorities. We provide for tax contingencies whenever it is deemed probable that a tax asset has been impaired or a tax liability has been incurred for events such as tax claims or changes in tax laws. Tax contingencies are based upon their technical merits, relevant tax law and the specific facts and circumstances as of each reporting period. Changes in facts and circumstances could result in material changes to the amounts recorded for such tax contingencies.

As part of the process of preparing our consolidated financial statements, we are required to estimate our taxes in each of the jurisdictions in which we operate. We estimate actual current tax exposure together with assessing temporary differences resulting from differing treatment of items, such as accruals and allowances not currently deductible for tax purposes. These differences result in deferred tax assets.

We make estimates and judgments about our future taxable income that are based on assumptions that are consistent with our plans and estimates. Should the actual amounts differ from our estimates, the amount of our valuation allowance could be

materially impacted. Any adjustment to the deferred tax asset valuation allowance would be recorded in the consolidated statement of operations in the period that the adjustment is determined to be required.

Results of operations

Our business is focused on the highest speed digital optics and signal processing communications applications for telecom transport and Metro networks and for data center applications.

In 2019, our High Speed Products for data rates of 100G and beyond comprised 91% of our revenues, steadily increasing from 86% in 2018 and 83% in 2017. In April 2019, we completed the sale of 100% interest in the operations of NeoPhotonics Corporation, LLC, our manufacturing operation in Russia. In connection with the sale, we recognized a gain on asset sale of \$0.9 million during the year ended December 31, 2019.

The following table presents certain consolidated statements of operations data for the periods indicated as a percentage of total revenue:

	Years Ended December 31,		
	2019	2018	2017
Revenue	100 %	100 %	100 %
Gross profit	25 %	21 %	21 %
Operating expenses	29 %	33 %	39 %
Loss from operations	(4)%	(13)%	(18)%
Interest and other income (expense), net	— %	— %	— %
Loss before income taxes	(4)%	(13)%	(18)%
Net loss	(5)%	(14)%	(18)%

Revenue

(in thousands, except percentages)	% Change		% Change	
	2019	2019 to 2018	2018	2018 to 2017
Total revenue	\$ 356,804	11%	\$ 322,540	10%
				\$ 292,894

We sell substantially all of our products to original equipment manufacturers, or OEMs. We price our products based on market and competitive conditions and may periodically reduce the price of our products as market and competitive conditions change and as manufacturing costs are reduced. Our sales transactions to customers are denominated primarily in U.S. dollars. Revenue is driven by the volume of shipments and may be impacted by pricing pressures. We have generated most of our revenue from a limited number of customers.

Customers accounting for more than 10% of our total revenue and revenue from our top five customers for the years ended December 31, 2019, 2018 and 2017 were as follows:

	Years Ended December 31,		
	2019	2018	2017
Huawei Technologies Co., Ltd (1)	41%	46%	40%
Ciena Corporation	29%	24%	16%
Percent of revenue from top five customers	84%	87%	78%

⁽¹⁾ Huawei's percentage of revenue included its affiliate, HiSilicon. Revenue from HiSilicon represented approximately 38%, 40% and 37% of total revenue, respectively, in 2019, 2018 and 2017.

The following tables present share of revenue by product group and geographical region:

	Years Ended December 31,		
	2019	2018	2017
High Speed Products	91%	86%	83%
Network Products and Solutions	9%	14%	17%

	Years Ended December 31,		
	2019	2018	2017
China	52%	58%	55%
Americas	23%	22%	18%
Rest of world	25%	20%	27%

Total revenue increased by \$34.3 million, or 11%, in 2019 compared to 2018, led by the solid growth in our tunable laser business for the industry's highest speed applications. In the second quarter of 2019, the BIS added Huawei and certain affiliates to the Entity List. We ceased all shipments to Huawei before the Entity List became effective and resumed shipment in late June of certain products that have been determined by us to be not subject to EAR. We expect this Entity List and/or any change to the U.S. export restrictions to continue to affect our revenue and operations. The reduction in the proportion of shipments to China in 2019 is due to strong growth in North America and Europe. Shipments to the Americas and to the rest of the world are mainly to contract manufacturers for non-China based network equipment manufacturers ("NEMs").

Total revenue increased by \$29.6 million, or 10%, in 2018 compared to 2017. The increase was the result of a normalization of demand in China and increased demand for High Speed Products for DCI and metro applications in North America and Europe. Changes in our geographic split are largely driven by changes in the location of our customer's contract manufacturing locations.

We expect continuous growth in revenue from our High Speed Products in 2020 along with the rapid expansion of Cloud and hyper-scale data center as well as global 5G wireless networks deployments. We also expect that a significant portion of our revenue will continue to be derived from a limited number of customers.

Cost of goods sold and gross margin

(in thousands, except percentages)	% Change		% Change		2017
	2019	2019 to 2018	2018	2018 to 2017	
Cost of goods sold	\$ 267,991	5%	\$ 256,367	11%	\$ 231,415
Gross profit	\$ 88,813	34%	66,173	8%	61,479

	2019	2018	2017
Gross profit as a % of revenue	24.9%	20.5%	21.0%

Our cost of goods sold consists primarily of the cost to produce wafers, modules and to manufacture and test our products. Additionally, our cost of goods sold includes stock-based compensation, write-downs of excess and obsolete inventory, royalty payments, amortization of certain purchased intangible assets, depreciation, acquisition-related fair value adjustments, restructuring charges, warranty costs, royalty payments, logistics and allocated facilities costs.

In 2019, gross profit increased \$22.6 million, or 34%, to \$88.8 million, compared to \$66.2 million in 2018. Our gross margin percent increased 4% to 25% from 21% in prior year, of which 5% was from cost reductions and favorable product mix net of year-over-year declines in average selling prices. Additionally, 1% lower inventory write-downs were offset by a 1% increase in customs import duties and 1% increase in accelerated depreciation expenses for an end-of-life production line.

In 2018, gross profit increased \$4.7 million, or 8%, to \$66.2 million, compared to \$61.5 million in 2017. Our gross margin percent decreased by approximately half a percentage point to 20.5% in 2018 as compared to 2017. The 0.5 percentage point decline in gross margin was attributable to approximately 3.8 percentage points from year-over-year declines in average selling prices, 0.4 percentage points of higher stock-based compensation expense and approximately 0.4 percentage points of higher royalties and customs import duties, offset by 2.3 percentage points of lower product manufacturing costs (yield improvements and lower materials costs), and 1.8 percentage points from improvements in factory utilization on higher production volumes and lower inventory write-downs and warranty costs.

Factors that can affect our gross margin include production volume and mix, inventory changes, changes in the average selling prices of our products, changes in the cost and volumes of materials purchased from our suppliers, changes in labor costs, changes in overhead costs or requirements, changes in custom duties or tariffs, revaluation of stock appreciation unit awards that are impacted by our stock price, write-downs of excess and obsolete inventories and warranty costs. In addition, we periodically negotiate pricing with certain customers which can cause our gross margins to fluctuate, particularly in the quarters subsequent to the periods in which the negotiations occurred.

Operating expenses

Personnel costs are the most significant component of operating expenses and consist of costs such as salaries, benefits, bonuses, stock-based compensation and other variable compensation.

(in thousands, except percentages)	2019	% Change 2019 to 2018	2018	% Change 2018 to 2017	2017
Research and development	\$ 57,634	7%	\$ 53,818	(8)%	\$ 58,287
Sales and marketing	16,088	(4)%	16,728	(6)%	17,760
General and administrative	29,759	(2)%	30,403	(12)%	34,453
Amortization of purchased intangible assets	119	(75)%	475	1%	472
Asset sale related costs	397	(7)%	427	228%	130
Restructuring charges	261	(92)%	3,135	(20)%	3,934
Litigation settlement	—	(100)%	2,645	100%	—
Loss (gain) on asset sale	(903)	(552)%	200	(109)%	(2,193)
Total operating expenses	\$ 103,355	(4)%	\$ 107,831	(4)%	\$ 112,843

Research and development

We focus our research and development efforts to continue pushing the performance leadership boundaries. Research and development expense of \$57.6 million, or 16% of revenue, increased \$3.8 million, or 7%, in 2019 compared to 2018, primarily due to \$2.9 million increase in product development investment and \$0.7 million increase in variable compensation expenses.

Research and development expense decreased \$4.5 million, or 8%, in 2018 compared to 2017. The decrease was primarily due to a \$2.8 million decrease in development expenses, a \$1.8 million decrease in payroll and related expenses and a \$1.4 million decrease in outside development services. These decreases were partially offset by a \$1.1 million increase in stock-based compensation expense compared to 2017.

We believe that investments in research and development are important to help meet our strategic objectives. In 2020, we plan to continue to invest in research and development activities, including new products that we believe will further enhance our competitive position. Research and development expense consists of personnel costs, including stock-based compensation, for our research and development personnel, and product development costs, including engineering services, development software and hardware tools, depreciation of equipment and facility costs. We record all research and development expense as incurred. As a percentage of total revenue, our research and development expense may vary as our investment and revenue levels change over time.

Sales and marketing

Sales and marketing expense decreased by \$0.6 million, or 4%, in 2019 compared to 2018, was mainly due to \$0.6 million lower personnel costs and \$0.4 million less traveling expenses, offset by an increase of \$0.4 million due to the absence of a bad debt recovery.

Sales and marketing expense decreased by \$1.0 million, or 6%, in 2018 compared to 2017, primarily due to a \$1.7 million decrease in payroll and related expenses and \$1.0 million decrease from the recovery of bad debts previously written off. These decreases were partially offset by a \$1.6 million increase in stock-based compensation expense compared to 2017.

We expect to continue to expand our high speed market focus and increase sales coverage of the DCI market while controlling our sales and marketing expenses in 2020, even as our business continues to expand geographically. Sales and marketing expense consists primarily of personnel costs, including stock-based compensation and sales commissions, costs

related to sales and marketing programs and services and facility costs. As a percentage of total revenue, our sales and marketing expense may vary as our revenue changes over time.

General and administrative

General and administrative expense consists of personnel costs, including stock-based compensation, for our finance, human resources and information technology personnel and certain executive officers, as well as professional services costs related to accounting, tax, banking, legal and information technology services, depreciation and facility costs.

General and administrative expense decreased by \$0.6 million, or 2%, in 2019 compared to 2018, primarily due to a \$0.7 million decrease in depreciation and amortization as certain assets have reached end of depreciation life, a \$0.4 million decrease in city/local taxes as there were additional taxes from a 2018 audit and a \$0.2 million decrease from completion of the sale of 100% interest in our manufacturing operations subsidiary in Russia, offset by \$0.8 million increase in variable compensation expenses.

General and administrative expense decreased by \$4.1 million, or 12%, in 2018 compared to 2017, primarily due to a \$3.7 million decrease in professional services related to accounting, tax and legal, a \$2.3 million decrease in facilities-related cost and a \$0.7 million decrease in payroll and related expenses. These decreases were partially offset by a \$1.8 million increase in stock-based compensation expense and a \$0.4 million increase in city/local taxes compared to 2017.

We have been focusing on controlling our general and administrative expense and expect to continue in 2020. As a percentage of total revenue, our general and administrative expense may vary as our revenue changes over time.

Amortization of purchased intangible assets

Our intangible assets are being amortized over their estimated useful lives. Amortization expense relating to technology and patents and leasehold interests are included within cost of goods sold, while customer relationships and non-compete agreements are recorded within operating expenses.

In 2019, amortization of purchased intangible assets was \$0.8 million, comprising of \$0.7 million in cost of goods sold and \$0.1 million in operating expenses. Decrease of \$0.3 million from 2018 due to certain intangible assets have become fully amortized during 2019.

In 2018, amortization of purchased intangible assets was \$1.2 million, comprising of \$0.7 million in cost of goods sold and \$0.5 million in operating expenses.

In 2017, amortization of purchased intangible assets was \$1.3 million, comprising of \$0.8 million in cost of goods sold and \$0.5 million in operating expenses.

Asset sale related costs

In 2019, we incurred \$0.4 million in legal and other professional fees related to the our litigation with APAT OE relating to the sale of our low speed transceiver product lines (See Note 14 of Notes to Consolidated Financial Statements in Item 8 of Part II of this Report).

In 2018, we incurred \$0.4 million in asset sale related transaction costs related to legal, accounting and other professional services.

In 2017, we incurred \$0.1 million in asset sale related transaction costs related to legal, accounting and other professional services.

Restructuring charges

We initiated restructuring actions in 2018 in order to focus on key growth initiatives and to move towards a lower break even revenue level. Actions to lower operating expenses and manufacturing costs included a reduction in force, facilities consolidation and certain asset-related adjustments.

We incurred \$0.3 million in the year ended December 31, 2019 for follow-on expenses related to the 2018 restructuring.

We recorded \$0.2 million and \$3.1 million in restructuring charges within cost of goods sold and operating expenses in 2018, respectively. Restructuring charges in 2018 primarily included \$1.6 million related to changes in the fair value of penalty payment derivative, \$1.0 million related to asset impairment charges and \$0.6 million related to employee severance.

In 2017, we initiated restructuring actions in order to focus on key growth initiatives and to achieve a lower break even revenue level through lower operating expenses and manufacturing costs. Actions included a reduction in force, facilities consolidation and certain asset-related adjustments. We recorded \$0.8 million and \$3.9 million in restructuring charges within cost of goods sold and operating expenses in 2017, respectively. Additionally, we recorded a charge of \$2.0 million to cost of goods sold in 2017 for discontinued product inventory write-downs related our decisions to end-of-life certain products.

Litigation settlement

In September 2018, we and Cisco signed a settlement agreement under which we agreed to pay Cisco \$0.3 million in cash and \$0.2 million in product credits which was issued in December 2019.

In January 2019, we and Lestina International Ltd. signed a settlement agreement under which we agreed to pay Lestina International Ltd. \$2.2 million in cash. These payments were completed in two installments paid in February and June 2019. See Note 14 of Notes to Consolidated Financial Statements in Item 8 of Part II of this Report.

Interest and other income (expense), net

(in thousands, except percentages)	2019	% Change 2019 to 2018	2018	% Change 2018 to 2017	2017
Interest income	\$ 376	(5)%	\$ 397	101%	\$ 198
Interest expense	(1,919)	(23)%	(2,493)	83%	(1,362)
Other income (expense), net	642	(56)%	1,446	1,290%	104
Total	<u>\$ (901)</u>	39%	<u>\$ (650)</u>	(39)%	<u>\$ (1,060)</u>

Interest expense decreased in the year ended December 31, 2019, as compared with the year ended December 31, 2018. The decrease was due to a reduction in outstanding borrowings during the year ended December 31, 2019. The decrease of \$0.8 million in other income in the year ended December 31, 2019, as compared with the year ended December 31, 2018, was primarily attributed to a net decrease of \$1.2 million in foreign exchange gain and a \$0.3 million more government grants.

Income taxes and effective tax rates

(in thousands, except percentages)	Years ended December 31,		
	2019	2018	2017
Provision for income taxes	\$ (1,633)	\$ (1,329)	\$ (909)
Effective tax rate	(11)%	(3)%	(2)%

In 2019, our income tax provision was primarily related to the operating profit realized in our foreign subsidiaries in Japan and China. Historically, we have experienced net losses in the U.S. and in the short term, we expect this trend to continue.

The effective tax rate was (11)% in 2019 as compared to (3)% in 2018 mainly due to higher earnings in foreign jurisdictions and decrease in net loss generated in the U.S. in 2019.

The effective tax rate was (3)% in 2018 as compared to (2)% in 2017 mainly due to higher earnings in foreign jurisdictions and decrease in net loss generated in the U.S. in 2018.

Liquidity and capital resources

As of December 31, 2019, we had working capital of \$121.7 million, including total cash, cash equivalents, short-term investments and restricted cash of \$89.1 million. Approximately 22% of our total cash, cash equivalents, short-term investments and restricted cash were held by our foreign entities, including approximately \$15.2 million in accounts held by our subsidiaries in China, of which \$10.9 million was in restricted cash, and approximately \$4.0 million in accounts held by our subsidiary in Japan. Cash, cash equivalents, investments and restricted cash held outside of the U.S. may be subject to taxes if repatriated and may not be immediately available for our working capital needs.

Approximately \$9.2 million of our retained earnings within our total accumulated deficit as of December 31, 2019 was subject to restrictions due to the fact that our subsidiaries in China are required to set aside at least 10% of their respective accumulated profits each year end to fund statutory common reserves as well as allocate a discretionary portion of their after-

tax profits to their staff welfare and bonus fund. This restricted amount is not distributable as cash dividends except in the event of liquidation.

In January 2017, we completed the sale of certain Low Speed Transceiver Products' assets for approximately \$25.0 million in consideration plus approximately \$1.4 million for a post-closing transition services arrangement. The consideration was reduced by \$3.4 million for inventory adjustment after closing to approximately \$21.6 million, which was subject to other adjustments of up to \$10.0 million for any potential claims. See Note 9 in Notes to Consolidated Financial Statements in Item 8 of Part II of this Report.

In September 2017 we entered into a revolving line of credit agreement with Wells Fargo Bank, National Association ("Wells Fargo") as the administrative agent for a lender group (the "Wells Fargo Credit Facility" or "Credit Facility").

The Wells Fargo Credit Facility provides for borrowings equal to the lower of (a) a maximum revolver amount of \$50.0 million, or (b) an amount equal to 80% - 85% of eligible accounts receivable plus 100% of qualified cash balances up to \$15.0 million, less certain discretionary adjustments ("Borrowing Base"). The maximum revolver amount may be increased by up to \$25.0 million, subject to certain conditions. At closing, \$50.0 million was available, of which \$30.0 million was drawn. We used \$20.0 million of this amount to pay the principal and interest due under the Comerica Bank Credit Facility, which has since been terminated.

The Credit Facility matures on June 30, 2022 and borrowings bear interest at an interest rate option of either (a) the LIBOR rate, plus an applicable margin ranging from 1.50% to 1.75% per annum, or (b) the prime lending rate, plus an applicable margin ranging from 0.50% to 0.75% per annum. We are also required to pay a commitment fee equal to 0.25% of the unused portion of the Credit Facility.

The Credit Facility agreement requires prepayment of the borrowings to the extent the outstanding balance is greater than the lesser of (a) the most recently calculated Borrowing Base, or (b) the maximum revolver amount. The Borrowing Base calculation contains a customary provision that gives the lender the ability to reduce the Borrowing Base by reserves that are subjectively determinable, which is considered a subjective acceleration clause. We are required to maintain a combination of certain defined cash balances and unused borrowing capacity under the Credit Facility of at least \$20.0 million, of which at least \$5.0 million must be unused borrowing capacity. Borrowings under the Credit Facility are collateralized by substantially all of our assets.

On June 14, 2019, we entered into a First Amendment to the Credit Facility (the "Amended Credit Facility"). The Amendment removes Huawei from the list of "Eligible Accounts" as a basis for our borrowing while Huawei is on the Entity List. During the period of time while Huawei remains on the Entity List, the concentration limits of certain other customers are increased to partially offset the removal of Huawei. Additionally, until Huawei is no longer on the Entity List, we are required to maintain a temporary combination of certain defined unrestricted cash and unused borrowing capacity under the credit facility of at least \$30.0 million in U.S. and \$40.0 million world-wide, of which at least \$5.0 million shall include unused borrowing capacity.

We were in compliance with the covenants of this Credit Facility as of December 31, 2019. As of December 31, 2019, the outstanding balance under the Credit Facility was \$27.3 million and the weighted average rate under the LIBOR option was 3.72%. The remaining borrowing capacity as of December 31, 2019 was \$10.4 million, of which \$5.0 million is required to be maintained as unused borrowing capacity.

We regularly issue short-term notes payable to our suppliers in China in exchange for accounts payable. These notes are supported by non-interest bearing bank acceptance drafts and are due three to six months after issuance. As a condition of the notes payable arrangements, we are required to keep a compensating balance at the issuing banks that is a percentage of the total notes payable balance until the amounts are settled. As of December 31, 2019, our subsidiary in China had two line of credit facilities with banking institutions.

As of December 31, 2018, the non-interest bearing bank acceptance drafts issued in connection with our notes payable to our suppliers in China under these line of credit facilities had an outstanding balance of \$4.8 million. There were no such balances as of December 31, 2019. Compensating balances relating to these credit facilities totaled \$2.5 million and \$2.6 million, respectively, as of December 31, 2019 and December 31, 2018. Compensating balances are classified as restricted cash on our consolidated balance sheets. See Note 4 and Note 11 of Notes to Consolidated Financial Statements in Item 8 of Part II of this Report.

As of December 31, 2019, we had two term loan arrangements with MUFG Bank, Ltd. (collectively the "Mitsubishi Bank Term Loans") and a third loan arrangement with the MUFG Bank, Ltd. and The Yamanashi Chou Bank, Ltd. One of the Mitsubishi Bank Term Loans requires equal monthly payments of principal equal to 8.3 million JPY until the maturity date of

February 25, 2025, with a lump sum payment of the balance of 8.4 million JPY on the maturity date. Interest on this loan accrues and is paid monthly based upon the annual rate of the monthly Tokyo Interbank Offer Rate (TIBOR) plus 1.40% and is secured by real estate collateral. The second term loan of 690.0 million JPY (approximately \$6.4 million) (the "2017 Mitsubishi Bank Loan") was entered into in March 2017 to acquire manufacturing equipment for our Japanese subsidiary and has an annual interest rate of the monthly TIBOR rate plus 1.00%. The 2017 Mitsubishi Bank Loan requires monthly interest and principal payments over 72 months commencing in April 2018. This loan was available from March 31, 2017 to March 30, 2018 and 690.0 million JPY (approximately \$6.4 million) under this loan was fully drawn in March 2017. In January 2018, we entered into a term loan agreement with MUFG Bank, Ltd. and The Yamanashi Chou Bank, Ltd. for a term loan in the aggregate principal amount of 850.0 million JPY (approximately \$7.8 million) (the "Mitsubishi-Yamanashi Term Loan"). The Mitsubishi-Yamanashi Term Loan was available from January 29, 2018 to January 29, 2025. The full amount of the Mitsubishi-Yamanashi Term Loan was drawn on January 29, 2018. Interest on the Mitsubishi-Yamanashi Term Loan is based upon the annual rate of the three months TIBOR rate plus 1.00%. The Mitsubishi-Yamanashi Term Loan requires quarterly interest payments, along with the principal payments, over 82 months commencing in April 2018. As of December 31, 2019, our aggregate outstanding principal balance under Mitsubishi Bank Term Loans and Mitsubishi-Yamanashi Term Loan was 1.6 billion JPY (approximately \$15.1 million). See Note 11 of Notes to Consolidated Financial Statements in Item 8 of Part II of this Report.

From time to time we accept notes receivable in exchange for accounts receivable from certain of our customers in China. These notes receivable are non-interest bearing and are generally due within nine months. Historically, we have collected on the notes receivable in full at the time of maturity.

In 2019, we generated operating losses of \$14.5 million and cash flows from operations of \$34.7 million. We had an accumulated deficit of \$414.5 million as of December 31, 2019.

During 2019 under the revolving line of credit we repaid \$10.0 million to Wells Fargo. Additionally, we had \$3.0 million of current portion of long-term debt as of December 31, 2019, which we plan to pay out of our existing available cash.

In China, when there is a case pending in judicial court, banks may choose to limit borrowing against existing credit lines, regardless of the legitimacy of the case. We have a dispute pending with APAT OE in judicial court (See Note 14 of Notes to Consolidated Financial Statements in Item 8 of Part II of this Report). We do not expect to make any additional draws against our credit facilities in China until this matter is resolved. We have less expensive cash and credit lines available in the U.S., and believe this will not impact our operations in China.

