AXT INC
Form 10-K
February 27, 2017
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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, 2016
OR
TRANSITION REPORT PURSUANT TO SECTION 13 OR 15(d) OF THE SECURITIES EXCHANGE ACT OF 1934
For the transition period from to

Commission file number: 000-24085

AXT, INC.

(Exact name of registrant as specified in its charter)

Delaware	94-3031310
(State or other jurisdiction of incorporation or organization)	(I.R.S. Employer Identification No.)
4281 Technology Drive, Fremont, California	94538
(Address of principal executive offices)	(Zip Code)

Registrant’s telephone number, including area code: (510) 438-4700

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

Title of each class	Name of each exchange on which registered
Common Stock, $0.001	The NASDAQ Stock Market LLC

par value
Securities registered pursuant to Section 12(g) of the Act:

None

Indicate by checkmark if the registrant is a well-known seasoned issuer, as defined in Rule 405 of the Securities Act Yes No

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

Indicate by checkmark whether the registrant (1) has filed all reports required to be filed by Section 13 or 15 (d) of the Securities 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 and posted on its corporate Web site, if any, every Interactive Data File required to be submitted and posted 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 and post such files). Yes No

Indicate by checkmark if disclosure of delinquent filers pursuant to Item 405 of Regulation S-K (§ 229.405 of this chapter) is not contained herein, and will not be contained, to the best of registrant's knowledge, in definitive proxy or information statements incorporated by reference in Part III of this Form 10-K or any amendment to this Form 10-K.

Indicate by checkmark whether the registrant is a large accelerated filer, an accelerated filer, a non-accelerated filer or a smaller reporting company. See the definitions of "large accelerated filer," "accelerated filer," and "smaller reporting company" in Rule 12b-2 of the Act. (Check one):

reporting company)

Large accelerated filer Accelerated filer Non accelerated filer Smaller reporting company

(Do not check if a smaller reporting company)

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

The aggregate market value of the voting stock held by non-affiliates of the registrant, based upon the closing sale price of $3.19 for the common stock on June 30, 2016 as reported on the Nasdaq Global Select Market, was approximately $99,297,229. Shares of common stock held by each officer, director and by each person who owns 10% or more of the outstanding common stock have been excluded in that such persons may be deemed to be affiliates. This determination of affiliate status is not a conclusive determination for other purposes.

As of February 27, 2017, 33,031,479 shares, $0.001 par value, of the registrant's common stock were outstanding.

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PART I

This Annual Report (including the following section regarding Management's Discussion and Analysis of Financial Condition and Results of Operations) contains forward-looking statements within the meaning of Section 21E of the Securities Exchange Act of 1934, as amended. Statements relating to our expectations regarding results of operations, customer demand, customer qualifications of our products, our ability to expand our markets or increase sales, the development of new products, applications, enhancements or technologies, gross margins, expense levels, the impact of the adoption of certain accounting pronouncements, our investments in capital projects, our plan to relocate our China manufacturing operations, and our belief that we have adequate cash and investments to meet our needs over the next 12 months are forward-looking statements. Words such as "expects," "anticipates," "intends," "plans," "believes," "seeks," "estimates," "goals," "should," "continues," "would," "could" and similar expressions or variations of such words are intended to identify forward looking statements, but are not the exclusive means of identifying forward looking statements in this Annual Report. Additionally, statements concerning future matters such as our strategy, plans, industry trends and the impact of trends and economic cycles on our business are forward-looking statements. All forward-looking statements are based upon management's views as of the date of this Annual Report and are subject to risks and uncertainties that could cause actual results to differ materially from historical results or those anticipated in such forward-looking statements. Such risks and uncertainties include those set forth under the section entitled "Risk Factors" in Item 1A below, as well as those discussed elsewhere in this Annual Report, and identify important factors that could disrupt or injure our business or cause actual results to differ materially from those predicted in any such forward-looking statements.

These forward-looking statements are not guarantees of future performance. Readers are cautioned not to place undue reliance on these forward-looking statements, which speak only as of the date hereof. Readers are urged to carefully review and consider the various disclosures made in this report, which attempt to advise interested parties of the risks and factors that may affect our business, financial condition, results of operations and prospects. We undertake no obligation to revise or update any forward looking statements in order to reflect any development, event or circumstance that may arise after the date of this report.