Rusnano Rights Agreement

In April 2019, we completed the sale of 100% interest in the operations of NeoPhotonics Corporation, LLC, our manufacturing operations in Russia, to Rusnano. In connection with the sale, we received \$2.0 million in cash and settled a \$2.0 million exit fee that would have otherwise been owed to Rusnano.

Cash flow discussion

The table below sets forth selected cash flow data for the periods presented:

(in thousands)	Years ended December 31,		
	2019	2018	2017
Net cash provided by (used in) operating activities	\$ 34,687	\$ 19,595	\$ (32,767)
Net cash used in investing activities	(7,447)	(11,781)	(17,314)
Net cash provided by (used in) financing activities	(14,878)	(19,460)	43,102
Effect of exchange rates on cash, cash equivalents and restricted cash	(161)	(680)	1,958
Net increase (decrease) in cash, cash equivalents and restricted cash	\$ 12,201	\$ (12,326)	\$ (5,021)

Operating activities

In 2019, net cash provided by operating activities was \$34.7 million, compared to \$19.6 million in 2018. The increase was primarily attributable to lower net loss and non-cash adjustments of \$29.1 million, a \$13.7 million increase in cash flows related to accounts receivables and a \$1.4 million increase in cash flows related to accounts payables. The increases were partially offset by a \$10.3 million decrease in cash flows related to the inventories, \$11.1 million related to accrued and other liabilities and \$7.7 million related to prepaid expenses and other current assets.

In 2018, net cash provided by operating activities was \$19.6 million, compared to \$32.8 million net cash used in operating activities in 2017. The increase was primarily attributable to a \$15.2 million increase in cash flows related to lower net loss and non-cash adjustments, \$29.7 million increase in cash flows related to decreased inventories, \$19.6 million increase in cash flows related to prepaid expenses and other assets and \$9.5 million increase in cash flows related to accounts payable. The increases were partially offset by a \$21.0 million decrease in cash flows from accounts receivable.

Investing activities

In 2019, net cash used in investing activities was \$7.4 million, a \$4.4 million decrease compared to \$11.8 million used in 2018. The decrease in net cash used in investment activities was primarily attributable to \$5.3 million decrease in property, plant and equipment purchases in 2019, \$2.2 million in proceeds from the sale of property, plant and equipment, and \$1.8 million due to discontinuation of the foreign currency hedge transactions in 2018, partially offset by decrease of net cash flows from marketable securities by \$5.0 million.

In 2018, net cash used in investing activities was \$11.8 million, a \$5.5 million decrease compared to \$17.3 million used in 2017. The decrease in net cash used in investment activities was primarily attributable to \$32.5 million decrease in property, plant and equipment purchases in 2018, partially offset by \$21.6 million in proceeds from the sale of our Low Speed Transceiver Products' assets in January 2017 and \$3.4 million due to increase in payments for settlement of foreign currency hedges in 2018.

Financing activities

In 2019, net cash used in financing activities was \$14.9 million, a \$4.6 million decrease compared to \$19.5 million net cash provided by financing activities in 2018. The decrease in cash flows from investing activities was primarily attributable to a \$7.5 million decrease in net borrowings under our credit facilities, terms loans and note payables in China, partially offset by a \$1.8 million decrease in proceeds from exercise of stock options and issuance of stock under our employee stock purchase plan and a \$1.2 million decrease in proceeds from government grants.

In 2018, net cash used in financing activities was \$19.5 million, a \$62.6 million decrease compared to \$43.1 million net cash provided by financing activities in 2017. The decrease in cash flows from investing activities was primarily attributable to \$64.7 million decrease in net borrowings under our credit facilities, terms loans and note payables in China, partially offset by a \$1.2 million increase in proceeds from government grants.

Contractual obligations and commitments

The following summarizes our contractual obligations as of December 31, 2019:

(in thousands)	Payments due by period				
	Total	Less than 1 Year	1-3 Years	3-5 Years	More than 5 Years
Long-term debt ⁽¹⁾	42,452	3,097	33,523	5,400	432
Retirement obligations ⁽²⁾	4,090	520	909	414	2,247
Operating leases ⁽³⁾	23,664	3,227	6,193	5,987	8,257
Purchase commitments ⁽⁴⁾	62,089	62,089	—	—	—
Asset retirement obligations ⁽⁵⁾	3,544	15	342	—	3,187
Expected interest payments ⁽⁶⁾	3,090	1,203	1,816	70	1
Finance lease	275	95	180	—	—
Total	139,204	\$ 70,246	\$ 42,963	\$ 11,871	\$ 14,124
Uncertainty in timing of future payments:					
Restricted retained earnings	9,236				
Deferred compensation plan	619				
Total commitments	\$ 149,059				

(1) See Note 11, *Debt*, in Notes to Consolidated Financial Statements in Item 8 of Part II of this Report for additional information regarding our debt.

- (2) See Note 13, *Pension Plans*, in Notes to Consolidated Financial Statements in Item 8 of Part II of this Report for additional information regarding our retirement obligations.
- (3) We have entered into various non-cancelable operating lease agreements for our offices in China, U.S. and Canada.
- (4) This is an estimate of the amount outstanding under open purchase orders for the purchase of inventory and other goods at December 31, 2019. Certain of these open purchase orders may be cancellable without penalty.
- (5) We have an asset retirement obligation of \$3.4 million associated with our facility leases in California and \$0.1 million in Japan, included in Accrued and other current liabilities and Other noncurrent liabilities in the consolidated balance sheets as of December 31, 2019.
- (6) We calculate the expected interest payments based on our long-term debt at prevailing interest rates as of December 31, 2019.

Uncertain Tax Positions

As of December 31, 2019, the liability for uncertain tax positions was \$0.1 million. We cannot conclude on the timing of cash payments associated with our uncertain tax positions.

Rusnano Rights Agreement

In connection with our April 2012 common stock private placement transaction, we entered into a rights agreement with Rusnano. Refer to the discussion in the “Liquidity and Capital Resources – Rusnano Rights Agreement” section.

Off-balance sheet arrangements

During the years ended December 31, 2019 and 2018, we did not have any significant off-balance sheet arrangements, as defined in Item 303(a)(4)(ii) of Regulation S-K.

Recent accounting pronouncements

See Note 2, *Summary of Significant Accounting Policies*, in Notes to the Consolidated Financial Statements in Item 8 of Part II of this Report, for a full description of recent accounting pronouncements, including the expected dates of adoption and estimated effects on financial condition and results of operations, which is incorporated herein by reference.

ITEM 7A. QUANTITATIVE AND QUALITATIVE DISCLOSURES ABOUT MARKET RISK

Interest rate fluctuation risk

The primary objective of our investment activities is to preserve principal while at the same time maximizing the income we receive from our investments without significantly increasing risk. To achieve this objective, we invest our excess cash in a variety of securities, including U.S. government agency securities, corporate notes and bonds and money market funds meeting certain criteria. These securities are classified as available-for-sale which are recorded on the balance sheet at fair value. We have determined that the gross unrealized gains or losses on the available-for-sale securities at December 31, 2019 are temporary in nature. We may sell these marketable securities investments in the future to fund future operating needs.

As of December 31, 2019, we had \$27.3 million outstanding under our U.S. credit facilities and \$15.1 million outstanding under our term loans in Japan, which were subject to fluctuations in interest rates. For the year ended December 31, 2019, a hypothetical 10% increase in the interest rate could result in \$0.1 million additional annual interest expense. The hypothetical assumptions made above will be different from what actually occurs in the future. Furthermore, the computations do not anticipate actions that may be taken by our management should the hypothetical market changes actually occur over time. As a result, actual impacts on our results of operations in the future will differ from those quantified above.

Foreign currency exchange risk

Foreign currency exchange rates are subject to fluctuation and may cause us to recognize transaction gains and losses in our statements of operations. A large portion of our business is conducted through our subsidiaries in China, whose functional currency is the RMB and Japan, whose functional currency is the JPY. To the extent that transactions by these subsidiaries are in currencies other than their functional currencies, we bear the risk that fluctuations in the exchange rates of the RMB and JPY in relation to other currencies could increase our costs and expenses. During the year ended December 31, 2019, we recognized net foreign currency transaction gain of \$0.2 million. We use the U.S. dollar as the reporting currency for our consolidated financial statements. Any significant revaluation of the RMB or JPY may materially and adversely affect our results of

operations upon translation of these subsidiaries' financial statements into U.S. dollars. While we generate a significant portion of our revenue in U.S. dollars, a significant portion of our cost of goods sold are in RMB. Therefore appreciation in RMB against the U.S. dollar would negatively impact our cost of goods sold upon translation to U.S. dollars. For example, for the year ended December 31, 2019, a 10% appreciation in RMB against the U.S. dollar would have resulted in an approximately \$1.0 million increase in our cost of goods sold.

In July 2016, we commenced entering into hedging transactions to reduce the short-term impact of foreign currency fluctuations. Starting in the second half of 2018, we discontinued entering into foreign currency forward contracts. This may increase the risks to us arising from the short-term impact of foreign currency fluctuations. In addition, our currency exchange variations may be magnified by any Chinese exchange control regulations that restrict our ability to convert RMB into foreign currency.

Inflation risk

Inflationary factors, such as increases in our cost of goods sold and operating expenses, may adversely affect our results of operations. Although we do not believe that inflation has had a material impact on our financial position or results of operations to date, an increase in the rate of inflation in the future, particularly in China, may have an adverse effect on our levels of gross profit and operating profit as a percentage of revenue if the sales prices for our products do not proportionately increase with these increased expenses.

ITEM 8. FINANCIAL STATEMENTS AND SUPPLEMENTARY DATA

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REPORT OF INDEPENDENT REGISTERED PUBLIC ACCOUNTING FIRM

To the Stockholders and the Board of Directors of NeoPhotonics Corporation

Opinion on the Financial Statements

We have audited the accompanying consolidated balance sheets of NeoPhotonics Corporation and subsidiaries (the "Company") as of December 31, 2019 and 2018, the related consolidated statements of operations, comprehensive loss, stockholders' equity, and cash flows, for each of the three years in the period ended December 31, 2019, and the related notes (collectively referred to as the "financial statements"). In our opinion, the financial statements present fairly, in all material respects, the financial position of the Company as of December 31, 2019 and 2018, and the results of its operations and its cash flows for each of the three years in the period ended December 31, 2019, in conformity with accounting principles generally accepted in the United States of America.

We have also audited, in accordance with the standards of the Public Company Accounting Oversight Board (United States) (PCAOB), the Company's internal control over financial reporting as of December 31, 2019, based on criteria established in *Internal Control - Integrated Framework (2013)* issued by the Committee of Sponsoring Organizations of the Treadway Commission and our report dated February 27, 2020, expressed an unqualified opinion on the Company's internal control over financial reporting.

Change in Accounting Principle

As discussed in Note 2 to the financial statements, the Company has changed its method of accounting for leases in fiscal year 2019 due to the adoption of Accounting Standards Update (ASU) 2016-02, Leases (Topic 842) and related amendments.

Basis for Opinion

These financial statements are the responsibility of the Company's management. Our responsibility is to express an opinion on the Company's financial statements based on our audits. We are a public accounting firm registered with the PCAOB and are required to be independent with respect to the Company in accordance with the U.S. federal securities laws and the applicable rules and regulations of the Securities and Exchange Commission and the PCAOB.

We conducted our audits in accordance with the standards of the PCAOB. Those standards require that we plan and perform the audit to obtain reasonable assurance about whether the financial statements are free of material misstatement, whether due to error or fraud. Our audits included performing procedures to assess the risks of material misstatement of the financial statements, whether due to error or fraud, and performing procedures that respond to those risks. Such procedures included examining, on a test basis, evidence regarding the amounts and disclosures in the financial statements. Our audits also included evaluating the accounting principles used and significant estimates made by management, as well as evaluating the overall presentation of the financial statements. We believe that our audits provide a reasonable basis for our opinion.

San Jose, California

February 27, 2020

We have served as the Company's auditor since 2014.

NEOPHOTONICS CORPORATION
CONSOLIDATED BALANCE SHEETS

(In thousands, except per share)	December 31,	
	2019	2018
ASSETS		
Current assets:		
Cash and cash equivalents	\$ 70,467	\$ 58,185
Short-term investments	7,638	7,481
Restricted cash	10,972	11,053
Accounts receivable, net of allowance for doubtful accounts	68,890	74,751
Inventories	46,930	52,159
Assets held for sale	—	2,971
Prepaid expenses and other current assets	25,851	26,605
Total current assets	230,748	233,205
Property, plant and equipment, net	81,133	100,090
Operating lease right-of-use assets	15,603	—
Purchased intangible assets, net	2,151	3,018
Goodwill	1,115	1,115
Other long-term assets	3,929	3,148
Total assets	\$ 334,679	\$ 340,576
LIABILITIES AND STOCKHOLDERS' EQUITY		
Current liabilities:		
Accounts payable	\$ 58,554	\$ 58,403
Notes payable and short-term borrowing	—	4,795
Current portion of long-term debt	3,044	2,897
Accrued and other current liabilities	47,481	50,288
Total current liabilities	109,079	116,383
Long-term debt, net of current portion	39,237	50,454
Operating lease liabilities, non-current	16,543	—
Other noncurrent liabilities	9,614	13,499
Total liabilities	174,473	180,336
Commitments and contingencies (Note 14)		
Stockholders' equity:		
Preferred stock, \$0.0025 par value, 10,000 shares authorized, no shares issued or outstanding	—	—
Common stock, \$0.0025 par value, 100,000 shares authorized		
At December 31, 2019, 48,526 shares issued and outstanding; at December 31, 2018, 46,378 shares issued and outstanding	121	116
Additional paid-in capital	582,504	564,722
Accumulated other comprehensive loss	(7,871)	(7,126)
Accumulated deficit	(414,548)	(397,472)
Total stockholders' equity	160,206	160,240
Total liabilities and stockholders' equity	\$ 334,679	\$ 340,576

See Accompanying Notes to Consolidated Financial Statements.

NEOPHOTONICS CORPORATION
CONSOLIDATED STATEMENTS OF OPERATIONS

(In thousands, except per share value)	Years Ended December 31,		
	2019	2018	2017
Revenue	\$ 356,804	\$ 322,540	\$ 292,894
Cost of goods sold	267,991	256,367	231,415
Gross profit	88,813	66,173	61,479
Operating expenses:			
Research and development	57,634	53,818	58,287
Sales and marketing	16,088	16,728	17,760
General and administrative	29,759	30,403	34,453
Amortization of purchased intangible assets	119	475	472
Asset sale related costs	397	427	130
Restructuring charges	261	3,135	3,934
Litigation settlement	—	2,645	—
Loss (gain) on asset sale	(903)	200	(2,193)
Total operating expenses	103,355	107,831	112,843
Loss from operations	(14,542)	(41,658)	(51,364)
Interest income	376	397	198
Interest expense	(1,919)	(2,493)	(1,362)
Other income, net	642	1,446	104
Total interest and other income (expense), net	(901)	(650)	(1,060)
Loss before income taxes	(15,443)	(42,308)	(52,424)
Provision for income taxes	(1,633)	(1,329)	(909)
Net loss	\$ (17,076)	\$ (43,637)	\$ (53,333)
Basic and diluted net loss per share	\$ (0.36)	\$ (0.97)	\$ (1.23)
Weighted average shares used to compute basic and diluted net loss per share	47,304	45,144	43,431

See Accompanying Notes to Consolidated Financial Statements.

NEOPHOTONICS CORPORATION
CONSOLIDATED STATEMENTS OF COMPREHENSIVE LOSS

(in thousands)	Years ended December 31,		
	2019	2018	2017
Net loss	\$ (17,076)	\$ (43,637)	\$ (53,333)
Other comprehensive income (loss):			
Foreign currency translation adjustments, net of zero tax	(745)	(7,464)	8,803
Unrealized gain on available-for-sale securities, net of zero tax	—	1	17
Defined benefit pension plans:			
Loss arising during the period	—	(95)	(32)
Tax	—	34	11
Total other comprehensive income (loss)	(745)	(7,524)	8,799
Comprehensive loss	\$ (17,821)	\$ (51,161)	\$ (44,534)

See Accompanying Notes to Consolidated Financial Statements.

NEOPHOTONICS CORPORATION
CONSOLIDATED STATEMENTS OF STOCKHOLDERS' EQUITY

(In thousands)	Common stock		Additional paid-in capital	Accumulated other comprehensive income (loss)	Accumulated deficit	Total stockholders' equity
	Shares	Amount				
Balances at December 31, 2016	42,526	\$ 106	\$ 532,378	\$ (8,401)	\$ (298,678)	\$ 225,405
Comprehensive income (loss)	—	—	—	8,799	(53,333)	(44,534)
Issuance of common stock upon exercise of stock options	665	2	2,481	—	—	2,483
Issuance of common stock under employee stock purchase plan	349	1	2,392	—	—	2,393
Issuance of common stock for vested restricted stock units	806	2	(2)	—	—	—
Tax withholding related to vesting of restricted stock units	(127)	—	(998)	—	—	(998)
Stock-based compensation costs	—	—	9,702	—	—	9,702
Balances at December 31, 2017	44,219	111	545,953	398	(352,011)	194,451
Impact of adoption of new accounting standard ASU 2016-16	—	—	—	—	(1,824)	(1,824)
Comprehensive loss	—	—	—	(7,524)	(43,637)	(51,161)
Issuance of common stock upon exercise of stock options	779	2	3,420	—	—	3,422
Issuance of common stock under employee stock purchase plan	404	1	2,190	—	—	2,191
Issuance of common stock for vested restricted stock units	1,124	2	(2)	—	—	—
Tax withholding related to vesting of restricted stock units	(148)	—	(954)	—	—	(954)
Stock-based compensation costs	—	—	14,115	—	—	14,115
Balances at December 31, 2018	46,378	116	564,722	(7,126)	(397,472)	160,240
Comprehensive loss	—	—	—	(745)	(17,076)	(17,821)
Issuance of common stock in exchange for research and development services, net of issuance costs of \$46	442	1	2,453	—	—	2,454
Issuance of common stock upon exercise of stock options	486	1	1,892	—	—	1,893
Issuance of common stock under employee stock purchase plan	357	1	1,952	—	—	1,953
Issuance of common stock for vested restricted stock units	1,018	2	(2)	—	—	—
Tax withholding related to vesting of restricted stock units	(155)	—	(733)	—	—	(733)
Stock-based compensation costs	—	—	12,220	—	—	12,220
Balances at December 31, 2019	48,526	\$ 121	\$ 582,504	\$ (7,871)	\$ (414,548)	\$ 160,206

See Accompanying Notes to Consolidated Financial Statements.

NEOPHOTONICS CORPORATION
CONSOLIDATED STATEMENTS OF CASH FLOWS

(In thousands)	Years ended December 31,		
	2019	2018	2017
Cash flows from operating activities			
Net loss	\$ (17,076)	\$ (43,637)	\$ (53,333)
Adjustments to reconcile net loss to net cash provided by (used in) operating activities:			
Depreciation and amortization	30,788	31,105	28,350
Stock-based compensation expense	12,456	14,142	8,206
Deferred taxes	(287)	(328)	792
Amortization of investment, debt and other	414	438	247
Loss (gain) on disposal of property and equipment	(872)	1,322	(1,746)
Amortization of operating lease right-of-use assets	1,774	—	—
Loss (gain) on foreign currency hedges	—	2,220	(2,104)
Allowance for doubtful accounts	(13)	61	577
Write-down of inventories	7,847	6,133	8,349
Foreign currency remeasurement and other, net	(910)	(3,944)	2,583
Issuance of common stock in exchange for research and development services	2,500	—	—
Asset impairment charges	—	—	324
Change in assets and liabilities:			
Accounts receivable	5,838	(7,874)	13,166
Inventories	(2,891)	7,368	(22,347)
Prepaid expenses and other assets	429	8,162	(11,409)
Accounts payable	(41)	(1,411)	(10,874)
Accrued and other liabilities	(5,269)	5,838	6,452
Net cash provided by (used in) operating activities	34,687	19,595	(32,767)
Cash flows from investing activities			
Purchase of property, plant and equipment	(9,532)	(14,867)	(47,409)
Proceeds from sale of property, plant and equipment and other assets	2,242	32	21,809
Purchase of marketable securities	(157)	(920)	(52,062)
Proceeds from sale of marketable securities	—	5,000	52,272
Proceeds from maturity of marketable securities	—	750	6,458
Settlement of foreign currency hedges	—	(1,776)	1,618
Net cash used in investing activities	(7,447)	(11,781)	(17,314)
Cash flows from financing activities			
Proceeds from exercise of stock options and issuance of stock under ESPP	3,846	5,614	4,893
Offering costs	(46)	—	—
Tax withholding on restricted stock units	(733)	(954)	(998)
Payments for public stock offering, net of offering costs	—	—	(117)
Proceeds from bank loans	5,000	34,305	112,834
Repayment of bank loans	(18,084)	(63,040)	(68,492)
Proceeds from issuance of notes payable	—	7,137	6,621
Repayment of finance lease liabilities	(87)	—	—
Repayment of notes payable	(4,774)	(3,732)	(11,639)
Proceeds from government grants	—	1,210	—
Net cash (used in) provided by financing activities	(14,878)	(19,460)	43,102
Effect of exchange rates on cash, cash equivalents and restricted cash	(161)	(680)	1,958
Net increase (decrease) in cash, cash equivalents and restricted cash	12,201	(12,326)	(5,021)
Cash, cash equivalents and restricted cash at the beginning of the period	69,238	81,564	86,585
Cash, cash equivalents and restricted cash at the end of the period	\$ 81,439	\$ 69,238	\$ 81,564
Supplemental disclosure of cash flow information:			
Cash paid for interest	\$ 278	\$ 1,600	\$ 732
Net cash paid (received) for income taxes	1,289	(1,383)	5,388
Supplemental disclosure of noncash investing and financing activities:			
Neo Russia penalty settlement	2,000	—	—
Debt interest rolled into principal	1,368	—	—
Government approved expenditures incurred after receipt of government funds	579	—	—
Decrease (increase) in unpaid property, plant and equipment	(374)	8,548	6,072
Capital lease	—	362	—

See Accompanying Notes to Consolidated Financial Statements.

NEOPHOTONICS CORPORATION
NOTES TO CONSOLIDATED FINANCIAL STATEMENTS

1. The Company and basis of presentation

Business and organization

NeoPhotonics Corporation and its subsidiaries (NeoPhotonics or the Company) develops, manufactures and sells optoelectronic products that transmit, receive and switch high speed digital optical signals for communications networks. The Company sells its products worldwide, primarily to leading network equipment manufacturers.

Certain Significant Risks and Uncertainties

The Company operates in a dynamic industry and, accordingly, can be affected by a variety of factors. For example, any of the following areas could have a negative effect on the Company in terms of its future financial position, results of operations or cash flows: the general state of the U.S., China and world economies; the highly cyclical nature of the industries the Company serves; the loss of any of a small number of its larger customers; ability to obtain additional financing; inability to meet certain debt covenants; failure to successfully integrate completed acquisitions; fundamental changes in the technology underlying the Company's products; the hiring, training and retention of key employees; successful and timely completion of product design efforts; and new product design introductions by competitors.

Consolidation

The consolidated financial statements include the accounts of the Company and its wholly owned subsidiaries. Intercompany accounts and transactions have been eliminated in consolidation.