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Item 1. Business

AXT, Inc. (“AXT”, “we,” “us,” and “our” refer to AXT, Inc. and its consolidated subsidiaries) is a worldwide developer and producer of high-performance compound and single element semiconductor substrates, also known as wafers. Our consolidated subsidiaries produce and sell certain raw materials some of which are used in our substrate manufacturing process and some of which are sold to other companies.

Our substrate wafers are used when a typical silicon substrate wafer cannot meet the conductive requirements of a chip. The dominant substrates used in producing semiconductor chips and other electronic circuits are made from silicon. However, certain chips may become too hot or perform their function too slowly if silicon is used as the base material. In addition, optoelectronic applications, such as LED lighting and chip-based lasers, do not use silicon substrates because they require a wave form frequency that cannot be achieved using silicon. Alternative or specialty materials are used to replace silicon as the preferred base in these situations. Our wafers provide such alternative or specialty materials. We have two product lines: specialty material substrates and raw materials. Our compound substrates combine indium with phosphorous (indium phosphide: InP) or gallium with arsenic (gallium arsenide: GaAs). Our single element substrates are made from germanium (Ge).

Our raw materials include both raw gallium and purified gallium. We use purified gallium in producing our GaAs substrates and sell both raw gallium and purified gallium in the open market to other companies for use in magnetic materials, high temperature thermometers and growing single crystal ingots including gallium arsenide, gallium nitride, gallium antimonide, gallium phosphide and other materials and alloys. We also produce pyrolytic boron nitride (pBN) crucibles used in the high temperature (typically in the range 500 C to 1,500 C) growth process of single crystal ingots and epitaxial layer growth in MBE (Molecular Beam Epitaxy) reactors. We use these pBN crucibles in our own ingot growth processes and also sell them in the open market to other companies. Our substrate product group generated 81%, 75% and 72% of our revenue and our raw materials product group generated 19%, 25% and 28% for 2016, 2015 and 2014, respectively.

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The following chart shows our substrate group and their materials, diameters and illustrative applications and shows our raw materials group primary products and illustrative uses and applications.

Products Substrate Group	Substrate Diameter	Sample of Applications
Indium Phosphide (InP)	2”, 3”, 4”	• Fiber optic lasers and detectors • Passive Optical Networks (PONs) • Data center connectivity using light/lasers • Silicon photonics • Photonic ICs (PICs) • High efficiency terrestrial solar cells (CPV) • RF amplifier and switching (military wireless and potential 5G) • Lasers • Infrared LED motion control • Infrared thermal imaging
Gallium Arsenide (GaAs - semi-insulating)	1”, 2”, 3”, 4”, 5”, 6”	• Power amplifiers for wireless devices • Direct broadcast television • High-performance transistors • Satellite communications • High efficiency solar cells for drones
Gallium Arsenide (GaAs - semi-conducting)	1”, 2”, 3”, 4”, 6”	• 3-D sensing using VCSELs • Data center communication using VCSELs • High brightness light emitting diodes (LEDs) • Lasers • Near-infrared sensors • Printer head lasers and LEDs • Laser machining, cutting and drilling • Optical couplers • Night vision goggles
Germanium (Ge)	2”, 4”, 6”	• Satellite and terrestrial solar cells • Optical sensors and detectors • Concentrated photo voltaic (CPV) cells for satellites • Multi-junction solar cells for satellites • Infrared detectors
Raw Materials Group		
4N raw gallium		• Magnetic materials • High temperature thermometers • Low melting point alloys • Optical glass • Infrared detectors
6N+ purified gallium		• Key material in single crystal ingots such as: - Gallium Arsenide (GaAs) - Gallium Nitride (GaN) - Gallium Antimonide (GaSb) - Gallium Phosphide (GaP)
Boron trioxide (B2O3)		• Encapsulant in the ingot growth of III-V compound semiconductors

Gallium-Magnesium alloy	• Used for the synthesis of organo-gallium compounds in epitaxial growth on semiconductor wafers
pyrolytic boron nitride (pBN) crucibles	• Used when growing single-crystal compound semiconductor ingots • Used when growing epitaxial layers in MBE reactors

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We manufacture all of our products in the People's Republic of China (PRC or China), which generally has favorable costs for facilities and labor compared with comparable facilities in the United States, Europe or Japan. Our supply chain includes partial ownership of 10 companies in China (subsidiaries/joint ventures). We believe this supply chain arrangement provides us with pricing advantages, reliable supply, market trend visibility and better sourcing lead-times for key raw materials central to manufacturing our substrates. Our subsidiaries and joint venture companies produce materials, including pure raw gallium (4N Ga), high purity gallium (6N Ga), arsenic, germanium, germanium dioxide, pyrolytic boron nitride (pBN) crucibles and boron oxide (B2O3). Our ownership and the ownership held by our consolidated subsidiaries in these entities range from 83% to 20%. We have board representation in all 10 of these companies. We consolidate the companies in which we have either a controlling financial interest, or majority financial interest combined with the ability to exercise substantive control over the operation or financial decisions made by the subsidiary. We use the equity method to account for companies in which we have smaller financial interest and have the ability to exercise significant influence, but not control, over the subsidiary. We purchase portions of the materials produced by these joint venture companies for our own use and sell the remainder of their production to third parties.

The Beijing city government has announced that it will expand its offices into the area where our manufacturing facility is located and we believe the Beijing city government intends to relocate thousands of government employees. The Beijing city government desires to upgrade this area and has applied pressure on manufacturing companies that use restricted materials to relocate, including us. It is our understanding that a master development plan of the area where our manufacturing facility is located has not yet been formally approved by the China central government and the timeline for relocating our gallium arsenide wafer production operations at our current site has not yet been determined by the China central government. We are advised that the China central government intends to be the final authority in this matter and is committed to having a master plan that is reasonable and orderly. We believe the China central government will undertake a comprehensive review of the master development plan, which will add time to the process. We are working with the government and are forming a plan to identify a new manufacturing site, acquire land use rights for such site, construct a facility and move our gallium arsenide production line. We intend to complete this relocation by the end of 2018 or the first half of 2019.

The Beijing city government's economic development bureau has requested that we consider maintaining our indium phosphide production operations at our current site, along with our China headquarters and research and development ("R&D") center. We believe we will still relocate our gallium arsenide and germanium production, but we may avoid moving indium phosphide production if we elect to remain at our current site. Over time it may be more efficient to consolidate all production at one site.

In light of our discussion with the Beijing city government, we believe we may be able to relocate the portion of our production facilities that we agree to relocate smoothly and safely and in a reasonable manner, without a material disruption of supply to our customers. The anticipated relocation of all or part of our operations will require us to develop and execute an orderly relocation plan. A failure to properly execute a relocation plan could result in disruption to our production and have a material adverse impact on our revenue and our results of operations and financial condition.

To date, we have not completed a land use rights purchase of our new manufacturing site. We do not yet have construction bids or third party estimates for the relocation costs or construction costs of our future manufacturing facility, but we currently believe the land use rights purchase amount, relocation costs and facility construction costs will be in the range of $25 million to $35 million, but could be substantially more expensive. Further, we believe that we may recover some of these costs by monetizing the vacated property at our current site in Beijing. We currently believe the soonest we could monetize the vacated property is the year 2020.

We were incorporated in California in December 1986 and reincorporated in Delaware in May 1998. The Company went public in 1998. We changed our name from American Xtal Technology, Inc. to AXT, Inc. in July 2000. Our principal corporate office is located at 4281 Technology Drive, Fremont, California 94538, and our telephone number at this address is (510) 438-4700. We have approximately 25 employees in our Fremont facility and approximately 661 employees in our Beijing facility.

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Industry Background

Certain electronic and opto-electronic applications have performance requirements that exceed the capabilities of conventional silicon substrates, also known as wafers, and often require high-performance compound, i.e. a mixture of two materials, or single element substrates. Examples of higher performance non-silicon based substrates include GaAs, InP, gallium nitride (GaN), silicon carbide (SiC) and Ge. One of the earliest broadly used alternative substrates was GaAs and GaAs substrates were the earliest substrates we produced.

Semi-insulating GaAs is used to create various high speed microwave components, including power amplifier chips in cell phones, satellite communications and broadcast television. Semi-conducting GaAs substrates are used to create opto-electronic products, including high brightness light emitting diodes (HBLEDs) that are often used to backlight wireless handsets and liquid crystal display (LCD) TVs and also used for automotive panels, signage, display and lighting applications. A possible new application for semi-conducting GaAs is 3-D sensing using VCSELs (vertical cavity surface emitting lasers), an array of lasers on a single chip that could be used in cell phones and other devices. InP is a high performance semiconductor substrate used in broadband and fiber optic applications and data center connectivity. In recent years InP demand has increased. Ge substrates are used in applications such as solar cells for space and terrestrial photovoltaic applications.