2. Summary of significant accounting policies

Use of estimates

The preparation of financial statements in accordance with U.S. GAAP requires management to make estimates and assumptions that affect the reported amounts of assets and liabilities and disclosure of contingent assets and liabilities at the date of the financial statements and the reported revenue and expenses during the reporting period. Significant estimates made by management include: the useful lives of property, plant and equipment and intangible assets as well as future cash flows to be generated by those assets; fair values of identifiable assets acquired and liabilities assumed in business combinations; allowances for doubtful accounts; valuation allowances for deferred tax assets; write off of excess and obsolete inventories; the valuation of the Rusnano payment derivative and the valuations and recognition of stock-based compensation. Actual results could differ from these estimates.

Concentration of credit risk and significant customers

Financial instruments that potentially subject the Company to concentrations of credit risk are primarily cash and cash equivalents and trade accounts receivable. The Company's investment policy requires cash and cash equivalents to be placed with high-credit quality institutions and limits on the amount of credit risk from any one issuer. The Company performs ongoing credit evaluations of its customers' financial condition whenever deemed necessary and generally does not require collateral. The Company maintains an allowance for doubtful accounts based upon the expected collectability of all accounts receivable, which takes into consideration an analysis of historical bad debts, specific customer creditworthiness and current economic trends.

Customers accounting for more than 10% of our total revenue and revenue from our top five customers for the years ended December 31, 2019, 2018 and 2017 were as follows:

	Years Ended December 31,		
	2019	2018	2017
Percent of revenue from customers accounting for 10% or more of total revenue:			
Huawei Technologies Co., Ltd	41%	46%	40%
Ciena Corporation	29%	24%	16%
Percent of revenue from top five customers	84%	87%	78%

NEOPHOTONICS CORPORATION
NOTES TO CONSOLIDATED FINANCIAL STATEMENTS (continued)

As of December 31, 2019, two customers accounted for approximately 37% and 19%, respectively, of the Company's total accounts receivable. As of December 31, 2018, two customers accounted for 35% and 17% of the Company's total accounts receivable.

Restricted cash

As a condition of the notes payable lending arrangements and the line of credit facilities, the Company is required to keep a compensating balance at the issuing banks. In addition, the Company also maintained restricted cash in connection with the asset purchase agreement executed in December 2016 (see Note 9), government grants received in advance and cash balances temporarily restricted for regular business operations until a legal dispute is resolved (see Note 14). These balances have been excluded from the Company's cash and cash equivalents balance and are classified as restricted cash in the Company's consolidated balance sheets. As of December 31, 2019 and 2018, the amount of restricted cash was \$11.0 million and \$11.1 million, respectively.

Cash, cash equivalents and investments

Highly liquid investments with a maturity of 90 days or less at the date of purchase are considered cash equivalents, with the exception of money market funds and commercial paper which are classified as short-term investments. Marketable securities are reported at fair value and are classified as available-for-sale investments in our current assets because they represent investments of cash available for current operations and for strategic reasons. As a result, the Company recorded all its marketable securities in short-term investments regardless of the contractual maturity date of the securities.

The Company regularly reviews its investment portfolio to identify and evaluate investments that have indications of possible impairment. Factors considered in determining whether a loss is other-than-temporary include: the length of time and extent to which the fair market value has been lower than the cost basis, the financial condition and near-term prospects of the investee, credit quality, likelihood of recovery, and the Company's ability to hold the investment for a period of time sufficient to allow for any anticipated recovery in fair market value.

Unrealized gains and losses, net of tax, are included in accumulated other comprehensive loss as a separate component of stockholders' equity on the consolidated balance sheets. The amortization of premiums and discounts on the investments, and realized gains and losses on available-for-sale securities are included in other income, net in the consolidated statements of operations. The Company uses the specific-identification method to determine cost in calculating realized gains and losses upon the sale of its marketable securities.

Fair Value Measurements

Fair value is defined as the price at which an asset could be exchanged in a current transaction between knowledgeable, willing parties. A liability's fair value is defined as the amount that would be paid to transfer the liability to a new obligor, not the amount that would be paid to settle the liability with the creditor. Where available, fair value is based on observable market prices or parameters or derived from such prices or parameters. Where observable prices or inputs are not available, valuation models are applied. These valuation techniques involve some level of management estimation and judgment, the degree of which is dependent on the price transparency for the instruments or market and the instruments' complexity. Valuation techniques used to measure fair value must maximize the use of observable inputs and minimize the use of unobservable inputs. The authoritative accounting guidance describes a fair value hierarchy based on three levels of inputs that may be used to measure fair value, of which the first two are considered observable and the last is considered unobservable. These levels of inputs are as follows:

Level 1—Observable inputs such as unadjusted, quoted prices in active markets for identical assets or liabilities at the measurement date.

Level 2—Inputs (other than quoted prices included in Level 1) are either directly or indirectly observable for the asset or liability. These include quoted prices for similar assets or liabilities in active markets and quoted prices for identical or similar assets or liabilities in markets that are not active.

Level 3—Unobservable inputs that reflect management's best estimate of what market participants would use in pricing the asset or liability at the measurement date. Consideration is given to the risk inherent in the valuation technique and the risk inherent in the inputs to the model.

For marketable securities measured at fair value using Level 2 inputs, the Company reviews trading activity and pricing for these investments as of the measurement date. When sufficient quoted pricing for identical securities is not available, the

NEOPHOTONICS CORPORATION
NOTES TO CONSOLIDATED FINANCIAL STATEMENTS (continued)

Company uses market pricing and other observable market inputs for similar securities obtained from various third party data providers. These inputs either represent quoted prices for similar assets in active markets or have been derived from observable market data.

Accounts receivable

Accounts receivable include trade receivables and notes receivable from customers. The notes are generally due within nine months. The Company receives notes receivable in exchange for accounts receivable from certain customers in China that are secured by the customer's affiliated financial institution.

An allowance for doubtful accounts is calculated based on the aging of the Company's trade receivables, historical experience, and management judgment. The Company writes off trade receivables against the allowance when management determines a balance is uncollectible and is no longer actively pursuing collection of the receivable.

Inventories

Inventories consist of on-hand raw materials, work-in-progress inventories and finished goods. Raw materials and work-in-progress inventories are stored mainly on the Company's premises. Finished goods are stored on the Company's premises as well as on consignment at certain customer sites.

Inventories are stated at the lower of standard cost, which approximates actual cost determined on the weighted average basis, or net realizable value. Inventories are recorded using the first-in, first-out method. The Company routinely evaluates quantities and values of inventories in light of current market conditions and market trends, and records a write-down for quantities in excess of demand and product obsolescence. The evaluation may take into consideration historic usage, expected demand, anticipated sales price, new product development schedules, the effect new products might have on the sale of existing products, product obsolescence, customer concentrations, product merchantability and other factors. Market conditions are subject to change and actual consumption of inventory could differ from forecasted demand. The Company also regularly reviews the cost of inventories against their estimated market value and records a lower of cost or market write-down for inventories that have a cost in excess of estimated market value, resulting in a new cost basis for the related inventories which is not reversed.

Business Combinations

The Company allocates the fair value of purchase consideration to the tangible and intangible assets acquired and liabilities assumed based on their estimated fair values as of the close of acquisition. The excess of the fair value of purchase consideration over the fair values of these identifiable assets and liabilities is recorded as goodwill. When determining the fair values of assets acquired and liabilities assumed, management makes significant estimates and assumptions through established and generally accepted valuation techniques.

Fair value estimates are based on the assumptions management believes a market participant would use in pricing the asset or liability. Critical estimates in valuing certain intangible assets include, but are not limited to, future expected cash flows from customer relationships and acquired patents and developed technology as well as discount rates. Management's estimates of fair value are based upon assumptions believed to be reasonable, but which are inherently uncertain and unpredictable and, as a result, actual results may differ from estimates.

Amounts recorded in a business combination may change during the measurement period, which is a period not to exceed one year from the date of acquisition, as additional information about conditions existing at the acquisition date becomes available.

Goodwill

Goodwill is reviewed for impairment annually in the fourth fiscal quarter or more frequently if events or changes in circumstances indicate that the carrying value of goodwill may not be recoverable. The Company will assess the qualitative factors to determine whether it is more likely than not that the fair value of its reporting unit is less than its carrying amount as a basis for determining whether it is necessary to perform the two-step goodwill impairment. If the Company determines that it is more likely than not that its fair value is less than its carrying amount, then the two-step goodwill impairment test is performed. The first step, identifying a potential impairment, compares the fair value of the reporting unit with its carrying amount. If the carrying amount exceeds its fair value, the second step would need to be performed; otherwise, no further steps are required. The second step, measuring the impairment loss, compares the implied fair value of the goodwill with the carrying amount of the goodwill. Any excess of the goodwill carrying amount over the implied fair value is recognized as an impairment loss, and

NEOPHOTONICS CORPORATION
NOTES TO CONSOLIDATED FINANCIAL STATEMENTS (continued)

the carrying value of goodwill is written down to fair value. The Company had no goodwill impairment in 2019, 2018 and 2017.

Long-lived assets

Property, plant and equipment are stated at cost, net of accumulated depreciation and amortization. Repairs and maintenance costs are expensed as incurred. Depreciation and amortization are computed using the straight-line method over the following estimated useful lives:

Buildings	20-30 years
Machinery and equipment	2-7 years
Furniture, fixtures and office equipment	3-5 years
Software	5-7 years
Leasehold improvements	life of the asset or lease term, if shorter

Intangible assets acquired in a business combination are recorded at fair value. Identifiable finite-lived intangible assets are amortized over the period of estimated benefit using the straight-line method, reflecting the pattern of economic benefits associated with these assets. The estimated useful lives of the Company's finite-lived intangible assets generally range from two to seven years. The acquired land use rights in China have an estimated useful life of 45 years.

Assets held for sale are measured at the lower of carrying value or the fair value less cost to sell. The carrying value of intangible assets and other long-lived assets is reviewed on a regular basis for the existence of facts or circumstances, both internally and externally, that may suggest impairment. Some factors which the Company considers to be triggering events for impairment review include a significant decrease in the market value of an asset, a significant change in the extent or manner in which an asset is used, a significant adverse change in the business climate that could affect the value of an asset, an accumulation of costs for an asset in excess of the amount originally expected, a current period operating loss or cash flow decline combined with a history of operating loss or cash flow uses or a projection that demonstrates continuing losses and a current expectation that, it is more likely than not, a long-lived asset will be disposed of at a loss before the end of its estimated useful life.

If one or more of such facts or circumstances exist, the Company will evaluate the carrying value of long-lived assets to determine if impairment exists by comparing it to estimated undiscounted future cash flows over the remaining useful life of the assets. If the carrying value of the assets is greater than the estimated future cash flow, the assets are written down to the estimated fair value. The Company's cash flow estimates contain management's best estimates, using appropriate and customary assumptions and projections at the time. Any write-down would be treated as a permanent reduction in the carrying amount of the asset and an operating loss would be recognized.

The Company incurred asset impairment charges of \$1.0 million and \$0.4 million in restructuring charges in 2018 and 2017, respectively. There were no asset impairment charges in 2019 (see Note 10).

Leases

The Company determines if an arrangement is a lease at inception. Operating leases are included in operating lease right-of-use ("ROU") assets, other current liabilities and operating lease liabilities on the Company's consolidated balance sheet. Finance leases are included in property, plant and equipment, current portion of long-term debt and long-term debt, net of current portion on the consolidated balance sheets.

Operating lease ROU assets and operating lease liabilities are recognized based on the present value of the future minimum lease payments over the lease term at commencement date. As most of our leases do not provide an implicit rate, the Company uses an estimate of its incremental borrowing rate based on observed market data and other information available at the lease commencement date. The operating lease ROU assets also include any lease payments made and exclude lease incentives. Lease terms may include options to extend or terminate the lease when it is reasonably certain that the Company will exercise such options. The Company does not record leases on the consolidated balance sheet with a term of one year or less. The Company does not separate lease and non-lease components but rather account for each separate component as a single lease component for all underlying classes of assets. Variable lease payments are expensed as incurred and are not included within the operating lease ROU asset and lease liability calculation. Variable lease payments primarily include

NEOPHOTONICS CORPORATION
NOTES TO CONSOLIDATED FINANCIAL STATEMENTS (continued)

reimbursements of costs incurred by lessors for common area maintenance and utilities. Lease expense for minimum operating lease payments is recognized on a straight-line basis over the lease term.

Revenue recognition

See Note 3.

Product warranties

The Company generally provides warranties to cover defects in workmanship, materials and manufacturing for a period of one to three years to meet the stated functionality as agreed to in each sales arrangement. Products are tested against specified functionality requirements prior to delivery, but the Company nevertheless from time to time experiences claims under its warranty guarantees. The Company accrues for estimated warranty costs under those guarantees based upon historical experience, and for specific items, at the time their existence is known and the amounts are determinable.

Research and development

Research and development expense consists of personnel costs, including stock-based compensation expense, for the Company's research and development personnel and product development costs, including engineering services, development software and hardware tools, depreciation of capital equipment and facility costs. Research and development costs are expensed as incurred.

Advertising costs

Advertising costs are expensed as incurred and, to date, have not been significant.

Stock-based compensation

The Company grants stock-based awards to employees, consultants and directors. The stock-based awards, including stock options, restricted stock units, employee stock purchase rights, stock appreciation units and market-based awards, are accounted for at estimated fair values. Vesting of stock-based awards is generally subject to the grantee's continuing service to the Company.

The Company generally determines the fair value of stock options and stock appreciation rights utilizing the Black-Scholes-Merton option-pricing model, or a lattice-binomial option-pricing model for stock-based awards with a market condition. The fair value of employee grants is measured on the date of grant and then recognized over the period during which an employee is required to provide services in exchange for the award, known as the requisite service period (usually the vesting period) on a straight-line basis. The fair value of non-employee grants is measured on the date of grant and then marked to market until vest dates and then recognized over the requisite service period.

The Company records expense and an equal adjustment to the liability for stock appreciation units equal to the fair value of the vested portion of the awards as of each period end. Each reporting period thereafter, compensation expense will be recorded based on the remaining service period and the then fair value of the award until vesting of the award is completed. After vesting is completed, the Company will continue to re-measure the fair value of the liability each reporting period until the award is exercised or expires, with changes in the fair value of the liability recorded in the consolidated statements of operations.

Restricted stock units are valued at the closing sales price as quoted on the New York Stock Exchange on the date of grant, and are converted into shares of common stock upon vesting on a one-for-one basis. The compensation expense related to the restricted stock units is determined using the fair value of common stock on the date of grant, and the expense is recognized on a straight-line basis over the vesting period.

Employee stock purchase rights are accounted for at fair value, utilizing the Black-Scholes-Merton option-pricing model.

Stock-based compensation expense for modified stock-based awards are recognized using the pool approach, under which the remaining compensation cost from the original awards plus the incremental costs, if any, of the related modified awards is recognized in its entirety over the remaining portion of the requisition service period of the corresponding modified awards.

Stock-based compensation expense recognized at fair value includes the impact of estimated forfeitures. The Company estimates future forfeitures at the date of grant and revises the estimates, if necessary, in subsequent periods if actual forfeitures differ from those estimates.

NEOPHOTONICS CORPORATION
NOTES TO CONSOLIDATED FINANCIAL STATEMENTS (continued)

Income taxes

Income taxes are accounted for under the asset and liability method. Deferred tax assets and liabilities are recognized for the future tax consequences attributable to differences between the carrying amounts of existing assets and liabilities in the financial statements and their respective tax bases, and operating loss and tax credit carryforwards. Deferred tax assets and liabilities are measured using enacted tax rates expected to apply to taxable income in the years in which those temporary differences are expected to be recovered or settled. The effect on deferred tax assets and liabilities from a change in tax rates is recognized in the consolidated statement of operations in the period that includes the enactment date.

The Company operates in various tax jurisdictions and is subject to audit by various tax authorities. In preparing the Company's consolidated financial statements, the Company is required to estimate its taxes in each of the jurisdictions in which it operates. The Company estimates actual current tax exposure as well as assesses temporary differences resulting from different treatment of items, such as accruals and allowances not currently deductible for tax purposes. These differences result in deferred tax assets which represent future tax benefits to be received when certain expenses previously recognized in the financial statements become deductible expenses under applicable income tax laws, or loss credit carryforwards are utilized.

In assessing the realizability of deferred tax assets, management considers whether it is more likely than not that some portion or all of a deferred tax asset will be realized. The ultimate realization of deferred tax assets is dependent upon the generation of future taxable income during the periods in which those temporary differences become deductible. A valuation allowance is recorded for loss carryforwards and other deferred tax assets where it is more likely than not that such deferred tax assets will not be realized. The Company classifies its net deferred tax assets as other long-term assets and deferred tax liabilities as noncurrent liabilities on its consolidated balance sheet.

Foreign currency

Generally the functional currency of the Company's international subsidiaries is the local currency. The Company translates the financial statements of these subsidiaries to U.S. dollars using month-end rates of exchange for assets and liabilities, and average rates of exchange for revenue, costs, and expenses. Translation gains and losses are recorded in accumulated other comprehensive income (loss) as a component of stockholders' equity. Effective July 1, 2016, the Company has established a hedging program using monthly forward exchange contracts as economic hedges to protect against volatility of foreign exchange rate exposure of its net intercompany activities based on a cost-benefit analysis that considers that magnitude of the exposure, the volatility of the exchange rate and the cost of the hedging instruments. The forward contracts are not designated for hedge accounting and are marked to market at fair value and reported as either other current assets or accounts payable. Any changes in the fair value are recorded as foreign exchange gain (loss) and help mitigate the changes in the value of the underlying net intercompany balances. The Company recognized \$2.2 million loss in 2018 relating to its foreign currency contracts within other income, net. Net foreign exchange gain (loss) was \$0.2 million, \$1.4 million, and \$(0.5) million in 2019, 2018, and 2017, respectively. These gains and losses were recorded as other income, net in the Company's consolidated statements of operations. The Company presents the cash flows relating to these foreign exchange contracts as investing activities in its consolidated statements of cash flows. During the six months ended December 31, 2018, the Company temporarily discontinued entering into forward exchange contracts. This may increase the risks to us arising from the short-term impact of foreign currency fluctuations.

Net income (loss) per share

Basic net income (loss) per share is calculated by dividing net income (loss) by the weighted average number of common shares outstanding for the period. Diluted net income (loss) per share is calculated by dividing net income (loss) by the weighted average number of common shares and potential dilutive common share equivalents outstanding during the period if the effect is dilutive.

Accounting standards update recently adopted

In February 2016, the Financial Accounting Standards Board ("FASB") issued ASU 2016-2, Leases (Topic 842) ("ASU 2016-2"). ASU 2016-2 introduces a lessee model that requires recognition of assets and liabilities arising from qualified leases on the consolidated balance sheets and consolidated statements of operations and to disclose qualitative and quantitative information about lease transactions. It is effective for interim and annual periods beginning after December 15, 2018 using the modified retrospective transition method. In July 2018, the FASB issued ASU 2018- 11, Leases (ASC 842): Targeted Improvements. The update provides an optional transition method that allows entities to change the date of initial application to the beginning of the period of adoption. The Company adopted the guidance on January 1, 2019 under the optional transition

NEOPHOTONICS CORPORATION
NOTES TO CONSOLIDATED FINANCIAL STATEMENTS (continued)

method and the consolidated balance sheet as of December 31, 2018 continue to be reported under the previous lease accounting standard, ASC 840.

Certain optional practical expedients are allowed. The Company elected the package of practical expedients permitted under the transition guidance, which allowed the Company to carryforward historical lease classification, assessment on whether a contract was or contains a lease, and initial direct costs for any leases that existed prior to January 1, 2019. The Company also elected to combine lease and non-lease components and to keep leases with an initial term of 12 months or less off the consolidated balance sheet.

As a result of adopting Topic 842 on January 1, 2019, the Company recognized operating lease right-of-use assets of \$17.3 million and corresponding operating lease liabilities of \$20.8 million from existing leases on the Company's consolidated balance sheet. Refer to Note 12 for further details. The adoption of Topic 842 had no impact on the Company's consolidated statement of operations or consolidated statement of cash flows.

Recent accounting standards update not yet effective

In January 2017, the FASB issued ASU 2017-4, Intangibles-Goodwill and Other (Topic 350): Simplifying the Test for Goodwill Impairment ("ASU 2017-4"). This standard amends the goodwill impairment test to compare the fair value of a reporting unit with its carrying amount and recognize an impairment charge for the amount by which the carrying amount exceeds the reporting unit's fair value, up to the total amount of goodwill allocated to that reporting unit. ASU 2017-4 is effective prospectively for interim and annual periods beginning after December 15, 2019. Early adoption is permitted for interim and annual goodwill impairment tests performed on testing dates after January 1, 2017. The adoption of this standard is not expected to have a material impact on the Company's consolidated financial statements and related disclosures.

In June 2016, the FASB issued ASU 2016-13, Financial Instruments – Credit Losses (Topic 326): Measurement of Credit Losses on Financial Instruments ("ASU 2016-13"). ASU 2016-13 amends existing guidance on the impairment of financial assets and adds an impairment model that is based on expected losses rather than incurred losses and requires an entity to recognize as an allowance its estimate of expected credit losses for its financial assets. An entity will apply this guidance through a cumulative-effect adjustment to retained earnings upon adoption (a modified-retrospective approach) while a prospective transition approach is required for debt securities for which an other-than-temporary impairment had been recognized before the effective date. It is effective for the Company's annual and interim reporting periods beginning after December 15, 2019. Early adoption is permitted. The adoption of this standard is not expected to have a material impact on the Company's consolidated financial statements and related disclosures.

3. Revenue

Adoption of ASC Topic 606, "Revenue from Contracts with Customers"

On January 1, 2018, the Company adopted Topic 606 using the full retrospective method which required it to restate each prior reporting period presented. The adoption did not have a material impact on the Company's consolidated financial statements and as a result, no changes were made to prior reporting periods presented.

Product revenue

The Company develops, manufactures and sells optoelectronic products that transmit, receive, modify and switch high speed digital optical signals for communications networks. Revenue is derived primarily from the sale of hardware products. The Company sells its products worldwide, primarily to leading network equipment manufacturers.

Revenue recognition

Revenue is recognized upon transfer of control of promised products or services to customers in an amount that reflects the consideration the Company expects to receive in exchange for those products or services. The Company generally bears all costs, risk of loss or damage and retains title to the goods up to the point of transfer of control of promised products to customer. Revenue related to the sale of consignment inventories at customer vendor managed locations is not recognized until the products are pulled from consignment inventories by customers. In instances where acceptance of the product or solutions is specified by the customer, revenue is deferred until such required acceptance criteria have been met. Shipping and handling costs are included in the cost of goods sold. The Company presents revenue net of sales taxes and any similar assessments.

NEOPHOTONICS CORPORATION
NOTES TO CONSOLIDATED FINANCIAL STATEMENTS (continued)

Nature of products

Revenue from sale of hardware products is recognized upon transfer of control to the customer. The performance obligation for the sale of hardware products is satisfied at a point in time. The Company has aligned its products in two groups - High Speed Products and Network Products and Solutions. The following presents revenue by product group (in thousands):

	Years Ended December 31,		
	2019	2018	2017
High Speed Products	\$ 323,804	\$ 275,803	\$ 241,780
Network Products and Solutions	33,000	46,737	51,114
Total revenue	<u>\$ 356,804</u>	<u>\$ 322,540</u>	<u>\$ 292,894</u>

The following table presents the Company's revenue information by geographical region. Revenue is classified based on the ship to location requested by the customer. Such classification recognizes that for many customers, including those in North America or in Europe, designated shipping points are often in China or elsewhere in Asia (in thousands):

	Years Ended December 31,		
	2019	2018	2017
China	\$ 186,157	\$ 187,277	\$ 161,637
Americas	82,741	70,906	52,973
Rest of world	87,906	64,357	78,284
Total revenue	<u>\$ 356,804</u>	<u>\$ 322,540</u>	<u>\$ 292,894</u>

Certain prior period amounts have been reclassified to conform to the current period presentation.

Deferred revenue

The Company records deferred revenue when cash payments are received or due in advance of the Company's performance. Refer to Note 8 for disclosure of deferred revenue balances. There were no increase in deferred revenue balances in 2019. The Company has \$1.1 million of deferred revenue as of December 31, 2018 which was recognized as a revenue in 2019. The increase in the deferred revenue balances during 2018 was immaterial, offset by approximately \$0.9 million of revenue recognized during 2018 included in the deferred revenue balances as of December 31, 2017.

Contract assets

Contract assets are rights to consideration in exchange for goods or services that the Company has transferred to a customer when such right is conditional on something other than the passage of time. The balance of contract assets are excluding any amounts presented as an accounts receivables. There were no contract assets balances as of December 31, 2019 and December 31 2018.

Refund liabilities

The Company recognizes a refund liability if the Company receives consideration from a customer and expects to refund some or all of that consideration to the customer. The balance of refund liabilities as of December 31, 2019 and December 31, 2018 was immaterial.

NEOPHOTONICS CORPORATION
NOTES TO CONSOLIDATED FINANCIAL STATEMENTS (continued)

4. Cash, cash equivalents, short-term investments and restricted cash

The following table summarizes the Company's cash, cash equivalents, short-term investments, and restricted cash at December 31, 2019 and 2018 (in thousands):

	December 31, 2019	December 31, 2018
Cash and cash equivalents:		
Cash	\$ 70,467	58,185
Cash equivalents	—	—
Cash and cash equivalents	\$ 70,467	\$ 58,185
Short-term investments	\$ 7,638	\$ 7,481
Restricted cash	\$ 10,972	\$ 11,053
	December 31, 2019	December 31, 2018
Cash and cash equivalents	\$ 70,467	\$ 58,185
Restricted cash	10,972	11,053
Total cash, cash equivalents and restricted cash shown in the consolidated statement of cash flows	\$ 81,439	\$ 69,238

The following table summarizes the Company's unrealized gains and losses related to the short-term investments in marketable securities designated as available-for-sale (in thousands):

	As of December 31, 2019				As of December 31, 2018			
	Amortized Cost	Gross Unrealized Gains	Gross Unrealized Loss	Fair Value	Amortized Cost	Gross Unrealized Gains	Gross Unrealized Loss	Fair Value
Marketable securities:								
Money market funds	7,638	—	—	7,638	7,481	—	—	7,481
Total	\$ 7,638	\$ —	\$ —	\$ 7,638	\$ 7,481	\$ —	\$ —	\$ 7,481
Reported as:								
Short-term investments	7,638	—	—	7,638	7,481	—	—	7,481
Total	\$ 7,638	\$ —	\$ —	\$ 7,638	\$ 7,481	\$ —	\$ —	\$ 7,481

As of December 31, 2019 and 2018, maturities of marketable securities were as follows (in thousands):

	December 31, 2019	December 31, 2018
Less than 1 year	\$ 7,638	\$ 7,481
Due in 1 to 2 years	—	—
Due in 3 to 5 years	—	—
Total	\$ 7,638	\$ 7,481

Realized gains and losses on the sale of marketable securities during the years ended December 31, 2019, 2018 and 2017 were immaterial. The Company did not recognize any impairment losses on its marketable securities during the years ended December 31, 2019, 2018 or 2017. As of December 31, 2019, the Company did not have any investments in marketable securities that were in an unrealized loss position for a period in excess of 12 months.

NEOPHOTONICS CORPORATION
NOTES TO CONSOLIDATED FINANCIAL STATEMENTS (continued)

5. Fair value measurements*Assets and Liabilities Measured at Fair Value on a Recurring Basis*

The following table presents the Company's assets that are measured at fair value on a recurring basis (in thousands):

	December 31, 2019				December 31, 2018			
	Level 1	Level 2	Level 3	Total	Level 1	Level 2	Level 3	Total
Cash equivalents and short-term investments:								
Money market funds	\$ 7,638	\$ —	\$ —	\$ 7,638	\$ 7,481	\$ —	\$ —	\$ 7,481
Total	\$ 7,638	\$ —	\$ —	\$ 7,638	\$ 7,481	\$ —	\$ —	\$ 7,481
Mutual funds held in Rabbi Trust, recorded in other long-term assets	\$ 616	\$ —	\$ —	\$ 616	\$ 465	\$ —	\$ —	\$ 465

The Company offers a Non-Qualified Deferred Compensation Plan ("NQDC Plan") to a select group of its highly compensated employees to provide participants the opportunity to defer payment of certain compensation as defined in the NQDC Plan. A Rabbi Trust has been established to fund the NQDC Plan obligation, which was fully funded as of December 31, 2019 and 2018. The assets held by the Rabbi Trust are in the form of exchange traded mutual funds and are included in the Company's other long-term assets on its consolidated balance sheets as of December 31, 2019 and 2018. Level 1 assets are determined by using quoted prices in active markets for identical assets. The fair values of Level 2 assets are priced based on quoted market prices for similar instruments or non-binding market prices that are corroborated by observable market data using inputs such as benchmark yields, broker quotes and other similar data.

The following table presents the Company's liabilities that are measured at fair value on a recurring basis (in thousands):

	As of December 31, 2018			
	Level 1	Level 2	Level 3	Total
Rusnano payment derivative	\$ —	\$ —	\$ 2,000	\$ 2,000
Total	\$ —	\$ —	\$ 2,000	\$ 2,000

There were no liabilities that are measured at fair value on a recurring basis as of December 31, 2019.

The fair value of the Rusnano payment derivative is based on the Company's estimate (see Note 14). The fair values of the foreign currency forward contracts are based on quoted market rates and market observable data for similar instruments. There were no transfers between levels of the fair value hierarchy during the periods presented.

Assets and Liabilities Measured at Fair Value on a Nonrecurring Basis

There were no assets and liabilities measured on a nonrecurring basis as of December 31, 2019.

In 2018, the Company reclassified \$2.5 million of property, plant and equipment within assets held for sale. The estimated fair value less direct costs of sale approximates the related carrying value of these assets as of December 31, 2018 (see Note 9).

In 2018, the Company wrote-off \$1.0 million of property, plant and equipment within operating expenses. These assets were measured at fair value which is zero due to events or circumstances the Company identified as having significant impact on their fair value during 2018.

Assets and Liabilities Not Measured at Fair Value

The carrying values of cash, restricted cash, accounts receivable, accounts payable, notes payable and short-term borrowing approximate their fair values due to the short-term nature and liquidity of these financial instruments.

The fair value of the Company's long-term debt have been calculated using an estimate of the interest rate the Company would have had to pay on the issuance of liabilities with a similar maturity and discounting the cash flows at that rate which it considers to be a level 2 fair value measurement and was not materially different than the carrying value as of December 31, 2019 and 2018 as the interest rates approximated rates currently available to the Company. The fair values do not necessarily give an indication of the amount that the Company would currently have to pay to extinguish any of this debt.

NEOPHOTONICS CORPORATION
NOTES TO CONSOLIDATED FINANCIAL STATEMENTS (continued)

6. Net loss per share

The following table sets forth the computation of the basic and diluted net loss per share attributable to NeoPhotonics Corporation common stockholders for the periods indicated (in thousands, except per share amounts):

	Years Ended December 31,		
	2019	2018	2017
Numerator:			
Net loss	(17,076)	\$ (43,637)	\$ (53,333)
Denominator:			
Weighted average shares used to compute per share amount:			
Basic	47,304	45,144	43,431
Dilutive effect of equity awards	—	—	—
Diluted	47,304	45,144	43,431
Basic net loss per share	\$ (0.36)	\$ (0.97)	\$ (1.23)
Diluted net loss per share	\$ (0.36)	\$ (0.97)	\$ (1.23)

The Company has excluded the impact of the following outstanding employee stock options, restricted stock units, common stock warrants and shares expected to be issued under its employee stock purchase plan from the computation of diluted net loss per share, as their effect would have been antidilutive (in thousands):

	December 31,		
	2019	2018	2017
Employee stock options	2,599	3,203	3,934
Restricted stock units	3,171	2,486	2,405
Market-based restricted stock units	641	695	—
Employee stock purchase plan	298	414	421
	6,709	6,798	6,760

7. Purchased intangible assets

Purchased intangible assets consist of the following (in thousands):

	December 31, 2019			December 31, 2018		
	Gross Assets	Accumulated Amortization	Net Assets	Gross Assets	Accumulated Amortization	Net Assets
Technology and patents	\$ 36,880	\$ (35,555)	\$ 1,325	\$ 37,029	\$ (34,995)	\$ 2,034
Customer relationships	15,089	(15,089)	—	15,146	(15,026)	120
Leasehold interest	1,222	(396)	826	1,238	(374)	864
	\$ 53,191	\$ (51,040)	\$ 2,151	\$ 53,413	\$ (50,395)	\$ 3,018

Amortization expense relating to technology and patents and the leasehold interest intangible assets is included within cost of goods sold, and customer relationships and the non-compete agreements within operating expenses.

The following table presents details of the amortization expense of the Company's purchased intangible assets as reported in the consolidated statements of operations (in thousands):

NEOPHOTONICS CORPORATION
NOTES TO CONSOLIDATED FINANCIAL STATEMENTS (continued)

	Years ended December 31,		
	2019	2018	2017
Cost of goods sold	\$ 737	\$ 756	\$ 869
Operating expenses	119	475	472
Total	<u>\$ 856</u>	<u>\$ 1,231</u>	<u>\$ 1,341</u>

The estimated future amortization expense of purchased intangible assets as of December 31, 2019, is as follows (in thousands):

2020	\$ 736
2021	644
2022	27
2023	27
2024	27
Thereafter	690
	<u>\$ 2,151</u>

8. Balance sheet components

Restricted Cash

Restricted cash was as follows (in thousands):

	December 31,	
	2019	2018
Restricted in connection with notes payable and short-term borrowing (see Note 11)	\$ 2,559	\$ 2,589
Restricted in connection with asset purchase agreement (see Note 9)	1,999	2,019
Restricted in connection with a current legal dispute with APAT OE (See Note 9)	5,989	5,156
Restricted in connection with government grants received in advance	425	1,289
Total restricted cash	<u>\$ 10,972</u>	<u>\$ 11,053</u>
Reported as:		
Restricted cash	<u>\$ 10,972</u>	<u>\$ 11,053</u>

Accounts receivable, net

Accounts receivable, net were as follows (in thousands):

	December 31,	
	2019	2018
Accounts receivable	\$ 68,988	\$ 74,343
Trade notes receivable	156	672
Allowance for doubtful accounts	(254)	(264)
	<u>\$ 68,890</u>	<u>\$ 74,751</u>

The table below summarizes the movement in the Company's allowance for doubtful accounts (in thousands):

NEOPHOTONICS CORPORATION
NOTES TO CONSOLIDATED FINANCIAL STATEMENTS (continued)

Balance at December 31, 2016	\$	(425)
Provision for bad debt, net		(577)
Write-offs, net of recoveries		376
Balance at December 31, 2017		(626)
Reversal of provision for bad debt, net		428
Write-offs, net of recoveries		(66)
Balance at December 31, 2018		(264)
Reversal of provision for bad debt, net		15
Write-offs, net of recoveries		(5)
Balance at December 31, 2019	\$	(254)

Inventories

Inventories were as follows (in thousands):

	December 31,	
	2019	2018
Raw materials	\$ 19,350	\$ 27,806
Work in process	12,262	13,044
Finished goods ⁽¹⁾	15,318	11,309
	<u>\$ 46,930</u>	<u>\$ 52,159</u>

(1) Included in finished goods was \$1.6 million and \$5.6 million of inventory at customer vendor managed inventory locations at December 31, 2019 and 2018, respectively.

Prepaid expenses and other current assets

Prepaid expenses and other current assets were as follows (in thousands):

	December 31,	
	2019	2018
Prepaid taxes and taxes receivable	6,979	\$ 5,461
Transition services agreement receivable (see Note 9)	11,861	11,999
Deposits and other prepaid expenses	2,512	3,020
Other receivable	4,499	6,125
	<u>\$ 25,851</u>	<u>\$ 26,605</u>

Property, plant and equipment, net

Property, plant and equipment, net were as follows (in thousands):

	December 31,	
	2019	2018
Land	\$ 3,197	\$ 3,157
Buildings	23,624	23,379
Machinery and equipment	181,596	187,746
Furniture, fixtures, software and office equipment	10,736	10,201
Leasehold improvements	22,058	22,000
	<u>241,211</u>	<u>246,483</u>
Less: Accumulated depreciation	(160,078)	(146,393)
	<u>\$ 81,133</u>	<u>\$ 100,090</u>

NEOPHOTONICS CORPORATION
NOTES TO CONSOLIDATED FINANCIAL STATEMENTS (continued)

Depreciation expense was \$27.7 million, \$29.9 million and \$27.0 million for the years ended December 31, 2019, 2018 and 2017, respectively. In 2017, the Company wrote off certain leasehold improvements in its facilities in California and recorded a restructuring charge of \$0.1 million in connection with the Company's restructuring actions. Purchases of property, plant and equipment unpaid as of December 31, 2019, 2018 and 2017 was \$1.9 million, \$1.5 million and \$10.0 million, respectively.

Accrued and other current liabilities

Accrued and other current liabilities were as follows (in thousands):

	December 31,	
	2019	2018
Employee-related	\$ 17,877	\$ 14,899
Transition services agreement payables (see Note 9)	11,765	11,769
Asset sale related contingent liabilities (see Note 9)	6,664	6,751
Operating lease liabilities, current	2,086	—
Income and other taxes payable	2,036	1,580
Deferred revenue, current	—	1,114
Accrued warranty	712	672
Rusnano payment derivative	—	2,000
Accrued litigation settlement	—	2,645
Other accrued expenses	6,341	8,858
	<u>\$ 47,481</u>	<u>\$ 50,288</u>

Accrued warranty

The table below summarizes the movement in the warranty accrual, which is included in accrued and other current liabilities (in thousands):

	Years ended December 31,		
	2019	2018	2017
Beginning balance	\$ 672	\$ 1,334	\$ 678
Warranty accruals	782	399	1,263
Settlements	(742)	(1,061)	(607)
Ending balance	<u>\$ 712</u>	<u>\$ 672</u>	<u>\$ 1,334</u>

Other noncurrent liabilities

Other noncurrent liabilities were as follows (in thousands):

	December 31,	
	2019	2018
Pension and other employee-related	\$ 4,125	\$ 4,529
Deferred rent	—	3,058
Government grant	1,380	2,108
Deferred income tax liabilities	528	—
Capital lease obligation	—	282
*Asset retirement obligations	3,529	3,391
Other	52	131
	<u>\$ 9,614</u>	<u>\$ 13,499</u>

NEOPHOTONICS CORPORATION
NOTES TO CONSOLIDATED FINANCIAL STATEMENTS (continued)

*Asset retirement obligations are legal obligations associated with the retirement of long-lived assets pertaining to leasehold improvements. In 2019 accretion related to the asset retirement obligations was \$0.2 million.

9. Asset sale

NeoRussia

In December 2018, the Company entered into an agreement with Joint Stock Company Rusnano, a related party, for Joint Stock Company Rusnano group to purchase the 100% interest in the operations of NeoPhotonics Corporation, LLC, the Company's manufacturing operations in Russia. In 2018, the Company recorded additional restructuring expense of \$1.6 million related to these operations, bringing the total amount accrued for the Rusnano payment derivative to \$2.0 million. As of December 31, 2018, the Company had recorded assets with a carrying value of \$3.0 million as held for sale. The balance for liabilities held for sale as of December 31, 2018 was immaterial.

In April 2019, the Company completed the sale of 100% interest in the operations of NeoPhotonics Corporation, LLC, to Joint Stock Company Rusnano, a related party. In connection with the sale, the Company received \$2.0 million in cash, settled the \$2.0 million exit fee and recognized a gain on asset sale of \$0.9 million within operating expenses during the 2019.

APAT

In January 2017, the Company completed the sale of its Low Speed Transceiver Products' assets to APAT OE pursuant to an asset purchase agreement dated December 14, 2016 for consideration of approximately \$25.0 million (in RMB equivalent) plus approximately \$1.4 million (in RMB equivalent) post-closing transaction service fees to be received under a transition services agreement with APAT OE in which the Company will provide short-term manufacturing and other specific services pursuant to such agreement. The related supply chain purchase commitments and value-added tax obligations have been assumed by APAT OE. The Company recognized a \$2.2 million gain on the sale of assets within operating loss in 2017. The receivable and payable balances related to the transition service arrangement were \$11.9 million and \$11.8 million, respectively, as of December 31, 2019.

As of December 31, 2019, the Company has a reserve of \$6.7 million within accrued and other current liabilities for warranty claims.

10. Restructuring

In 2017, the Company initiated restructuring actions in order to focus on key growth initiatives and a lower break even revenue level through lower operating expenses and manufacturing costs. Actions included a reduction in force, facilities consolidation and certain asset-related adjustments. The Company recorded \$0.3 million in restructuring charges within operating expenses in 2019. The Company recorded \$0.2 million and \$3.1 million in restructuring charges within cost of goods sold and operating expenses in 2018, respectively. Additionally, the Company recorded a charge of \$2.0 million to cost of goods sold in 2017 for discontinued product inventory write-downs related the Company's decisions to end-of-life certain products.

	Employee Severance	Facilities Consolidation	Others	Total
Restructuring obligations December 31, 2018	\$ 436	\$ 769	\$ 1,611	\$ 2,816
Charges	88	—	173	261
Cash payments	(524)	(149)	(173)	(846)
*Non-cash settlements and other	—	(620)	(1,611)	(2,231)
Restructuring obligations December 31, 2019	\$ —	\$ —	\$ —	\$ —

*Includes reclassification of the operating lease liability of \$0.6 million and \$1.6 million related to the NeoRussia penalty settlement.

NEOPHOTONICS CORPORATION
NOTES TO CONSOLIDATED FINANCIAL STATEMENTS (continued)

11. Debt

The table below summarizes the carrying amount and weighted average interest rate of the Company's debt (in thousands, except percentages):

	December 31, 2019		December 31, 2018	
	Carrying Amount	Interest Rate	Carrying Amount	Interest Rate
Notes payable to suppliers	—		4,795	
Total notes payable and short-term borrowing	\$ —		\$ 4,795	
Long-term debt, current and non-current:				
Borrowing under Wells Fargo Credit Facility	\$ 27,329	3.72%	\$ 35,961	4.41%
Mitsubishi Bank loans	9,255	1.04%-1.44%	11,094	1.05%-1.45%
Mitsubishi Bank and Yamanashi Chou Bank loan	5,868	1.07%	6,898	1.10%
Finance lease liability	275		—	
Unaccreted discount and issuance costs	(446)		(602)	
Total long-term debt, net of unaccreted discount and issuance costs	\$ 42,281		\$ 53,351	
Reported as:				
Current portion of long-term debt	\$ 3,044		\$ 2,897	
Long-term debt, net of current portion	39,237		50,454	
Total long-term debt, net of unaccreted discount and issuance costs	\$ 42,281		\$ 53,351	

The effective interest rates of the debt in the table above approximated their stated interest rates.

Notes payable and short-term borrowing

The Company regularly issues notes payable to its suppliers in China. These notes are supported by non-interest bearing bank acceptance drafts issued under the Company's existing line of credit facilities and are due three to six months after issuance. As a condition of the notes payable arrangements, the Company is required to keep a compensating balance at the issuing banks that is a percentage of the total notes payable balance until the amounts are settled. As of December 31, 2019, the Company's subsidiary in China had two line of credit facilities with the following banking institutions:

- Under the first line of credit facility with Shanghai Pudong Development Bank, the Company can borrow up to RMB 120.0 million (\$17.2 million) for short-term loans at varying interest rates, or up to approximately RMB 240.0 million (\$34.4 million) for bank acceptance drafts (with up to 50% compensating balance requirement). This line of credit facility expires in November 2021. In November 2017, the Company borrowed \$17.0 million under this line which bears interest at 4.1%, which was repaid in May 2018.
- Under the second line of credit facility with Shanghai Pudong Development Bank, which expires in November 2021, the Company can borrow up to RMB 30.0 million (\$4.3 million) for short-term loans at varying interest rates, or up to approximately RMB 60.0 million (\$8.6 million) for bank acceptance drafts (with up to 50% compensating balance requirement).
- In December 2017, the Company's subsidiary in China entered into a third line of credit facility with China CITIC Bank in China, which expired in November 2018. The purpose of the credit facility was to provide short-term borrowings, bank acceptance drafts and letters of credits. Under this credit facility, the Company could borrow up to approximately RMB 250 million (\$35.9 million) at varying interest rates, or up to approximately RMB 390.6 million (\$56.1 million) for bank acceptance drafts (with up to 36% compensating balance requirement). In February 2018, the Company borrowed \$17.0 million under this line which bore interest at 4.7%. The amount of \$17.0 million under this line was repaid in August 2018.
- The Company had a line of credit facility previously with China CITIC Bank in China which expired during September 2017. In July 2017, the Company borrowed \$17.0 million under this line which bore interest at LIBOR plus 2.55%. The amount of \$17.0 million under this line was repaid to CITIC Bank in January 2018.

NEOPHOTONICS CORPORATION
NOTES TO CONSOLIDATED FINANCIAL STATEMENTS (continued)

Under these line of credit facilities, the non-interest bearing bank acceptance drafts issued in connection with the Company's notes payable to its suppliers in China, had no outstanding balance at December 31, 2019 and an outstanding balance of \$4.8 million as of December 31, 2018, respectively.

As of December 31, 2019 and December 31, 2018, compensating balances relating to bank acceptance drafts and letters of credit issued to suppliers and the Company's subsidiaries totaled to \$2.5 million and \$2.6 million, respectively. Compensating balances are classified as restricted cash on the Company's consolidated balance sheets.

In China, when there is a case pending in judicial court, banks may choose to limit borrowing against existing credit lines, regardless of the legitimacy of the case. The Company has a dispute pending with APAT OE in judicial court (See Note 14). The Company does not expect to make any additional draws against its credit facilities in China until this matter is resolved.

Credit Facilities

The Company had a credit agreement, as amended with the Comerica Bank as lead bank in the U.S. (the "Comerica Bank Credit Facility") with a borrowing capacity of up to \$30.0 million. In January 2017, the Company amended the Comerica Bank Credit Facility to extend the maturity to April 30, 2017 and to remove the covenant related to EBDITA. In April 2017, the Company amended the Comerica Bank Credit Facility to extend the maturity date to July 31, 2017 and to add a financial covenant that required maintenance of a modified EBITDA. In June 2017, the Company amended the Comerica Bank Credit Facility to extend the maturity to August 31, 2017, to allow NeoPhotonics China to borrow up to \$17.0 million, to limit the indebtedness under the facility to \$20.0 million and to modify the EBITDA requirement. In August 2017, the Credit Facility was further amended to extend the maturity to September 30, 2017. Borrowings under the Comerica Bank Credit Facility bore interest at an interest rate option of a base rate as defined in the agreement plus 1.75% or LIBOR plus 2.75%. The base rate was the greater of (a) the effective prime rate, (b) the Federal Funds effective rate plus one percent, and (c) the daily adjusting LIBOR rate plus one percent.