The AXT Advantages

We believe that we benefit from the following advantages:

- Key leadership in InP technology and revenue growth. We have invested in InP research and development for a number of years and have developed a strong base of proprietary technology that we continue to expand. There are significant barriers to entry in the InP substrate market and currently there are only three leading providers, including AXT. Further, we believe that this market will continue to expand and grow and we have been adding capacity to take advantage of this expansion.
- Key provider of low defect density GaAs which can be used to make 3-D sensing chips. The potential deployment of 3-D sensing in cell phones and other devices requires GaAs substrates with low etch pit density (EPD) (i.e., low defect densities.) The requirement of low EPD is a barrier to entry and we believe there are a limited number of potential substrate providers that can meet this requirement, which includes AXT.
- Proprietary process technology drives manufacturing. In our industry, the single crystal growth process and the wafer manufacturing process incorporate proprietary process technology. We have a substantial body of proprietary process technology and this creates a barrier to entry as evidenced by the small number of suppliers of InP wafers or GaAs low EPD wafers.
- Low-cost manufacturing operation in China. Since 2004, we have manufactured all of our products in China, which generally has favorable costs for facilities and labor compared to costs of comparable facilities and labor in the United States, Japan or Europe. As of December 31, 2016, approximately 969 of our 994 employees (including employees at both our Beijing facility as well as our consolidated joint venture companies) are located in China. Our primary competitors have their major manufacturing operations in Germany or Japan. Our presence in China also enables us to closely manage our raw materials supply chain.
- We are experienced at adding capacity quickly to take advantage of growing and changing market trends. In recent years we have quickly added capacity for InP substrates, enabling us to grow that business. We believe that expansion is less difficult in China than in Japan or Germany where our major competitors are located. High volume emerging market applications may require rapid expansion and we believe we are well-positioned to respond to increased demand.

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- We are the only compound semiconductor substrate supplier to have a position in raw materials. We have partial ownership in 10 companies in China that form an integral part of our supply chain. We believe our subsidiaries and joint venture companies in China provide us with more reliable supply and shorter lead-times for the raw materials central to our final manufactured products compared to third party providers. We believe that this dedicated supply chain will enable us to meet increases in demand from our customers by providing an increased volume of raw materials quickly, efficiently and cost effectively.
- Our diverse product offering results in a broader range of customers and applications. We offer a diverse range of products, which enables us to have a broad range of customers. For the year ended December 31, 2016, no customer accounted for over 10% of revenue and our five largest customers accounted for 35% of our revenue. We believe this diversity enabled us to recover quickly when a large portion of GaAs chips was replaced with silicon-on-insulator (SOI) chips in mobile phone switches, beginning in 2011. Further, this diversity gives us a greater opportunity to expand our business into new applications and markets and benefit from growth in demand for substrates given our pre-established market positions in a broad range of product applications.
- Enhanced revenue diversity through the sale of special materials. Because our strategy allows our subsidiaries to also sell raw materials in the open market to third parties, approximately one fifth of our total sales are from non-substrate products, providing further diversity in our customer base and business model.
- Business model unique among current competitors. We believe we are the only publicly traded company producing InP, GaAs and Ge substrates. Our direct competitors are either privately owned companies or divisions within large publicly traded companies. We believe the combination of access to U.S. capital markets, U.S.-based product quality standards, but China-based manufacturing and a unique strategy for the supply of many of the raw materials we need is an attractive business model to our customers who desire longevity and stability in their supply chain as well as competitive prices.
- Strong cash position with $54 million in cash and investments. As a pure play substrate provider, we have a strong cash position that enables us to make strategic investments in facilities, capacity, equipment, technology and resources. Our competitive focus and flexibility is supported by the staying power that this cash ensures.

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Strategy

Our goal is to become the leading worldwide supplier of high-performance compound and single element semiconductor substrates. Key elements of our strategy include:

Position AXT to benefit from emerging InP markets. As cloud-based data centers combine integrated circuits and InP-based lasers to transfer data through light, we believe there could be increased demand for InP substrates, which could complement our sales in the fiber-to-home and office markets. We believe there are also other possible applications for InP substrates in the future, which could include 5G cell phones and driverless cars.

Add InP capacity and continue InP R&D. We are adding manufacturing capacity for InP to support our expected growth for this product line. Substrate products often have long product life cycles and we believe the InP product life cycle could be similar to the GaAs product life cycle that has run for over 10 years. In addition to adding manufacturing capacity, we are continuing to invest in InP crystal growth technology and wafer processing technology. For example, we are developing six-inch diameter ingots and improving the relative flatness of the wafer surface to improve performance.