In September 2017, the Company entered into a revolving line of credit agreement with Wells Fargo as the administrative agent for a lender group (the "Wells Fargo Credit Facility" or "Credit Facility").

The Wells Fargo Credit Facility provides for borrowings equal to the lower of (a) a maximum revolver amount of \$50.0 million, or (b) an amount equal to 80% - 85% of eligible accounts receivable plus 100% of qualified cash balances up to \$15.0 million, less certain discretionary adjustments ("Borrowing Base"). The maximum revolver amount may be increased by up to \$25.0 million, subject to certain conditions. At closing, \$50.0 million was available, of which \$30.0 million was drawn. The Company used \$20.0 million of this amount to pay the principal and interest due under the Comerica Bank Credit Facility, which has since been terminated.

The Credit Facility matures on June 30, 2022 and borrowings bear interest at an interest rate option of either (a) the LIBOR rate, plus an applicable margin ranging from 1.50% to 1.75% per annum, or (b) the prime lending rate, plus an applicable margin ranging from 0.50% to 0.75% per annum. The Company is also required to pay a commitment fee equal to 0.25% of the unused portion of the Credit Facility.

The Credit Facility agreement ("Agreement") requires prepayment of the borrowings to the extent the outstanding balance is greater than the lesser of (a) the most recently calculated Borrowing Base, or (b) the maximum revolver amount. The Company is required to maintain a combination of certain defined cash balances and unused borrowing capacity under the Credit Facility of at least \$20.0 million, of which at least \$5.0 million shall include unused borrowing capacity. The Agreement also restricts the Company's ability to dispose of assets, permit change in control, merge or consolidate, make acquisitions, incur indebtedness, grant liens, make investments and make certain restricted payments. Borrowings under the Credit Facility are collateralized by substantially all of the Company's assets.

On June 14, 2019, the Company entered into a First Amendment to the Credit Facility (the "Amended Credit Facility"). The Amendment removes Huawei from the list of "Eligible Accounts" as a basis for the Company's borrowing while Huawei is on the U.S. Bureau of Industry and Security ("BIS") "Entity List". During the period of time while Huawei remains on the Entity List, the concentration limits of certain other customers are increased to partially offset the removal of Huawei. Additionally, until Huawei is no longer on the Entity List, the Company is required to maintain a temporary combination of certain defined unrestricted cash and unused borrowing capacity under the Credit Facility of at least \$30.0 million in the U.S. and \$40.0 million world-wide, of which at least \$5.0 million shall include unused borrowing capacity.

The Company was in compliance with the covenants of this Credit Facility as of December 31, 2019. As of December 31, 2019, the outstanding balance under the Credit Facility was \$27.3 million and the weighted average rate under the LIBOR

NEOPHOTONICS CORPORATION
NOTES TO CONSOLIDATED FINANCIAL STATEMENTS (continued)

option was 3.72%. The remaining borrowing capacity as of December 31, 2019 was \$10.4 million, of which \$5.0 million is required to be maintained as unused borrowing capacity. The Company repaid \$10.0 million borrowed revolving line of credit in 2019.

In 2019, \$1.4 million accrued interest were rolled into the principal amount of Wells Fargo Credit Facility.

Mitsubishi Bank Loans

On February 25, 2015, the Company entered into certain loan agreements and related agreements with MUFG Bank, Ltd. (the "Mitsubishi Bank") that provided for (i) a term loan in the aggregate principal amount of 500 million Japanese Yen (the "JPY") (\$4.4 million) (the "Term Loan A") and (ii) a term loan in the aggregate principal amount of one billion JPY (\$9.2 million) (the "Term Loan B" and together with the Term Loan A, the "2015 Mitsubishi Bank Loans"). The Mitsubishi Bank Loans are secured by a mortgage on certain real property and buildings owned by our Japanese subsidiary. Interest on the 2015 Mitsubishi Bank Loans accrues and is paid monthly based upon the annual rate of the monthly Tokyo Interbank Offer Rate (TIBOR) plus 1.40%. The Term Loan A requires interest only payments until the maturity date of February 23, 2018, with a lump sum payment of the aggregate principal amount on the maturity date. The Term Loan B requires equal monthly payments of principal equal to 8.3 million JPY until the maturity date of February 25, 2025, with a lump sum payment of the balance of 8.4 million JPY on the maturity date. Interest on the Term Loan B is accrued based upon monthly TIBOR plus 1.40% and is secured by real estate collateral. In conjunction with the execution of the Bank Loans, the Company paid a loan structuring fee, including consumption tax, of 40.5 million JPY (\$0.4 million). The Term Loan A of 500 million JPY (approximately \$4.4 million) was repaid to the Mitsubishi Bank in January 2018.

The 2015 Mitsubishi Bank Loans contain customary representations and warranties and customary affirmative and negative covenants applicable to the Company's Japanese subsidiary, including, among other things, restrictions on cessation in business, management, mergers or acquisitions. The 2015 Mitsubishi Bank Loans contain financial covenants relating to minimum net assets, maximum ordinary loss and a coverage ratio covenant. The Company was in compliance with the related covenants as of December 31, 2019 and December 31, 2018. Outstanding principal balance for Term Loan B and unamortized debt issuance costs were approximately 516.7 million JPY (approximately \$4.8 million) and 48.5 million JPY (approximately \$0.4 million), respectively, as of December 31, 2019.

In March 2017, the Company entered into a loan agreement and related agreements with the Mitsubishi Bank for a term loan of 690 million JPY (approximately \$6.4 million) (the "2017 Mitsubishi Bank Loan") to acquire manufacturing equipment for its Japanese subsidiary. This loan is secured by the manufacturing equipment owned by the Company's subsidiary in Japan. Interest on the 2017 Mitsubishi Bank Loan is based on the annual rate of the monthly TIBOR rate plus 1.00%. The 2017 Mitsubishi Bank Loan matures on March 29, 2024 and requires monthly interest and principal payments over 72 months commencing in April 2018. The loan contains customary covenants relating to minimum net assets, maximum ordinary loss and a coverage ratio covenant. The Company was in compliance with these covenants as of December 31, 2019. The loan was available from March 31, 2017 to March 30, 2018 and 690 million JPY (approximately \$6.4 million) under this loan was fully drawn in March 2017. Outstanding principal balance for the 2017 Mitsubishi Bank Loan was approximately 488.8 million JPY (approximately \$4.5 million) as of December 31, 2019.

Mitsubishi Bank and Yamanashi Chou Bank loan

In January 2018, the Company entered into a term loan agreement with Mitsubishi Bank and The Yamanashi Chou Bank, Ltd. for a term loan in the aggregate principal amount of 850 million JPY (approximately \$7.8 million) (the "Term Loan C"). The purpose of the Term Loan C is to obtain machinery for the core parts of the manufacturing line and payments for related expenses by the Company's subsidiary in Japan. The Term Loan C was available from January 29, 2018 to January 29, 2025. The full amount of the Term Loan C was drawn in January 2018. Interest on the Term Loan C is based upon the annual rate of the three months TIBOR rate plus 1.00%. The Term Loan C requires quarterly interest payments, along with the principal payments, over 82 months commencing in April 2018. The Term Loan C loan agreement contains customary representations and warranties and customary affirmative and negative covenants applicable to the Japanese Subsidiary, including, among other things, restrictions on cessation in business, management, mergers or acquisitions. The Term Loan C loan agreement contains financial covenants relating to minimum net assets and maximum ordinary loss. The Company was in compliance with these covenants as of December 31, 2019. Outstanding principal balance for the Mitsubishi Bank and Yamanashi Chou Bank Loan was approximately 637.5 million JPY (approximately \$5.9 million) as of December 31, 2019.

At December 31, 2019, maturities of long-term debt were as follows (in thousands):

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NOTES TO CONSOLIDATED FINANCIAL STATEMENTS (continued)

2020	\$	3,192
2021		3,192
2022		30,511
2023		3,097
2024		2,303
Thereafter		432
	<u>\$</u>	<u>42,727</u>

12. Leases

The Company has operating leases for offices, research and development facilities and manufacturing facilities. Leases have remaining terms of less than one year to seven years, some of which include options to extend the leases and some of which may include options to terminate the leases within one year.

On June 13, 2017, the Company entered into an office lease for approximately 39,000 square feet for the Company's current headquarters in San Jose (the "Lease") with a commencement date of June 1, 2017. Upon commencement, the Lease had an initial term of one hundred and twenty-three (123) months, ending September 30, 2027, (the "Initial Term") with a monthly rental rate of \$41,000, escalating annually to a maximum monthly rental rate of approximately \$73,000 in the last year of the Initial Term. Upon termination of the Lease, the Company anticipates a restoration cost of approximately \$0.7 million.

In September 2016, the Company entered into an office lease for approximately 64,000 square feet of office and laboratory space located in San Jose (the "Lease"). The term of the Lease commenced on January 1, 2017. Upon commencement, the Lease has an initial term of one hundred and twenty-nine (129) months, ending on September 30, 2027 (the "Initial Term"), with an initial monthly rental rate of \$144,000, escalating annually to a maximum monthly rental rate of approximately \$194,000 in the last year of the Initial Term. The Landlord has agreed to provide the office and laboratory space to the Company free of charge for the first nine months of the Initial Term through September 30, 2017. Upon termination of the Lease, the Company anticipates a restoration cost of approximately \$3.1 million.

As of December 31, 2019 and December 31, 2018, an asset recorded in property, plant and equipment under a finance lease was immaterial.

The components of lease expense were as follows (in thousands):

	Year Ended December 31,	
	2019	
Operating lease cost	\$	3,026
Variable and short-term lease cost		1,482
Total lease cost	<u>\$</u>	<u>4,508</u>

Other information related to leases was as follows (in thousands, except lease term and discount rate):

	Year Ended December 31,	
	2019	
<i>Supplemental cash flow information</i>		
Cash paid for amounts included in the measurement of lease liabilities:		
Operating cash flows from operating leases	\$	3,600
<i>Right-of-use assets obtained in exchange for lease obligations:</i>		
Operating leases	\$	136
<i>Weighted average remaining lease term (in years)</i>		
Operating leases		7.4
<i>Weighted average discount rate</i>		
Operating leases		6.4%

NEOPHOTONICS CORPORATION
NOTES TO CONSOLIDATED FINANCIAL STATEMENTS (continued)

Future minimum lease payments under non-cancelable leases as of December 31, 2019 were as follows (in thousands):

	Operating Leases
2020	\$ 3,227
2021	3,099
2022	3,094
2023	3,043
2024	2,944
Thereafter	8,257
Total future minimum lease payments	23,664
Less imputed interest	(5,035)
Total	<u>\$ 18,629</u>

Reported as of December 31, 2019:	Operating Leases
Accrued and other current liabilities	\$ 2,086
Operating lease liabilities, noncurrent	16,543
Total	<u>\$ 18,629</u>

As of December 31, 2018, the future minimum payments under lease agreements in accordance with our historical accounting policies under Topic 840 were as follows (in thousands):

	Operating Leases
2019	\$ 3,618
2020	3,113
2021	3,059
2022	3,056
2023	3,049
Thereafter	11,437
Total future minimum lease payments	<u>\$ 27,332</u>

The Company recognized rent expense on a straight-line basis over the lease period. Rent expense under the Company's operating leases was \$4.2 million and \$4.6 million, respectively, in the years ended December 31, 2018 and 2017.

13. Pension Plans

Japan defined benefit pension plans

In connection with its acquisition of NeoPhotonics Semiconductor in 2013, the Company assumed responsibility for two defined benefit plans that provide retirement benefits to its NeoPhotonics Semiconductor employees in Japan: the Retirement Allowance Plan ("RAP") and the Defined Benefit Corporate Pension Plan ("DBCPP"). The RAP is an unfunded plan administered by the Company. Effective February 28, 2014, the DBCPP was converted to a defined contribution plan ("DCP"). In May 2014, LAPIS Semiconductor Co., Ltd. ("LAPIS") transferred approximately \$2.0 million into the newly formed DCP which was the allowable amount that can be transferred according to the Japanese regulations. LAPIS also paid the Company approximately \$0.3 million in connection with the conversion of the plan. Additionally, the Company transferred the net unfunded projected benefit obligation amount from the DBCPP to the RAP and froze the RAP benefit at the February 28, 2014 amount. Under the RAP, lump sum benefits are provided upon retirement or upon certain instances of termination. In 2014, the Company reclassified \$0.2 million and \$0.1 million from accumulated other comprehensive income to cost of goods sold and operating expenses, respectively.

The funded status of these plans for the years ended December 31, 2019, 2018 and 2017 was as follows (in thousands):

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NOTES TO CONSOLIDATED FINANCIAL STATEMENTS (continued)

	<u>2019</u>	<u>2018</u>	<u>2017</u>
	<u>RAP</u>	<u>RAP</u>	<u>RAP</u>
Change in projected benefit obligation:			
Projected benefit obligation, beginning of period	\$ 4,308	\$ 4,616	\$ 4,802
Service cost	—	—	—
Interest cost	4	4	5
Benefits paid	(276)	(517)	(411)
Actuarial (gain)/loss	—	95	32
Curtailement/Settlement	—	—	—
Transfer from DBCPP to RAP	—	—	—
Currency translation adjustment	54	110	188
Projected benefit obligation, end of period	<u>\$ 4,090</u>	<u>\$ 4,308</u>	<u>\$ 4,616</u>
Change in plan assets:			
Plan assets at fair value, beginning of period	\$ —	\$ —	\$ —
Employer contributions	—	—	—
Benefits paid	—	—	—
Transfer to DCP	—	—	—
Currency translation adjustment	—	—	—
Plan assets at calculated amount, end of period	<u>\$ —</u>	<u>\$ —</u>	<u>\$ —</u>
Amounts recognized in consolidated balance sheets:			
Accrued and other current liabilities	<u>\$ 585</u>	<u>\$ 257</u>	<u>\$ 488</u>
Other noncurrent liabilities	<u>\$ 3,505</u>	<u>\$ 4,051</u>	<u>\$ 4,128</u>
Amount recognized in accumulated other comprehensive loss:			
Defined benefit pension plans adjustment	<u>\$ 378</u>	<u>\$ 373</u>	<u>\$ 271</u>
Accumulated benefit obligation, end of period	<u>\$ 4,090</u>	<u>\$ 4,308</u>	<u>\$ 4,616</u>

Net periodic pension cost associated with these plans for the years ended December 31, 2019, 2018 and 2017 included the following components (in thousands):

	<u>2019</u>	<u>2018</u>	<u>2017</u>
	<u>RAP</u>	<u>RAP</u>	<u>RAP</u>
Service cost	\$ —	\$ —	\$ —
Interest cost	4	4	5
Other	—	—	—
Curtailement/settlement (gain) loss	—	—	—
Net periodic pension costs	<u>\$ 4</u>	<u>\$ 4</u>	<u>\$ 5</u>

The projected and accumulated benefit obligations for the RAP were calculated as of December 31, 2019 and 2018 using a discount rate assumption of 0.1% and 0.1%, respectively.

Estimated future benefit payments under the RAP are as follows (in thousands):

2020	\$ 520
2021	610
2022	299
2023	—
2024	414
2025 - 2029	1,562
Thereafter	685
	<u>\$ 4,090</u>

401(k) Plan

The Company maintains a savings and retirement plan qualified under Section 401(k) of the Internal Revenue Code of 1986, as amended (the "IRC"). The Company currently matches a portion of all eligible employee contributions which vest

NEOPHOTONICS CORPORATION
NOTES TO CONSOLIDATED FINANCIAL STATEMENTS (continued)

immediately. The Company's matching contributions to the plan totaled \$0.5 million, \$0.4 million and \$0.5 million, respectively, for the years ended December 31, 2019, 2018, and 2017.

14. Commitments and contingencies

Litigation

From time to time, the Company is subject to various claims and legal proceedings, either asserted or unasserted, that arise in the ordinary course of business. The Company accrues for legal contingencies if the Company can estimate the potential liability and if the Company believes it is probable that the case will be ruled against it. If a legal claim for which the Company did not accrue is resolved against it, the Company would record the expense in the period in which the ruling was made. The Company believes that the likelihood of an ultimate amount of liability, if any, for any pending claims of any type (alone or combined) that will materially affect the Company's financial position, results of operations or cash flows is remote. The ultimate outcome of any litigation is uncertain, however, and unfavorable outcomes could have a material negative impact on the Company's financial condition and operating results. Regardless of outcome, litigation can have an adverse impact on the Company because of defense costs, negative publicity, diversion of management resources and other factors.

In January 2010, Finisar Corporation, or Finisar, filed a complaint in the U.S. District Court for the Northern District of California, or the Court, against Source Photonics, Inc., MRV Communications, Inc., Oplink Communications, Inc. and the Company, or collectively, the co-defendants. In the complaint, Finisar alleged infringement of certain of its U.S. patents. In 2010 the Company filed an answer to the complaint and counterclaims, asserting two claims of patent infringement and additional claims. The Court dismissed without prejudice all co-defendants (including the Company) except Source Photonics, Inc., on grounds that such claims should have been asserted in four separate lawsuits, one against each defendant. This dismissal does not prevent Finisar from bringing a new similar lawsuit against the Company. In 2011 the Company and Finisar agreed to suspend their respective claims and in 2012 the Company and Finisar further agreed to toll their respective claims. While there has been no action on this matter since 2012, the Company is currently unable to predict the outcome of this dispute and therefore cannot determine the likelihood of loss nor estimate a range of possible loss.

In December 2016, the Company was served with a lawsuit filed by Lestina International Ltd. ("Lestina"), in Santa Clara County, CA. The lawsuit is regarding a dispute of approximately \$3.0 million related to purchase orders for the Company's Low Speed Transceiver Products that was soon thereafter sold by the Company to APAT OE in January 2017. The purchase orders in question were included in the asset sale and were assumed liabilities by the purchaser of the business. The parties engaged in extensive negotiations and in January 2019, the parties agreed to a proposed settlement which was placed on the record of the Superior Court of Santa Clara County agreeing that NeoPhotonics Dongguan Co., Ltd. ("NeoDongguan") (the Company's wholly owned subsidiary located in China) would pay to Lestina a total of \$2.2 million. These payments were completed in two installments paid in February and June 2019. Upon Lestina's receipt of the final payment in June 2019, Lestina shipped to NeoDongguan the remaining parts from the original purchase orders.

In April 2018, APAT OE filed a lawsuit in the Qianhai Court in Shenzhen, China against NeoPhotonics (China) Co., Ltd. and NeoPhotonics Dongguan Co. Ltd. (collectively "NeoChina") and NeoPhotonics Corporation with a claim of approximately \$20.0 million. The lawsuit relates to the sale of the low speed transceiver business to APAT OE from NeoChina. APAT OE claims that the business has been losing money and that APAT OE was not given all of the information about the business they purchased prior to signing the Asset Purchase Agreement. In May 2018, counsel on behalf of NeoChina filed a motion objecting to the jurisdiction, claiming that the proper jurisdiction for any dispute between these parties is the Shenzhen Court of International Arbitration (or the "Arbitration Court") and the proper parties to this dispute are NeoChina and APAT OE, pursuant to the Asset Purchase Agreement signed by APAT OE and NeoChina (or the "APA"). In June 2018 a hearing was held in the Qianhai Court in Shenzhen, China and in August 2018 the Court ruled in favor of APAT OE. In October 2018, a hearing was held in the Intermediate Court of Shenzhen (or the "Intermediate Court") on an appeal which was filed by NeoChina and in November 2018 the Intermediate Court ruled in favor of NeoChina and dismissed in totality the litigation against NeoChina, ruling that arbitration was the proper forum for such dispute resolution between the parties. The litigation continued against NeoPhotonics Corporation in Qianhai Court and Intermediate Court, where NeoPhotonics Corporation claims that there is no existing contract between APAT OE and NeoPhotonics Corporation and therefore there is no basis for litigation. In December 2019, NeoPhotonics Corporation received a notice that the case against NeoPhotonics Corporation had been dismissed in the Qianhai Court in Shenzhen, China. APAT OE has appealed this decision to the Shenzhen Intermediate Court. The Company is unable to predict the outcome of this matter and is not currently aware of the precise amount of the ongoing claim by APAT against NeoPhotonics Corporation in this lawsuit.

NEOPHOTONICS CORPORATION
NOTES TO CONSOLIDATED FINANCIAL STATEMENTS (continued)

In December 2018, APAT OE officially filed claims through two lawsuits against NeoChina, NeoPhotonics Corporation Limited Hong Kong (or NeoHK), Novel Centennial Limited BVI (or NeoBVI) and NeoPhotonics Corporation in the Intermediate Court in addition to a pre-trial preservation order. On the same day the Court issued the order to preserve approximately \$29.0 million of NeoChina assets, which is the approximate amount of the revised claims by APAT OE against all defendants in the first lawsuit. In January 2019, there was an additional pre-trial preservation order to preserve approximately \$3.8 million of NeoChina assets. The temporary pre-trial preservation order was made simultaneously to the filing of the two lawsuits, but the defendants were not served or aware of the lawsuit until later in January 2019. In the first lawsuit, the legal claims are the same as the ones APAT OE filed in April 2018 in Qianhai Court in Shenzhen, China (as described above). The difference is that instead of distributing claims in separate cases, APAT OE has combined its claims to one single case and added the additional defendants of NeoHK and NeoBVI and increased the claimed damages to approximately \$29.0 million. In the second lawsuit, the claims are new and related to the alleged new issues related to a contract manufacturer located in the Philippines and claiming damages in the amount of RMB 50.9 million (approximately \$7.6 million). APAT OE claims that the defendants have interfered with APAT OE's ability to sign an engagement agreement with the contract manufacturer. The defendants believe this dispute is related to and should be under the jurisdiction that was agreed to in the APA, and therefore should be properly transferred to the Shenzhen Court of International Arbitration. In March 2019 the Shenzhen Intermediate Court assigned a judge for the two lawsuits, but no hearing date has been set yet. The Company is unable to predict the outcome of this matter.

In February 2019, NeoChina filed a case in the Qianhai Court in Shenzhen, China against APAT OE and Zhejiang Merchants Property Insurance Company for losses and damages caused to NeoChina from APAT OE's previously granted property preservation. The claim was for approximately RMB 350,000 (approximately \$52,000) in damages and legal fees and was heard in May 2019. In December 2019 NeoChina received a final judgment in favor of the defendants.

APAT Arbitration

In June 2017, APAT OE filed an arbitration claim in the Shenzhen Court of International Arbitration (or the Arbitration Court) against NeoChina (collectively both of the Company's China subsidiaries), claiming that approximately \$1.5 million of the inventory that was sold to APAT OE by NeoChina in an Asset Purchase Agreement executed between the parties on December 14, 2016 was aged inventory and of no value. The arbitration was heard in the Arbitration Court in August 2017. In October 2017, NeoChina was informed that it was successful in the defense of the dispute and was also successful in its counterclaim against APAT OE. NeoChina was awarded approximately RMB 700,000 (approximately \$110,000) in compensatory damages and attorney fees as well as having the approximately \$1.5 million claim against it rejected in its entirety.

In April 2018, APAT OE filed a Notice of Judicial Review of the arbitration judgment in the Shenzhen Intermediate Court in Shenzhen, China. The case was heard in May 2018, and NeoChina was successful in disputing the Judicial Review, which means that the arbitration judgment against APAT OE and in favor of NeoChina stands.

In July 2018, NeoChina applied together to the Shenzhen Intermediate Court for enforcement of the previous arbitration ruling because APAT OE had refused to perform the arbitral award. In October 2018, the Court enforced the award, officially closing this arbitration matter.

In July 2018, NeoChina filed an arbitration claim against APAT OE in the Arbitration Court claiming approximately USD \$12.0 million in damages as related to liability under the APA. NeoChina also was granted a property preservation of APAT OE's bank accounts. In February 2019 NeoChina applied to the Arbitration Court to reduce the claim to USD \$7.1 million according to the evidence of confirmation requests received by NeoChina. In August 2019, NeoChina applied to the Arbitration Court to modify the claim to USD \$8.1 million subject to the supplementary evidence of NeoChina. A hearing occurred on September 23, 2019. No judgment has been issued to date. The Company is unable to predict the outcome of this matter.

In November 2018, APAT OE filed an additional arbitration claim against NeoChina and NeoPhotonics Corporation claiming approximately USD \$7.8 million for liability under the APA. In March 2019, NeoChina filed a response and counterclaim against APAT OE including a claim for attorney fees in the amount of RMB 810,000 (approximately \$121,000). This matter is scheduled to be heard in the same hearing as the NeoChina arbitration claim referenced above, which matter was heard on September 23, 2019. No judgment has been issued to date. The Company is unable to predict the outcome of this matter.

NEOPHOTONICS CORPORATION
NOTES TO CONSOLIDATED FINANCIAL STATEMENTS (continued)

Indemnifications

In the normal course of business, the Company enters into agreements that contain a variety of representations and warranties and provide for general indemnification. The Company's exposure under these agreements is unknown because it involves claims that may be made against the Company in the future, but have not yet been made. To date, the Company has not paid any claims or been required to defend any action related to its indemnification obligations. However, the Company may record charges in the future as a result of these indemnification obligations.

In November 2016 Oyster Communications, Inc. filed nine patent lawsuits against several defendants in the U.S. District Court for the Eastern District of Texas, including one against Cisco Systems, Inc ("Cisco"). One defendant successfully transferred their case to the U.S. District Court for the Northern District of California. Additional defendants requested venue changes are still pending. The Company was not named as a defendant in any of the lawsuits. In July 2017, Cisco notified the Company that it would be seeking indemnification from the Company for claims against Cisco arising from the lawsuits and the parties engaged in discussions and negotiations. In September 2018, the Company and Cisco signed a settlement agreement under which the Company agreed to pay to Cisco \$0.3 million, which was paid in January 31, 2019 and \$0.2 million in product credit, which was issued in December, 2019. This settlement resolved Cisco's indemnification claims against the Company in this matter.

Purchase obligations

The Company has open purchase orders with its suppliers for the purchase of inventory and other items in the ordinary course of its business. As of December 31, 2019, the Company's estimate of outstanding amounts under these purchase orders was approximately \$62.1 million, primarily expected to be purchased within the next 12 months. Certain of these open purchase orders may be cancellable without penalty.

Penalty Payment Derivative

In connection with a private placement transaction with Joint Stock Company "Rusnano" (formerly Open Joint Stock Company "RUSNANO"), or Rusnano, in 2012, the Company agreed to certain performance obligations including establishing a wholly-owned subsidiary in Russia and making a \$30.0 million investment commitment (the "Investment Commitment") towards the Company's Russian operations, which could be partially satisfied by cash and/or non-cash investment inside or outside of Russia and/or by way of non-cash asset transfers.

The Rights Agreement as amended in 2015 (the "Amended Rights Agreement") limits the maximum amount of penalties and/or exit fee (the "Rusnano Payment") to be paid by the Company to \$5.0 million in the aggregate and allows such payment to be reduced when certain milestones are met over time. The Amended Rights Agreement also provides for an updated investment plan for the Company's Russian subsidiaries that includes non-cash transfer of licensing rights to intellectual property, non-cash transfers of existing equipment and commitments to complete the remaining investment milestones through 2019.

As of December 31, 2018, the remaining Investment Commitment was approximately \$6.7 million to be invested at any time on or before December 31, 2019. At any point between December 31, 2018 and December 31, 2019, the Company may elect to pay a \$2.0 million exit fee to terminate any remaining obligations associated with the Investment Commitment.

Rusnano has non-transferable veto rights over the Company's Russian subsidiaries' annual budget during the investment period and must approve non-cash asset transfers to be made in satisfaction of the Investment Commitment. The Company accounted for the Rusnano Payment as an embedded derivative instrument. The fair value of the penalty payment derivative has been estimated at the date of the original common stock sale (April 27, 2012) and at each subsequent balance sheet date using a probability-weighted discounted future cash flow approach using unobservable inputs, which are classified as Level 3 within the fair value hierarchy. The primary inputs for this approach include the probability of achieving the Investment Commitment and a discount rate that approximates the Company's incremental borrowing rate. After the initial measurement, changes in the fair value of this derivative are recorded in other income (expense), net. The estimated fair value of this derivative was \$2.0 million as of December 31, 2018 and \$0.4 million as of December 31, 2017. As of December 31, 2018, and December 31, 2017, the derivative was reported within Accrued and other current liabilities and other noncurrent liabilities, respectively on the Company's consolidated balance sheets. See Note 8.

In December 2018, the Company signed a definitive agreement with Rusnano to sell the Company's 100% interest in NeoPhotonics Corporation, LLC, the subsidiary for the Company's manufacturing operations in Russia, for approximately book value. The purchase price agreed to be paid by Rusnano consisted of approximately \$3.0 million in cash and \$1.0 million in cancellation of the remaining penalty payment that would otherwise be owed to Rusnano as consideration for the Company's

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obligations to provide manufacturing process transition to NeoPhotonics Corporation, LLC. This transaction was completed in April 2019.

15. Stockholders' Equity

Common stock

As of December 31, 2019, the Company had reserved 7,720,441 shares of common stock for issuance under its stock plans and 1,717,211 shares of common stock for issuance under its employee stock purchase plan.

In August 2019, the Company filed a prospectus supplement with SEC to issue 103,734 shares of common stock and additional shares of common stock with an aggregate offering price of up to \$4.5 million to one of the Company's vendors as a consideration for research and development services. In 2019 the Company issued common shares totaling 441,410 for a total consideration of \$2.5 million.

Accumulated Other Comprehensive Income (Loss)

The following table shows the components of accumulated other comprehensive income (loss), net of taxes, as of December 31, 2019 and 2018 (in thousands):

	December 31, 2019	December 31, 2018
Foreign currency translation adjustments	\$ (7,641)	\$ (6,897)
Unrealized loss on available-for-sale securities	—	—
Defined benefit pension plan adjustment, net of taxes	(230)	(229)
	<u>\$ (7,871)</u>	<u>\$ (7,126)</u>

No material amounts related to available-for-sale securities or the defined benefit pension plan were reclassified out of accumulated other comprehensive income (loss) during the years ended December 31, 2019, 2018 or 2017.

Accumulated Deficit

Approximately \$9.2 million and \$9.0 million of the Company's retained earnings within its accumulated deficit at December 31, 2019 and 2018, respectively, was subject to restriction due to a requirement that its subsidiaries in China set aside at least 10% of their respective accumulated profits each year to fund statutory common reserves as well as allocate a discretionary portion of their after-tax profits to their staff welfare and bonus fund.

16. Restricted net assets

The Company's consolidated subsidiaries operating in China and Japan are restricted from transferring funds or assets to its parent company in the form of cash dividends, loans or advances. As of December 31, 2019 and December 31, 2018, the Company's consolidated subsidiaries had \$21.1 million and \$20.9 million, respectively, of restricted net assets. This compares to the Company's consolidated net assets of \$160.2 million and \$160.2 million as of December 31, 2019 and December 31, 2018, respectively, which consisted of (in thousands):

	December 31, 2019	December 31, 2018
Cash restricted in China as a result of ongoing litigation and unfulfilled government grants	\$ 10,936	\$ 11,018
China earnings restricted to fund statutory common reserves in China	9,240	9,005
Loan agreements in Japan requiring local subsidiaries to maintain minimum net asset levels	920	909
Total restricted net assets in the Company's consolidated subsidiaries	<u>\$ 21,096</u>	<u>\$ 20,932</u>

NEOPHOTONICS CORPORATION
NOTES TO CONSOLIDATED FINANCIAL STATEMENTS (continued)

17. Stock-based compensation***Equity incentive programs******2004 Stock Option Plan***

In March 2004, the Company adopted the 2004 Stock Option Plan (the “2004 Plan”) for the benefit of its eligible employees, consultants and independent directors. In February 2011, in connection with the closing of the Company’s initial public offering and execution of the associated underwriting agreement, shares authorized for issuance under the 2004 Plan were cancelled (except for those shares reserved for issuance upon exercise of outstanding stock options). As of December 31, 2019, options to purchase 65,644 shares were outstanding under the 2004 Plan and no shares were available for future grant.

2007 Stock Appreciation Grants Plan

In October 2007, the Company adopted its 2007 Stock Appreciation Grants Plan (the “2007 Plan”). The 2007 Plan provides for the grant of units (“stock appreciation units”) entitling the holder upon exercise to receive cash in an amount equal to the amount by which the Company’s common stock has appreciated in value. Each stock appreciation unit entitles a participant to a cash payment in the amount of the excess of the fair market value of a share of common stock on the exercise date over the fair market value of a share of common stock on the award date.

The total appreciation available to a participant from the exercise of an award is equal to the number of stock appreciation units being exercised, multiplied by the amount of appreciation per stock appreciation unit. The stock appreciation units granted under the 2007 Plan were primarily granted to employees or consultants of the Company’s subsidiaries in China.

As of December 31, 2019, 13,471 stock appreciation units were outstanding, all of which were vested. The Company does not intend to grant additional stock appreciation units under the 2007 Plan.

2010 Equity Incentive Plan

In April 2010, the Company adopted its 2010 Equity Incentive Plan (the “2010 Plan”). The 2010 Plan will terminate on April 13, 2020, unless sooner terminated by the board of directors.

The 2010 Plan provides for the grant of incentive stock options, non-statutory stock options, stock appreciation rights, restricted stock awards, restricted stock unit awards, market-based stock awards, and other forms of equity compensation, or collectively, stock awards, all of which may be granted to employees, including officers, and to non-employee directors and consultants. Additionally, the 2010 Plan provides for the grant of market-based cash awards. Incentive stock options may be granted only to employees. All other awards may be granted to employees, including officers, and to non-employee directors and consultants.

Under the terms of the 2010 Plan, awards may be granted at prices not less than 100% of the fair value of the Company’s common stock, as determined by the Company’s board of directors, on the date of grant for an incentive stock option and not less than 85% of the fair value of the Company’s common stock on the date of grant for a non-qualified stock option. Options vest over a period of time as determined by the board of directors, generally over a three to four year period, and expire ten years from date of grant.

Initially, the aggregate number of shares of the Company’s common stock that may be issued pursuant to stock awards under the 2010 Plan was 865,420 shares. The number of shares of the Company’s common stock reserved for issuance under the 2010 Plan automatically increase on January 1st each year, starting on January 1, 2012 and continuing through January 1, 2020, by 3.5% of the total number of shares of the Company’s common stock outstanding on December 31 of the preceding calendar year, or such lesser number of shares of common stock as determined by the Company’s board of directors. The maximum number of shares that may be issued pursuant to the exercise of incentive stock options under the 2010 Plan is 8,000,000 shares. As of December 31, 2019, stock options to purchase and restricted stock units to convert to a total of 5,831,720 shares of common stock were outstanding under the 2010 Plan and 1,093,354 shares were reserved for future issuance.

2010 Employee Stock Purchase Plan

In February 2011, the Company adopted its 2010 Employee Stock Purchase Plan (the “2010 ESPP”). The 2010 ESPP was implemented through a series of offerings of purchase rights to eligible U.S. employees. The offering period is for 12 months beginning November 16th of each year, with two purchase dates on May 15th and November 15th.

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NOTES TO CONSOLIDATED FINANCIAL STATEMENTS (continued)

The 2010 ESPP initially authorized the issuance of 342,568 shares of the Company's common stock pursuant to purchase rights granted to employees or to employees of designated affiliates. The number of shares of common stock reserved for issuance automatically increase on January 1st of each year, starting January 1, 2012, in an amount equal to the lesser of (1) 3.5% of the total number of shares of common stock outstanding on December 31st of the preceding calendar year, (2) 600,000 shares of common stock or (3) such lesser number of shares of common stock as determined by the Company's board of directors. As of December 31, 2019, the Company had 1,717,211 shares reserved for future issuance.

In June 2019, the Company's stockholders approved an amendment and restatement of the 2010 ESPP, which authorized 1,500,000 additional shares for issuance under the 2010 ESPP and eliminated the annual automatic increase provisions from the 2010 ESPP.

2011 Inducement Award Plan

In September 2011, the Company adopted its 2011 Inducement Award Plan (the "2011 Plan"). The 2011 Plan provides for awarding options, stock appreciation rights, restricted stock grants, restricted stock units and other awards to new employees of the Company and its affiliates, including as a result of future business acquisitions. All options under this plan will be designated as non-statutory stock options.

The number of shares initially reserved for issuance under the 2011 Plan was 750,000 shares. The exercise price of awards shall be not less than 100% of the fair market value of the Company's common stock on the date of grant. Each stock appreciation right grant will be denominated in shares of common stock equivalents. Options and stock appreciation rights have a maximum term of ten years measured from the date of grant, subject to earlier termination following the individual's cessation of service with the Company. In 2015, an additional 100,000 shares were authorized for issuance by the Company's board of directors. As of December 31, 2019, stock options to purchase and restricted stock units to convert to a total of 513,862 shares of common stock were outstanding under the 2011 Plan and 215,861 shares were reserved for future issuance.

Determining Fair Value

The Company estimated the fair value of certain stock-based awards using a Black-Scholes-Merton valuation model with the following assumptions:

	Years ended December 31,		
	2019	2018	2017
Stock options			
Weighted-average expected term (years)	6.00	6.02	5.99
Weighted-average volatility	67%	65%	65%
Risk-free interest rate	1.82%-2.27%	2.27%-2.62%	2.02%-2.08%
Expected dividends	—%	—%	—%
Stock appreciation units			
Weighted-average expected term (years)	1.52	1.94	2.30
Weighted-average volatility	64%	66%	69%
Risk-free interest rate	1.63%-2.63%	1.03%-2.81%	0.51%-1.62%
Expected dividends	—%	—%	—%
ESPP			
Weighted-average expected term (years)	0.71	0.72	0.72
Weighted-average volatility	71%	61%	61%
Risk-free interest rate	1.75%-2.44%	1.93%-2.59%	0.91%-1.31%
Expected dividends	—%	—%	—%

Expected term. The expected term for stock options was estimated using the Company's historical exercise behavior and expected future exercise behavior. Vested stock appreciation units first became exercisable upon the expiration of the lock-up period associated with the initial public offering. Therefore, the Company estimated the term of the award based on an average of the weighted-average exercise period and the remaining contractual term. The expected term for the ESPP represents the period of time from the beginning of the offering period to the purchase date.

Volatility. Due to the limited history of the trading of the Company's common stock since the initial public offering in February 2011, the expected volatility used by the Company was based on a combination of its own volatility and the volatility

NEOPHOTONICS CORPORATION
NOTES TO CONSOLIDATED FINANCIAL STATEMENTS (continued)

of similar entities through end of 2016. In evaluating similarity, factors such as industry, stage of life cycle, size, and financial leverage were taken into consideration. The term over which volatility was measured was commensurate with the expected term. Starting 2017, the volatility assumption is based on the historical volatility of our common stock over the expected term of the stock options.

Risk-free interest rate. The risk-free rate that the Company uses in the Black-Scholes-Merton option valuation model is based on U.S. Treasury zero-coupon issues with remaining terms similar to the expected term on the options.

Expected dividends. The Company has never declared or paid any cash dividends and does not plan to pay cash dividends in the foreseeable future, and, therefore, used an expected dividend yield of zero in the valuation model.

Stock-Based Compensation Expense

The following table summarizes the stock-based compensation expense recognized for the years ended December 31, 2019, 2018 and 2017. Unamortized stock-based compensation costs capitalized as part of inventory were immaterial in each of the periods presented (in thousands):

	Years ended December 31,		
	2019	2018	2017
Cost of goods sold	\$ 2,244	\$ 2,596	\$ 1,098
Research and development	3,138	3,570	2,491
Sales and marketing	2,411	3,248	1,697
General and administrative	4,663	4,728	2,920
	<u>\$ 12,456</u>	<u>\$ 14,142</u>	<u>\$ 8,206</u>

2014 Stock Option and Stock Appreciation Rights Repricing Offer

On December 18, 2014, the Company completed an offer to certain of its current employees (or engaged as a consultant to the Company) to receive the opportunity to reduce the exercise price of certain outstanding eligible options or eligible stock appreciation rights to the closing trading price of the Company's common stock on December 18, 2014, in exchange for such holders' agreement to accept a new vesting schedule (the "Repricing Offer"). The eligible stock options and stock appreciation rights covered an aggregate of 2,373,692 shares of the Company's common stock. On December 18, 2014, options to purchase 1,948,631 shares of the Company's common stock and stock appreciation rights to purchase 87,354 shares of the Company's common stock were repriced in the Repricing Offer. The repriced eligible options and eligible stock appreciation rights had a grant date compensation cost, net of forecasted forfeitures, of approximately \$2.6 million, which included incremental compensation cost of approximately \$0.9 million.

The new exercise price per share for each repriced eligible option or eligible stock appreciation right is \$3.50. Each of the repriced eligible options or eligible stock appreciation rights was subject to a new vesting schedule as follows: 50% of the shares subject to such repriced eligible option or eligible stock appreciation right vested and became exercisable on January 1, 2016, and the remaining 50% vested and became exercisable in 12 equal monthly installments on each monthly anniversary thereafter, in each case subject to continued service with the Company on each applicable vesting date; provided, however, that alternative vesting applied to certain eligible options or eligible stock appreciation rights if the expiration date of such eligible options or eligible stock appreciation rights was after January 30, 2016, but on or before January 1, 2017, then 50% of the shares subject to the repriced awards vested and became exercisable on January 1, 2016 and the remaining shares were subject to ratable monthly vesting over the remaining term ending 60 days prior to the expiration date of the repriced awards; if the expiration date of such eligible options or eligible stock appreciation rights was prior to January 30, 2016, then 100% of the shares subject to the repriced awards vested and became exercisable on the 60th day prior to the expiration date.

NEOPHOTONICS CORPORATION
NOTES TO CONSOLIDATED FINANCIAL STATEMENTS (continued)

Stock Option and Restricted Stock Unit Activity

The following table summarizes the Company's stock option and restricted stock unit, or RSU, activity during the year ended December 31, 2019:

	Shares Available for Grant	Stock Options		Restricted Stock Units	
		Number of Shares	Weighted Average Exercise Price	Number of Units	Weighted Average Grant Date Fair Value
Balance at December 31, 2018	1,102,323	3,202,745	\$ 5.73	2,486,028	\$ 7.87
Authorized for issuance	1,623,244	—	—	—	—
Granted	(2,087,020)	103,001	4.34	1,974,019	4.90
Exercised/Converted	—	(485,832)	3.90	(1,018,143)	8.72
Cancelled/Forfeited	670,668	(221,169)	6.81	(270,923)	7.23
Balance at December 31, 2019	1,309,215	2,598,745	\$ 5.93	3,170,981	\$ 5.80

The following table summarizes information about stock options outstanding as of December 31, 2019:

	Options Outstanding			
	Number of Shares	Weighted Average Exercise Price	Weighted Average Remaining Contractual Term (Years)	Aggregate Intrinsic Value (in Thousands)
Vested and expected to vest	2,582,127	\$ 5.92	4.88	\$ 8,280
Exercisable	2,351,411	\$ 5.87	4.57	\$ 7,723

The fair value of options vested during the years ended December 31, 2019, 2018 and 2017 was \$1.6 million, \$2.3 million and \$1.5 million, respectively. The intrinsic value of options vested and expected to vest and exercisable as of December 31, 2019 is calculated based on the difference between the exercise price and the fair value of the Company's common stock as of December 31, 2019. The intrinsic value of options exercised during the years ended December 31, 2019, 2018 and 2017, was \$1.3 million, \$2.4 million and \$3.0 million, respectively.

The weighted-average fair value of options granted was \$2.68, \$4.03 and \$4.43 per share for the years ended December 31, 2019, 2018 and 2017, respectively. At December 31, 2019, there was \$0.8 million of unrecognized stock-based compensation expense for stock options, net of estimated forfeitures, which will be recognized over the remaining weighted-average period of 1.2 years.

Included in the outstanding stock options at December 31, 2019 are 0.6 million shares of market-based stock options granted to key personnel. The fair value of its market-based option grants was \$4.72 for 2015 and \$1.65 for 2014 using a Monte Carlo simulation model with the assumptions discussed above. These options vested in September 2016 as a result of the satisfaction of the market condition requiring the average closing price of the Company's common stock over a period of 20 consecutive trading days to be equal to or greater than \$15.00 per share and the recipients remaining in continuous service with the Company through such period. The Company recorded approximately \$4.8 million in related stock-based compensation expense for these options in 2016.

The following table summarizes information about RSUs outstanding as of December 31, 2019:

	Restricted Stock Units Outstanding			
	Number of Shares	Weighted Average Exercise Price	Weighted Average Remaining Contractual Term (Years)	Aggregate Intrinsic Value (in Thousands)
Vested and expected to vest	2,743,267	\$ —	1.35	\$ 24,196

NEOPHOTONICS CORPORATION
NOTES TO CONSOLIDATED FINANCIAL STATEMENTS (continued)

The fair value of RSUs vested during the years ended December 31, 2019, 2018 and 2017 was \$8.9 million, \$9.8 million and \$7.6 million, respectively. The intrinsic value of RSUs vested and expected to vest as of December 31, 2019 is calculated based on the fair value of the Company's common stock as of December 31, 2019. The intrinsic value of RSUs converted during the years ended December 31, 2019, 2018 and 2017, was \$4.7 million, \$7.4 million and \$6.4 million, respectively.

The weighted-average fair value of RSUs granted was \$4.90, \$6.83 and \$7.86 per share for the years ended December 31, 2019, 2018 and 2017, respectively. At December 31, 2019, the Company had \$12.3 million of unrecognized stock-based compensation expense for RSUs, net of estimated forfeitures, which will be recognized over the remaining weighted-average period of 2.4 years.

The majority of the Company's RSUs that were converted during the years ended December 31, 2019, 2018 and 2017 were net share settled. Upon each settlement date, RSUs were withheld to cover the minimum withholding tax and the remaining amounts were delivered to the recipient as shares of the Company's common stock. In 2019, 2018 and 2017, the Company withheld 155,267, 147,572 and 126,999 shares, respectively, and remitted cash of \$0.7 million, \$1.0 million and \$1.0 million, respectively, to the appropriate tax authorities.

Market-based Restricted Stock Unit Activity

In 2019 and 2018, the Company granted 10,000 shares and 695,000 shares, respectively, of market-based RSUs to certain employees. These RSUs will vest if the 30-day weighted average closing price of the Company's common stock is equal to or greater than certain price targets per share and the recipients remain in continuous service with the Company through such service period. 63,500 RSU's were canceled during 2019, no RSUs were canceled in 2018. There were no RSUs vested in 2019 and 2018.

The weighted average grant-date fair value per share of market-based RSUs granted during 2019 and 2018 was approximately \$4.86 and \$5.82, respectively. As of December 31, 2019, the Company had \$1.3 million of unrecognized stock-based compensation expense for RSUs, net of estimated forfeitures, which will be recognized over the remaining weighted-average period of 1 year. The fair value of market-based RSUs was measured on the grant date using Monte Carlo simulation model with the following assumptions:

	Years ended December 31,	
	2019	2018
Weighted-average volatility	66%	66%
Risk-free interest rate	2.79%	2.79%
Expected dividends	—%	—%

Market-based RSUs expire seven years from the date of grant. As of December 31, 2019, the weighted average remaining contractual term for market-based RSUs is 5.6 years.

Stock Appreciation Unit Activity

The following table summarizes the Company's stock appreciation unit activity during the year ended December 31, 2019:

	Stock Appreciation Units	Weighted-Average Exercise Price
Stock appreciation units outstanding as of December 31, 2018	192,872	\$ 4.91
Stock appreciation units exercised	(11,252)	\$ 3.52
Stock appreciation units canceled	(18,149)	\$ 4.84
Stock appreciation units outstanding as of December 31, 2019	163,471	\$ 5.01

The fair value of stock appreciation units vested was immaterial in 2019, 2018 and 2017. The intrinsic value of stock appreciation units is calculated based on the difference between the exercise price and the fair value of the Company's common stock as of December 31, 2019. Cash paid for stock appreciation units exercised was \$0.1 million in 2019, \$0.1 million in 2018, and \$0.2 million in 2017.

NEOPHOTONICS CORPORATION
NOTES TO CONSOLIDATED FINANCIAL STATEMENTS (continued)

As of December 31, 2019 and 2018, the liability for settlement of stock appreciation units was approximately \$0.8 million and \$0.6 million, respectively, and was included in accrued and other current liabilities on the consolidated balance sheet, based on the fair value of the stock appreciation units, that will be recognized through settlement.

Included in the outstanding stock appreciation units at December 31, 2019 were 0.2 million shares of market-based stock appreciation units granted to key personnel which were granted during 2013. These market-based units vested in September 2016 upon the satisfaction of the market condition requiring the average closing price of the Company's common stock over a period of 20 consecutive trading days to be equal to or greater than \$15.00 per share and the recipients remaining in continuous service with the Company through such period. In 2019, the Company recorded approximately \$0.2 million loss as compared to approximately \$0.1 million gain in 2018, in related stock-based compensation for these stock appreciation units.

Employee Stock Purchase Plan

The Company issued 357,251 shares under the 2010 ESPP during the year ended December 31, 2019. As of December 31, 2019, there was \$0.8 million of unrecognized stock-based compensation expense for stock purchase rights that will be recognized over the remaining offering period, through November 2020.

18. Income taxes

The provision for income taxes is based upon the income (loss) before income taxes as follows (in thousands):

	Years Ended December 31,		
	2019	2018	2017
U.S. operations	\$ (21,579)	\$ (43,384)	\$ (52,725)
Non-U.S. operations	6,136	1,076	301
	<u>\$ (15,443)</u>	<u>\$ (42,308)</u>	<u>\$ (52,424)</u>

The components of the provision for income taxes consisted of the following (in thousands):

	Years Ended December 31,		
	2019	2018	2017
Current			
Federal	\$ (71)	\$ (49)	\$ (144)
State	(3)	36	3
Foreign	(1,854)	(1,634)	363
	<u>(1,928)</u>	<u>(1,647)</u>	<u>222</u>
Deferred			
Federal	—	42	4
State	—	—	—
Foreign	295	276	(1,135)
Total provision	<u>\$ (1,633)</u>	<u>\$ (1,329)</u>	<u>\$ (909)</u>

The tax provision differs from the amount obtained by applying the U.S. federal statutory tax rate as follows (in thousands, except percentages):

NEOPHOTONICS CORPORATION
NOTES TO CONSOLIDATED FINANCIAL STATEMENTS (continued)

	Years Ended December 31,		
	2019	2018	2017
Federal statutory rate	21%	21%	35%
Tax at federal statutory rate	\$ 3,255	\$ 8,869	\$ 18,354
State taxes, net of federal benefit	(3)	36	2
Mandatory repatriation/Section 956	—	—	(5,718)
Permanent differences	1,514	(371)	(67)
Stock-based compensation	(1,014)	(1,079)	(314)
Change in valuation allowance	(5,186)	(10,094)	16,273
Research and development	932	914	851
Foreign rate differences	(531)	(697)	(2,819)
Foreign tax credit	(405)	49	144
Change in prior year deferred balances	—	1,653	(28,262)
Other	(195)	(609)	647
Total provision for income taxes from continuing operations	\$ (1,633)	\$ (1,329)	\$ (909)

Deferred income tax assets and liabilities comprise the following (in thousands):

	December 31,	
	2019	2018
Deferred Tax Assets:		
Net operating loss carryforwards	\$ 54,339	\$ 56,828
Federal and state credits	30,111	28,328
Reserves, accruals and other	14,132	11,265
Fixed assets and intangibles	2,783	2,398
Total deferred tax assets	101,365	98,819
Valuation allowance	(92,149)	(92,891)
Total deferred tax assets, net of valuation allowance	9,216	5,928
Less deferred tax liabilities:		
Acquired intangibles	(283)	(313)
Property, plant and equipment	(4,663)	(4,754)
Right-of-Use Lease Assets	(3,124)	—
Net deferred tax assets	\$ 1,146	\$ 861
Reported as:		
Long term deferred tax assets, included within other long-term assets	\$ 1,674	\$ 861
Long term deferred income tax liabilities, included within noncurrent liabilities	(528)	—
Net deferred tax assets	\$ 1,146	\$ 861

The net valuation allowance increased by \$0.7 million in 2019 and increased by \$16.8 million in 2018. There was no material change to the valuation allowance in 2019.

The Company did not record a full valuation allowance against its net deferred tax assets in most foreign jurisdictions as it believes these deferred tax assets were realizable on a more likely than not basis as of December 31, 2019. Based upon the weight of available evidence, which includes the Company's historical operating performance and the reported cumulative net losses to date, the Company continues to maintain a full valuation allowance against its net U.S. deferred tax assets.

The Company adopted ASU 2016-16 on a modified retrospective basis effective January 1, 2018. Upon adoption of this standard on January 1, 2018, the Company recorded \$1.8 million to accumulated deficit balance for intra-entity transfer of an asset other than inventory in prior years.

NEOPHOTONICS CORPORATION
NOTES TO CONSOLIDATED FINANCIAL STATEMENTS (continued)

As of December 31, 2019, the Company had federal and state net operating loss, or NOL, carryforwards of approximately \$290.4 million and \$52.1 million, respectively. Federal NOL carryforwards start to expire in 2022 and a portion of the California NOL carryforwards will begin to expire in 2028. As of December 31, 2019, the Company also had federal and state research and development tax credit carryovers of \$10.2 million and \$18.8 million, respectively. The federal credits will begin to expire in 2020 and the state credits can be carried forward indefinitely. The Company also had \$10.5 million of foreign tax credit carryforwards which will start to expire in 2022 if not utilized. Utilization of NOL carryforwards and carried over tax credits may be subject to substantial annual limitation due to federal and state ownership limitations. The annual limitation may result in the expiration of NOL and tax credit carryforwards before utilization. The deferred tax assets listed above do not include NOL carryforwards that are expected to expire unutilized as a result of existing ownership changes.

The Company maintains its position for undistributed foreign earnings to be indefinite and does not provide for outside basis differences under the indefinite reinvestment assertion of ASC 740-30. Accordingly, the Company does not anticipate the need to provide for additional taxes for basis differences or withholding taxes on remitted foreign earnings in the immediate future.

At December 31, 2019, the Company's gross unrecognized tax benefits were approximately \$20.7 million, of which \$0.1 million would impact the effective tax rate if recognized. The Company does not believe that the amount of unrecognized tax benefits will change significantly in the next twelve months. There were no interest or penalties related to unrecognized tax benefits. The Company's policy is to classify interest and penalties associated with unrecognized tax benefits as income tax expense.

A reconciliation of the beginning and ending amount of unrecognized tax benefits is as follows (in thousands):

Balance at December 31, 2016	\$	23,606
Gross increases for tax positions of current year		1,933
Balance at December 31, 2017		25,539
Gross increases for tax positions of current year		657
Balance at December 31, 2018		26,196
Net changes in tax positions in current year		(5,544)
Balance at December 31, 2019	\$	20,652

The Company's material tax jurisdictions are the United States federal, California, Japan and China. As a result of NOL carryforwards, substantially all of the Company's tax years remain open to U.S. federal and state tax examination. Tax years for 2013 and forward remain open for Chinese tax examination.

19. Segment and geographic information

The Company's Chief Executive Officer, who is considered to be the chief operating decision maker, manages the Company's operations as a whole and reviews financial information presented on a consolidated basis for purposes of evaluating financial performance and allocating resources. In 2019, 2018 and 2017, the Company operated in one reportable segment.

Through 2019, the Company has aligned its products to High Speed Products and Network Products and Solutions (see Note 3).

The following tables set forth the Company's asset information by geographic region (in thousands):

NEOPHOTONICS CORPORATION
NOTES TO CONSOLIDATED FINANCIAL STATEMENTS (continued)

	As of December 31,	
	2019	2018
Property, plant and equipment, net:		
China	\$ 19,230	\$ 27,329
United States	26,068	29,054
Japan	25,772	29,631
Rest of world	10,063	14,076
Total	<u>\$ 81,133</u>	<u>\$ 100,090</u>

20. Selected Quarterly Financial Data (unaudited)

The following tables set forth a summary of the Company's quarterly financial information for each of the four quarters for the years ended December 31, 2019 and 2018:

Year ended December 31, 2019	First Quarter	Second Quarter	Third Quarter	Fourth Quarter
	(In thousands, except per share value)			
Revenues	\$ 79,366	\$ 81,690	\$ 92,392	\$ 103,356
Gross profit	15,737	15,675	26,199	31,202
Net income (loss)	(14,091)	(7,326)	2,272	2,069
Basic net income (loss) per share	\$ (0.30)	\$ (0.16)	\$ 0.05	\$ 0.04
Diluted net income (loss) per share	\$ (0.30)	\$ (0.16)	\$ 0.05	\$ 0.04
Weighted averages shares used to compute basic net income (loss) per share	46,414	46,754	47,666	48,358
Weighted averages shares used to compute diluted net income (loss) per share	46,414	46,754	48,615	50,238
Year ended December 31, 2018	First Quarter	Second Quarter	Third Quarter	Fourth Quarter
	(In thousands, except per share value)			
Revenues	\$ 68,586	\$ 81,102	\$ 81,748	\$ 91,104
Gross profit	9,182	15,472	18,933	22,586
Net loss	(18,246)	(10,537)	(8,125)	(6,729)
Basic net loss per share	\$ (0.41)	\$ (0.24)	\$ (0.18)	\$ (0.15)
Diluted net loss per share	(0.41)	(0.24)	(0.18)	(0.15)
Weighted averages shares used to compute basic net loss per share	44,259	44,665	45,476	46,150
Weighted averages shares used to compute diluted net loss per share	44,259	44,665	45,476	46,150

ITEM 9. CHANGES IN AND DISAGREEMENTS WITH ACCOUNTANTS ON ACCOUNTING AND FINANCIAL DISCLOSURE

Not applicable.

ITEM 9A. CONTROLS AND PROCEDURES

Evaluation of Disclosure Controls and Procedures

Our management, with the participation of our Chief Executive Officer and Chief Financial Officer, evaluated the effectiveness of the design and operation of our disclosure controls and procedures as of December 31, 2019. The term "disclosure controls and procedures," as defined in Rules 13a-15(e) and 15d-15(e) under the Securities Exchange Act of 1934, as amended (Exchange Act), means controls and other procedures of a company that are designed to ensure that information required to be disclosed by a company in the reports that it files or submits under the Exchange Act is recorded, processed, summarized and reported, within the time periods specified in the SEC's rules and forms. Disclosure controls and procedures

include, without limitation, controls and procedures designed to ensure that information required to be disclosed by a company in the reports that it files or submits under the Exchange Act is accumulated and communicated to the company's management, including its principal executive and principal financial officers, as appropriate to allow timely decisions regarding required disclosure.

Based upon that evaluation as of the end of the period covered in this Annual Report on Form 10-K, our Chief Executive Officer and Chief Financial Officer have concluded that our disclosure controls and procedures were effective as of December 31, 2019 at a reasonable assurance level.

Management's Report on Internal Control Over Financial Reporting

Our management is responsible for establishing and maintaining adequate internal control over financial reporting, as defined in Rules 13a-15(f) and 15d-15(f) as defined in the Exchange Act. Internal control over financial reporting consists of policies and procedures that: (1) pertain to the maintenance of records that, in reasonable detail, accurately and fairly reflect the transactions and dispositions of our company assets; (2) are designed and operated to provide reasonable assurance regarding the reliability of our financial reporting and our process for the preparation of financial statements for external purposes in accordance with generally accepted accounting principles and that receipts and expenditures are being made only in accordance with authorizations of our management and directors; and (3) provide reasonable assurance regarding prevention or timely detection of unauthorized acquisition, use or disposition of our assets that could have a material effect on the financial statements. Because of its inherent limitations, internal control over financial reporting may not prevent or detect misstatements. Also, projections of any evaluation of effectiveness to future periods are subject to the risk that controls may become inadequate because of changes in conditions, or that the degree of compliance with the policies or procedures may deteriorate.

Our management assessed the effectiveness of our internal control over financial reporting using the criteria set forth by the Committee of Sponsoring Organizations of the Treadway Commission in *Internal Control — Integrated Framework (2013)*. Based on the results of our assessment, using the criteria in *Internal Control – Integrated Framework (2013)*, our management has concluded that we maintained effective internal control over financial reporting as of December 31, 2019.

The effectiveness of our internal control over financial reporting as of December 31, 2019 has been audited by Deloitte & Touche LLP, an independent registered public accounting firm, as stated in their report, which appears below.

Changes in Internal Control Over Financial Reporting

There have not been any changes in our internal control over financial reporting (as defined in Rule 13a-15(f) under the Exchange Act) in the fourth quarter of 2019 that materially affected, or are reasonably likely to materially affect, our internal control over financial reporting.

Inherent Limitation on the Effectiveness of Internal Controls

The effectiveness of any system of internal control over financial reporting is subject to inherent limitations, including the exercise of judgment in designing, implementing, operating, and evaluating the controls and procedures, and the inability to eliminate misconduct completely. Accordingly, any system of internal control over financial reporting can only provide reasonable, not absolute, assurance. In addition, projections of any evaluation of effectiveness to future periods are subject to the risk that controls may become inadequate because of changes in conditions, or that the degree of compliance with the policies or procedures may deteriorate. We intend to continue to monitor and upgrade our internal controls as necessary or appropriate for our business, but cannot assure that such improvements will be sufficient to provide us with effective internal control over financial reporting.

REPORT OF INDEPENDENT REGISTERED PUBLIC ACCOUNTING FIRM

To the Stockholders and the Board of Directors of NeoPhotonics Corporation

Opinion on Internal Control over Financial Reporting

We have audited the internal control over financial reporting of NeoPhotonics Corporation and subsidiaries (the “Company”) as of December 31, 2019, based on criteria established in *Internal Control - Integrated Framework (2013)* issued by the Committee of Sponsoring Organizations of the Treadway Commission (COSO). In our opinion, the Company maintained, in all material respects, effective internal control over financial reporting as of December 31, 2019, based on criteria established in *Internal Control - Integrated Framework (2013)* issued by COSO.

We have also audited, in accordance with the standards of the Public Company Accounting Oversight Board (United States) (PCAOB), the consolidated financial statements as of and for the year ended December 31, 2019, of the Company and our report dated February 27, 2020, expressed an unqualified opinion on those consolidated financial statements and included an explanatory paragraph relating to the Company’s adoption of Accounting Standards Update (ASU) 2016-02, Leases (Topic 842) and related amendments.

Basis for Opinion

The Company’s management is responsible for maintaining effective internal control over financial reporting and for its assessment of the effectiveness of internal control over financial reporting, included in the accompanying Management’s Report on Internal Control over Financial Reporting. Our responsibility is to express an opinion on the Company’s internal control over financial reporting based on our audit. We are a public accounting firm registered with the PCAOB and are required to be independent with respect to the Company in accordance with the U.S. federal securities laws and the applicable rules and regulations of the Securities and Exchange Commission and the PCAOB.

We conducted our audit in accordance with the standards of the PCAOB. Those standards require that we plan and perform the audit to obtain reasonable assurance about whether effective internal control over financial reporting was maintained in all material respects. Our audit included obtaining an understanding of internal control over financial reporting, assessing the risk that a material weakness exists, testing and evaluating the design and operating effectiveness of internal control based on the assessed risk, and performing such other procedures as we considered necessary in the circumstances. We believe that our audit provides a reasonable basis for our opinion.

Definition and Limitations of Internal Control over Financial Reporting

A company’s internal control over financial reporting is a process designed to provide reasonable assurance regarding the reliability of financial reporting and the preparation of financial statements for external purposes in accordance with generally accepted accounting principles. A company’s internal control over financial reporting includes those policies and procedures that (1) pertain to the maintenance of records that, in reasonable detail, accurately and fairly reflect the transactions and dispositions of the assets of the company; (2) provide reasonable assurance that transactions are recorded as necessary to permit preparation of financial statements in accordance with generally accepted accounting principles, and that receipts and expenditures of the company are being made only in accordance with authorizations of management and directors of the company; and (3) provide reasonable assurance regarding prevention or timely detection of unauthorized acquisition, use, or disposition of the company’s assets that could have a material effect on the financial statements.

Because of its inherent limitations, internal control over financial reporting may not prevent or detect misstatements. Also, projections of any evaluation of effectiveness to future periods are subject to the risk that controls may become inadequate because of changes in conditions, or that the degree of compliance with the policies or procedures may deteriorate.

San Jose, California

February 27, 2020

ITEM 9B. OTHER INFORMATION

Not applicable.

Part III

ITEM 10. DIRECTORS, EXECUTIVE OFFICERS AND CORPORATE GOVERNANCE

The information required regarding our directors is incorporated herein by reference from the information contained in the section entitled “Proposal 1—Election of Directors” in our definitive Proxy Statement for the 2020 Annual Meeting of Stockholders (our “Proxy Statement”), a copy of which will be filed with the SEC on or before April 30, 2020.

The information required regarding our executive officers is incorporated herein by reference from the information contained in the section entitled “Management” in our Proxy Statement.

The information required regarding Section 16(a) beneficial ownership reporting compliance is incorporated by reference from the information contained in the section entitled “Section 16(a) Beneficial Ownership Reporting Compliance” in our Proxy Statement.

The information required with respect to procedures by which security holders may recommend nominees to our board of directors, the composition of our Audit Committee, and whether the Company has an “audit committee financial expert”, is incorporated by reference from the information contained in the section entitled “Proposal 1—Election of Directors” in our Proxy Statement.

Adoption of Code of Ethics

We have adopted a Code of Business Conduct and Ethics (the “Code”) applicable to all of our board of director members, employees and executive officers, including our Chief Executive Officer (Principal Executive Officer), and Chief Financial Officer (Principal Financial Officer and Principal Accounting Officer). We have made the Code available on our website at <http://www.neophotonics.com>.

We intend to satisfy the public disclosure requirements regarding (1) any amendments to the Code, or (2) any waivers under the Code given to our Principal Executive Officer, Principal Financial Officer and Principal Accounting Officer by posting such information on our website at <http://www.neophotonics.com>. There were no amendments to the Code or waivers granted thereunder relating to the Principal Executive Officer, Principal Financial Officer or Principal Accounting Officer during 2019.

ITEM 11. EXECUTIVE COMPENSATION

The information required regarding the compensation of our directors and executive officers is incorporated herein by reference from the information contained in the sections entitled “Executive Compensation,” “Director Compensation,” “Compensation Committee Report” and “Compensation Committee Interlocks and Insider Participation” in our Proxy Statement.

ITEM 12. SECURITY OWNERSHIP OF CERTAIN BENEFICIAL OWNERS AND MANAGEMENT

The information required regarding security ownership of our 5% or greater stockholders and of our directors and management is incorporated herein by reference from the information contained in the section entitled “Security Ownership of Certain Beneficial Owners and Management” in our Proxy Statement.

The information required regarding securities authorized for issuance our equity compensation plans is incorporated herein by reference from the information contained in the section entitled “Equity Compensation Plan Information” in our Proxy Statement.

ITEM 13. CERTAIN RELATIONSHIPS AND RELATED TRANSACTIONS AND DIRECTOR INDEPENDENCE

The information required regarding related transactions is incorporated herein by reference from the information contained in the section entitled “Certain Relationships and Related Transactions” and, with respect to director independence, the section entitled “Proposal 1—Election of Directors” in our Proxy Statement.

ITEM 14. PRINCIPAL ACCOUNTING FEES AND SERVICES

The information required is incorporated herein by reference from the information contained in the sections entitled “Principal Accountant Fees and Services” and “Pre-Approval Policies and Procedures” in the section entitled “Proposal 2—Ratification of Appointment of Independent Registered Public Accounting Firm” in our Proxy Statement.

PART IV

ITEM 15. EXHIBITS AND FINANCIAL STATEMENT SCHEDULES

We have filed the following documents as part of this Form 10-K:

1. Consolidated Financial Statements:

	<u>Page No.</u>
Report of Independent Registered Public Accounting Firm	55
Consolidated Balance Sheets	56
Consolidated Statements of Operations	57
Consolidated Statements of Comprehensive Loss	58
Consolidated Statements of Stockholders' Equity	59
Consolidated Statements of Cash Flows	60
Notes to Consolidated Financial Statements	61

2. Financial Statement Schedules

All schedules have been omitted because they are not required, not applicable, not present in amounts sufficient to require submission of the schedule, or the required information is otherwise included.

3. Exhibits

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Exhibit no.	Description of exhibit	Form	SEC File No.	Exhibit	Filing Date	Filed Herewith
2.1*	Asset Purchase Agreement dated December 14, 2016, by and among NeoPhotonics Dongguan Co., Ltd., NeoPhotonics (China) Co., Ltd. and APAT Optoelectronics Components Co., Ltd.	Form 8-K	001-35061	2.1	January 23, 2017	
2.2*	Supplementary Agreement to Asset Purchase Agreement, dated January 12, 2017, between APAT Optoelectronics Components Co., Ltd., NeoPhotonics Dongguan Co., Ltd. and NeoPhotonics (China) Co., Ltd.	Form 8-K	001-35061	2.2	January 23, 2017	
2.3*	Second Supplementary Agreement to Asset Purchase Agreement, dated January 14, 2017, between APAT Optoelectronics Components Co., Ltd., NeoPhotonics Dongguan Co., Ltd. and NeoPhotonics (China) Co., Ltd.	Form 8-K	001-35061	2.3	January 23, 2017	
3.1	Amended and Restated Certificate of Incorporation of NeoPhotonics Corporation.	Form 8-K	001-35061	3.1	February 10, 2011	
3.2	Amended and Restated Bylaws of NeoPhotonics Corporation.	Form S-1/A	333-166096	3.5	November 22, 2010	
4.1	Specimen Common Stock Certificate of NeoPhotonics Corporation.	Form S-1/A	333-166096	4.1	May 17, 2010	
4.2	Description of Securities					X
10.1	Form of Indemnification Agreement entered into by and between NeoPhotonics Corporation and each of its directors and officers.	Form S-1	333-166096	10.1	April 15, 2010	
10.2+	2004 Stock Option Plan, as amended, and related documents.	Form S-1	333-166096	10.2	April 15, 2010	
10.3+	2007 Stock Appreciation Grants Plan and related documents.	Form S-1	333-166096	10.3	April 15, 2010	
10.4+	2010 Equity Incentive Plan, as amended and forms of agreement thereunder.	Form S-8	333-189577	99.1	June 25, 2013	
10.5+	Amended and Restated Non-Employee Director Compensation Policy of NeoPhotonics Corporation.	Form 10-K	001-35061	10.5	March 16, 2017	
10.6+	Amended and Restated 2010 Employee Stock Purchase Plan	Form DEF 14A	001-35061		April 22, 2019	
10.7	Lease between Santur Corporation and 40915 Encyclopedia Circle, LLC, dated June 28, 2010.	Form 10-K	001-35061	10.35	March 30, 2012	
10.8	First Lease Amendment by and between NeoPhotonics Corporation and Landlord as defined in the recitals thereto, dated May 21, 2013.	Form 10-Q	001-35061	10.3	August 8, 2013	
10.9*	Maximum Comprehensive Credit Line Contract and Maximum Mortgage Contract by and between Agricultural Bank of China and NeoPhotonics (China) Co., Ltd. dated November 3, 2008 and December 25, 2008, respectively.	Form S-1	333-166096	10.9	April 15, 2010	
10.10	Property Lease Contract between NeoPhotonics (China) Co., Ltd. and Dongguan Conrad Hi-Tech Park Ltd., dated May 13, 2011.	Form 10-Q	001-35061	10.3	November 10, 2011	
10.11	Building Lease Agreement between NeoPhotonics Japan Godo Kaisha and Jones Lang Lasalle K.K., dated September 8, 2011.	Form 10-Q	001-35061	10.4	November 10, 2011	
10.12+	Employment Letter by and between NeoPhotonics Corporation and Timothy S. Jenks, dated March 30, 2010.	Form S-1	333-166096	10.17	April 15, 2010	
10.13+	Offer Letter by and between NeoPhotonics Corporation and Dr. Wupen Yuen, dated January 2, 2005.	Form S-1	333-166096	10.19	April 15, 2010	
10.14*+	Offer Letter by and between NeoPhotonics (China) Co., Ltd. and Chi Yue ("Raymond") Cheung, dated August 14, 2007.	Form S-1	333-166096	10.20	April 15, 2010	
10.15+	2011 Inducement Award Plan and related documents.	Form S-8	333-177306	99.1	October 13, 2011	

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Exhibit no.	Description of exhibit	Form	SEC File No.	Exhibit	Filing Date	Filed Herewith
10.19**	Loan Agreement by and between NeoPhotonics Semiconductor GK and The Bank of Tokyo-Mitsubishi UFJ, Ltd., dated February 25, 2015 (Contract A).	Form 10-K	001-35061	10.42	March 16, 2015	
10.20**	Loan Agreement by and between NeoPhotonics Semiconductor GK and The Bank of Tokyo-Mitsubishi UFJ, Ltd. dated February 25, 2015 (Contract B).	Form 10-K	001-35061	10.43	March 16, 2015	
10.23*	Amendment to Credit Agreement and Amendment to Security Agreement, dated October 20, 2015, by and between NeoPhotonics Corporation and CITIC Bank.	Form 10-Q	001-35061	10.2	November 6, 2015	
10.24*	Comprehensive Credit Granting Contract, dated October 20, 2015, by and between Neophotonics (China) Co., Ltd., Neophotonics Dongguan Co., Ltd. and Shenzhen Branch CITIC Bank.	Form 10-K	001-35061	10.42	March 15, 2016	
10.25*	Credit Line Agreement, dated July 9, 2015, by and between NeoPhotonics (China) Co., Ltd and Shanghai Pudong Development Bank Corporation.	Form 10-K	001-35061	10.43	March 15, 2016	
10.26+	Retention Agreement by and between the Company and Timothy S. Jenks, dated August 5, 2016.	Form 10-Q	001-35061	10.2	August 9, 2016	
10.27+	Retention Agreement by and between the Company and Dr. Chi Yue ("Raymond") Cheung, dated August 5, 2016.	Form 10-Q	001-35061	10.3	August 9, 2016	
10.29+	Retention Agreement by and between the Company and Dr. Wupen Yuen, dated August 5, 2016.	Form 10-Q	001-35061	10.6	August 9, 2016	
10.30	Lease Agreement, dated September 9, 2016, by and between NeoPhotonics Corporation and SP Zanker Property LLC.	Form 10-Q	001-35061	10.7	November 8, 2016	
10.31*	Extension dated September 14, 2016 of Property Lease Contract, dated May 31, 2011, by and between NeoPhotonics Dongguan Co., Ltd. and Dongguan Conrad Hi-Tech Park, Ltd.	Form 10-Q	001-35061	10.8	November 8, 2016	
10.32*	Amendment dated August 3, 2016, by and between NeoPhotonics (China) Co., Ltd. and Shanghai Pudong Development Bank Shenzhen Branch, to that certain Credit Line Agreement dated as of July 9, 2015	Form 10-Q	001-35061	10.11	November 8, 2016	

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10.34*	Comprehensive Credit Granting Contract, dated October 21, 2016, by and between Neophotonics (China) Co., Ltd. and Shenzhen Branch CITIC Bank	Form 10-Q	001-35061	10.13	November 8, 2016	
10.35*	Financing Line of Credit Agreement, dated July 25, 2016, by and between Neophotonics Dongguan Co., Ltd. and Shanghai Pudong Development Bank Shenzhen Branch	Form 10-Q	001-35061	10.14	November 8, 2016	
10.36**	Term Loan Agreement, dated March 29, 2017, by and between NeoPhotonics Semiconductor GK and The Bank of Tokyo-Mitsubishi.	Form 10-Q	001-35061	10.2	May 9, 2017	
10.37	Lease Agreement, dated June 13, 2017, by and between NeoPhotonics Corporation and The Realty Associates Fund X, L.P.	Form 8-K	001-35061	10.1	June 19, 2017	
10.38+	Offer Letter dated July 13, 2017 by and between NeoPhotonics Corporation and Elizabeth Eby.	Form 10-Q	001-35061	10.1	November 8, 2017	
10.39+	Retention Agreement dated August 14, 2017 by and between NeoPhotonics Corporation and Elizabeth Eby.	Form 10-Q	001-35061	10.2	November 8, 2017	
10.40	Credit Agreement, dated as of September 8, 2017, among NeoPhotonics Corporation, the lenders from time to time party thereto and Wells Fargo Bank, National Association, as administrative agent.	Form 8-K	001-35061	10.1	September 11, 2017	
10.41*	Comprehensive Credit Granting Contract, dated December 14, 2017, by and between NeoPhotonics (China) Co., Ltd. and China CITIC Bank.	Form 8-K	001-35061	10.1	December 18, 2017	
10.42**	Loan Agreement by and between NeoPhotonics Semiconductor GK and The Bank of Tokyo-Mitsubishi UFJ, Ltd. and The Yamanashi Chou Bank, Ltd. dated January 29, 2018	Form 10-K	001-35061	10.73	March 9, 2018	
10.43+	Amendment to Retention Agreement by and between NeoPhotonics Corporation and Elizabeth Eby dated November 6, 2017.	Form 10-K	001-35061	10.74	March 9, 2018	
10.44+	Offer Letter dated March 19, 2018 by and between NeoPhotonics Corporation and Yang Chiah Yee.	Form 10-Q	001-35061	10.2	May 9, 2018	
10.45+	Retention Agreement dated March 22, 2018 by and between NeoPhotonics Corporation and Yang Chiah Yee.	Form 10-Q	001-35061	10.3	May 9, 2018	
10.46+	2019 Bonus Program	Form 10-Q	001-35061	10.2	August 9, 2019	
10.47	First Amendment to Credit Agreement and First Amendment to Guaranty and Security Agreement dated June 14, 2019, with Wells Fargo Bank, National Association, as administrative agent, and the lenders party thereto.	Form 8-K	001-35061	10.1	June 19, 2019	
21.1	List of subsidiaries of NeoPhotonics Corporation.					X
23.1	Consent of Deloitte & Touche LLP, independent registered public accounting firm.					X
24.1	Power of Attorney (incorporated by reference to the signature page of this Annual Report on Form 10-K).					X
31.1	Certification pursuant to Rule 13a-14(a)/15d-14(a).					X
31.2	Certification pursuant to Rule 13a-14(a)/15d-14(a).					X
32.1	Certification of Chief Executive Officer and Chief Financial Officer pursuant to 18 U.S.C. Section 1350 as Adopted Pursuant to Section 906 of the Sarbanes-Oxley Act of 2002.					X
Exhibit no.	Description of exhibit	Form	SEC File No.	Exhibit	Filing Date	Filed Herewith
101.INS	XBRL Instance Document.					
101.SCH	XBRL Taxonomy Extension Schema Document.					
101.CAL	XBRL Taxonomy Extension Calculation Linkbase Document.					
101.DEF	XBRL Taxonomy Extension Definition Linkbase Document.					
101.LAB	XBRL Taxonomy Extension Label Linkbase Document.					
101.PRE	XBRL Taxonomy Extension Presentation Linkbase Document.					

*Translation to English of an original Chinese document.

**Translation to English of an original Japanese document.

+Management compensatory plan or arrangement.

ITEM 16. FORM 10-K SUMMARY

None.

DESCRIPTION OF CAPITAL STOCK

General

NeoPhotonics Corporation, or the Company, is authorized to issue up to 100,000,000 shares of common stock, \$0.0025 par value per share, or common stock, and 10,000,000 shares of preferred stock, \$0.0025 par value per share, or preferred stock.

The following summary description is based on the provisions of our certificate of incorporation, our amended and restated bylaws and the applicable provisions of the Delaware General Corporation Law. This information may not be complete in all respects and is qualified entirely by reference to the provisions of our certificate of incorporation, our amended and restated bylaws and the Delaware General Corporation Law. Our certificate of incorporation and our amended and restated bylaws are filed as exhibits to this Annual Report on Form 10-K to which this Description of Capital Stock is an exhibit.

Common Stock

The following is a description of our common stock, which is the only security of the Company registered pursuant to Section 12 of the Securities Exchange Act of 1934, as amended, or the Exchange Act.

Dividend rights. Subject to preferences that may apply to shares of preferred stock outstanding at the time, the holders of outstanding shares of our common stock are entitled to receive dividends out of funds legally available if our board of directors, in its discretion, determines to declare dividends and then only at the times and in the amounts that our board of directors may determine.

Voting rights. Each holder of common stock is entitled to one vote for each share of common stock held on all matters submitted to a vote of stockholders. Our certificate of incorporation does not provide for the right of stockholders to cumulate votes for the election of directors. Our certificate of incorporation establishes a classified board of directors, which is divided into three classes with staggered three-year terms. Only one class of directors will be elected at each annual meeting of our stockholders, with the other classes continuing for the remainder of their respective three-year terms. These provisions in our amended and restated certificate of incorporation could discourage potential takeover attempts. See “Anti-Takeover Effects of Delaware Law and Our Charter Documents” below.

No preemptive or similar rights. Our common stock is not entitled to preemptive rights and is not subject to conversion or redemption provisions. The rights, preferences and privileges of the holders of our common stock are subject to, and may be adversely affected by, the rights of the holders of any series of our preferred stock that we may designate and issue in the future.

Right to receive liquidation distributions. Upon our dissolution, liquidation or winding-up, the assets legally available for distribution to our stockholders are distributable ratably among the holders of our common stock, subject to prior satisfaction of all outstanding debt and liabilities and the preferential rights and payment of liquidation preferences, if any, on any outstanding shares of preferred stock.

The rights of the holders of our common stock are subject to, and may be adversely affected by, the rights of holders of shares of any preferred stock that we may designate and issue in the future.

Preferred Stock

We are authorized, subject to limitations prescribed by Delaware law, to issue up to 10,000,000 shares of preferred stock in one or more series established by our board of directors. Our board of directors is authorized to establish from time to time the number of shares to be included in each series and to fix the designation, powers, preferences and rights of the shares of each series and any of its qualifications, limitations or restrictions. Our board of directors can also increase or decrease the number of shares of any series, but not below the number of shares of

that series then outstanding, without any further vote or action by our stockholders. Our board of directors may authorize the issuance of preferred stock with voting or conversion rights that could adversely affect the voting power or other rights of the holders of the common stock. The issuance of preferred stock, while providing flexibility in connection with possible acquisitions and other corporate purposes, could, among other things, have the effect of delaying, deferring, discouraging or preventing a change in control of the Company and may adversely affect the market price of our common stock and the voting and other rights of the holders of our common stock.

Anti-Takeover Effects of Delaware Law and Our Charter Documents

Some of the provisions of Delaware law may have the effect of delaying, deferring, discouraging or preventing another person from acquiring control of the Company.

We are subject to Section 203 of the Delaware General Corporation Law, which prohibits a Delaware corporation from engaging in any business combination with any interested stockholder for a period of three years after the date that such stockholder became an interested stockholder, with the following exceptions:

- Ù before such date, the board of directors of the corporation approved either the business combination or the transaction that resulted in the stockholder becoming an interested stockholder;
- Ù upon closing of the transaction that resulted in the stockholder becoming an interested stockholder, the interested stockholder owned at least 85% of the voting stock of the corporation outstanding at the time the transaction began, excluding for purposes of determining the voting stock outstanding (but not the outstanding voting stock owned by the interested stockholder) those shares owned by (1) persons who are directors and also officers and (2) employee stock plans in which employee participants do not have the right to determine confidentially whether shares held subject to the plan will be tendered in a tender or exchange offer; or
- Ù on or after such date, the business combination is approved by the board of directors and authorized at an annual or special meeting of the stockholders, and not by written consent, by the affirmative vote of at least 66 2/3% of the outstanding voting stock that is not owned by the interested stockholder.

In general, Section 203 defines business combination to include the following:

- Ù any merger or consolidation involving the corporation and the interested stockholder;
- Ù any sale, transfer, pledge or other disposition of 10% or more of the assets of the corporation involving the interested stockholder;
- Ù subject to certain exceptions, any transaction that results in the issuance or transfer by the corporation of any stock of the corporation to the interested stockholder;
- Ù any transaction involving the corporation that has the effect of increasing the proportionate share of the stock or any class or series of the corporation beneficially owned by the interested stockholder; or
- Ù the receipt by the interested stockholder of the benefit of any loss, advances, guarantees, pledges or other financial benefits by or through the corporation.

In general, Section 203 defines an “interested stockholder” as an entity or person who, together with the person’s affiliates and associates, beneficially owns, or within three years prior to the time of determination of interested stockholder status did own, 15% or more of the outstanding voting stock of the corporation.

A Delaware corporation may “opt out” of these provisions with an express provision in its original certificate of incorporation or an express provision in its certificate of incorporation or bylaws resulting from a stockholders’ amendment approved by at least a majority of the outstanding voting shares. We have not elected to “opt out” of these provisions. The statute could prohibit or delay mergers or other takeover or change in control attempts and, accordingly, may discourage attempts to acquire us. Certain provisions in our certificate of incorporation and our amended and restated bylaws could have an effect of delaying, deferring or preventing a change in control.

Choice of Forum

Our certificate of incorporation provides that the Court of Chancery of the State of Delaware will be the exclusive forum for any derivative action or proceeding brought on our behalf, any action asserting a breach of fiduciary duty owed by any director, officer or employee to us or our stockholders, any action asserting a claim against us arising pursuant to the Delaware General Corporation Law or any action asserting a claim against us that is governed by the internal affairs doctrine. However, several lawsuits involving other companies have been brought challenging the validity of choice of forum provisions in certificates of incorporation, and it is possible that a court could rule that such provision is inapplicable or unenforceable.

LIST OF SUBSIDIARIES OF NEOPHOTONICS CORPORATION

SUBSIDIARY	JURISDICTION
NeoPhotonics Corporation Limited	Hong Kong
NeoPhotonics (China) Co., Ltd.	People's Republic of China
NeoPhotonics Dongguan Co., Ltd.	People's Republic of China
Novel Centennial Limited	British Virgin Islands
NeoPhotonics Semiconductor, Godo Kaisha	Japan
NeoPhotonics Technics Limited Liability Company	Russia
NeoPhotonics Laser Devices, Inc.	Delaware, United States of America

CONSENT OF INDEPENDENT REGISTERED PUBLIC ACCOUNTING FIRM

We consent to the incorporation by reference in Registration Statement Nos. 333-233032, 333-230859, 333-223661, 333-217211, 333-210399, 333-202942, 333-197657, 333-189577, 333-179453, 333-177306, 333-172031 on Form S-8 and Registration Statement No. 333-213967 on Form S-3 of our reports dated February 27, 2020, relating to the consolidated financial statements of NeoPhotonics Corporation and subsidiaries (NeoPhotonics Corporation), and the effectiveness of NeoPhotonics Corporation's internal control over financial reporting, appearing in this Annual Report on Form 10-K of NeoPhotonics Corporation for the year ended December 31, 2019.

/s/ DELOITTE & TOUCHE LLP

San Jose, California

February 27, 2020

CERTIFICATION

I, Timothy S. Jenks, certify that:

1. I have reviewed this Annual Report on Form 10-K of NeoPhotonics Corporation;

2. Based on my knowledge, this report does not contain any untrue statement of a material fact or omit to state a material fact necessary to make the statements made, in light of the circumstances under which such statements were made, not misleading with respect to the period covered by this report;

3. Based on my knowledge, the financial statements, and other financial information included in this report, fairly present in all material respects the financial condition, results of operations and cash flows of the Registrant as of, and for, the periods presented in this report;

4. The Registrant's other certifying officer and I are responsible for establishing and maintaining disclosure controls and procedures (as defined in Exchange Act Rules 13a-15(e) and 15d-15(e)) and internal control over financial reporting (as defined in Exchange Act Rules 13a-15(f) and 15d-15(f)) for the Registrant and have:

a) Designed such disclosure controls and procedures, or caused such disclosure controls and procedures to be designed under our supervision, to ensure that material information relating to the Registrant, including its consolidated subsidiaries, is made known to us by others within those entities, particularly during the period in which this report is being prepared;

b) Designed such internal control over financial reporting, or caused such internal control over financial reporting to be designed under our supervision, to provide reasonable assurance regarding the reliability of financial reporting and the preparation of financial statements for external purposes in accordance with generally accepted accounting principles;

c) Evaluated the effectiveness of the Registrant's disclosure controls and procedures and presented in this report our conclusions about the effectiveness of the disclosure controls and procedures, as of the end of the period covered by this report based on such evaluation; and

d) Disclosed in this report any change in the Registrant's internal control over financial reporting that occurred during the Registrant's most recent fiscal quarter (the Registrant's fourth fiscal quarter in the case of an annual report) that has materially affected, or is reasonably likely to materially affect, the Registrant's internal control over financial reporting.

5. The Registrant's other certifying officer and I have disclosed, based on our most recent evaluation of internal control over financial reporting, to the Registrant's auditors and the audit committee of the Registrant's board of directors (or persons performing the equivalent functions):

a) All significant deficiencies and material weaknesses in the design or operation of internal control over financial reporting which are reasonably likely to adversely affect the Registrant's ability to record, process, summarize and report financial information; and

b) Any fraud, whether or not material, that involves management or other employees who have a significant role in the Registrant's internal control over financial reporting.

Date: February 27, 2020

/s/ TIMOTHY S. JENKS

Timothy S. Jenks

President, Chief Executive Officer and
Chairman of the Board of Directors

CERTIFICATION

I, Elizabeth Eby, certify that:

1. I have reviewed this Annual Report on Form 10-K of NeoPhotonics Corporation;

2. Based on my knowledge, this report does not contain any untrue statement of a material fact or omit to state a material fact necessary to make the statements made, in light of the circumstances under which such statements were made, not misleading with respect to the period covered by this report;

3. Based on my knowledge, the financial statements, and other financial information included in this report, fairly present in all material respects the financial condition, results of operations and cash flows of the Registrant as of, and for, the periods presented in this report;

4. The Registrant's other certifying officer and I are responsible for establishing and maintaining disclosure controls and procedures (as defined in Exchange Act Rules 13a-15(e) and 15d-15(e)) and internal control over financial reporting (as defined in Exchange Act Rules 13a-15(f) and 15d-15(f)) for the Registrant and have:

a) Designed such disclosure controls and procedures, or caused such disclosure controls and procedures to be designed under our supervision, to ensure that material information relating to the Registrant, including its consolidated subsidiaries, is made known to us by others within those entities, particularly during the period in which this report is being prepared;

b) Designed such internal control over financial reporting, or caused such internal control over financial reporting to be designed under our supervision, to provide reasonable assurance regarding the reliability of financial reporting and the preparation of financial statements for external purposes in accordance with generally accepted accounting principles;

c) Evaluated the effectiveness of the Registrant's disclosure controls and procedures and presented in this report our conclusions about the effectiveness of the disclosure controls and procedures, as of the end of the period covered by this report based on such evaluation; and

d) Disclosed in this report any change in the Registrant's internal control over financial reporting that occurred during the Registrant's most recent fiscal quarter (the Registrant's fourth fiscal quarter in the case of an annual report) that has materially affected, or is reasonably likely to materially affect, the Registrant's internal control over financial reporting.

5. The Registrant's other certifying officer and I have disclosed, based on our most recent evaluation of internal control over financial reporting, to the Registrant's auditors and the audit committee of the Registrant's board of directors (or persons performing the equivalent functions):

a) All significant deficiencies and material weaknesses in the design or operation of internal control over financial reporting which are reasonably likely to adversely affect the Registrant's ability to record, process, summarize and report financial information; and

b) Any fraud, whether or not material, that involves management or other employees who have a significant role in the Registrant's internal control over financial reporting.

Date: February 27, 2020

/S/ ELIZABETH EBY

Elizabeth Eby

Chief Financial Officer and Senior Vice President, Finance

CERTIFICATION

Pursuant to the requirement set forth in Rule 13a-14(b) of the Securities Exchange Act of 1934, as amended (the "Exchange Act"), and Section 1350 of Chapter 63 of Title 18 of the U.S. Code (18 U.S.C. § 1350), Timothy S. Jenks, President, Chief Executive Officer and Chairman of the Board of Directors of NeoPhotonics Corporation (the "Company"), and Elizabeth Eby, Chief Financial Officer and Senior Vice President, Finance of the Company, each hereby certifies that, to the best of his knowledge:

1. The Company's Annual Report on Form 10-K for the period ended December 31, 2019, to which this Certification is attached as Exhibit 32.1 (the "Annual Report") fully complies with the requirements of Section 13(a) or Section 15(d) of the Exchange Act, as amended; and

2. The information contained in the Annual Report fairly presents, in all material respects, the financial condition and results of operations of the Company.

In Witness Whereof, the undersigned have set their hands hereto as of the 27th day of February, 2019.

/S/ TIMOTHY S. JENKS

Timothy S. Jenks
President, Chief Executive Officer and
Chairman of the Board of Directors

/S/ ELIZABETH EBY

Elizabeth Eby
Chief Financial Officer and Senior Vice President,
Finance

This certification accompanies the Form 10-K to which it relates, is not deemed filed with the Securities and Exchange Commission and is not to be incorporated by reference into any filing of NeoPhotonics Corporation under the Securities Act of 1933, as amended, or the Securities Exchange Act of 1934, as amended (whether made before or after the date of the Form 10-K), irrespective of any general incorporation language contained in such filing.