Position AXT to benefit from 3-D sensing applications. We are continuing to develop semi-conducting GaAs six-inch diameter wafers with low etch pitch density. The GaAs substrate requirements for 3-D sensing application include very low defect densities. As 3-D sensing applications develop, we believe there is a potential for high volumes for this product.

Secure the option to increase GaAs capacity when we finalize the relocation plans for manufacturing this substrate. The planned relocation of our GaAs manufacturing lines presents a strategic opportunity to ensure at the new site the ability to increase capacity in the future should market demands justify such capacity expansion and we intend to review the capacity expansion requirements as we proceed.

Offer diverse products, including custom products. We believe AXT has a reputation in the market place for providing a broad range of products, including custom products. We plan to further promote this brand image as a way to differentiate ourselves in the market place. Some competitors provide only gallium arsenide substrates. We provide gallium arsenide and also indium phosphide and germanium substrates. Some competitors provide only six inch diameter wafers. Our wafers range from one inch to up to six inches in diameter. We also produce substrates with customer defined specifications which may range from thickness or smoothness and may include adding special additional elements such as iron or sulfur. We believe product diversity can mitigate some of the impact of down cycles in our market because we are not dependent on a single product or application for revenue.

Many customers not just a few large customers. We seek to expand our customer base and avoid dependence on just a few large customers. We believe our diverse product offering has resulted in a diverse customer base. For the year ended December 31, 2016, no customer accounted for over 10% of revenue and our five largest customers accounted for 35% of our revenue. We believe customer diversity provides a measure of stability in troubled market conditions. Customer diversification may also enable us to achieve a higher average selling price by reducing our dependence on larger customers with pricing power.

Sustain manufacturing efficiencies. We seek to continue to leverage our China-based manufacturing advantage by increasing efficiencies in our manufacturing methods, systems and processes. Our strategy is to combine the benefits of U.S.-based quality control and access to U.S. capital markets with our China-based manufacturing operations.

Increase productivity and seek profitability in our 10 subsidiaries/joint venture companies. The supply and demand equation for specialty materials can be complex and volatile. Over the years, we have established or invested in 10

companies that are an integral part of our supply chain. We will continue to provide strategic support to these companies and they, in turn, will continue to be the backbone of our supply chain. We plan to work closely with these companies to increase their productivity and achieve profitability as they continue to support AXT's supply chain.

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Materials of the future. The specialty materials substrate market is dynamic and subject to continued changes and cycles. We plan to use our deep knowledge and experience in specialty materials and wafer substrates to seek new applications for existing substrates in our portfolio and explore additional materials that may be synergistic with our knowledge base, customer needs and manufacturing lines.

Technology

Wafers serve as a cornerstone in semiconductor device fabrication, on which integrated circuits and optical devices are fabricated. Wafers are sliced up from semiconducting ingots that are grown in a cylindrical form. The diameter and length of an ingot will vary depending on the type of material and the growth process used. An ingot may be either single-crystalline (also referred to as single element) or multi-crystalline (also referred to as compound elements). Single-crystalline wafers typically have better material parameters. Depending on physical properties of the materials in a wafer, the performance of devices and circuits can be remarkably different.

AXT uses its proprietary vertical gradient freeze (VGF) technique for growing single crystal Indium Phosphide (InP), Gallium Arsenide (GaAs) and Germanium (Ge) ingots. After growing the crystalline ingot, the ingot is then sawed into individual substrates or wafers. Before specialty material wafers can be used, a thin layer of structured chemicals is grown on the surface of the substrate. This is called an epitaxial layer. We sell the majority of our substrates to companies that specialize in applying the epitaxial layer. The wafers are then used to produce state-of-the-art electronic and opto-electronic devices and circuit applications.

InP and GaAs semiconducting compounds are formed combining elements from Groups III and V in the periodic table of elements, whereas Ge is a Group IV elemental semiconductor. Each of these materials has unique properties that determine the best device and/or circuit applications. As a result of their special high electron mobility combined with their direct ban-gap properties, both InP and GaAs wafers have enjoyed dominant roles in the production of light emitting diodes (LEDs), solid-state lasers and power amplifiers for mobile phones, to name a few applications. Ge wafers, on the other hand, have played a key role in the manufacturing of special solar cells known as triple junction solar cells (TJSCs) for space and terrestrial power generation.

With the recent evolution in several applications, InP lasers are projected to play a dominant role in the optoelectronics arena, e.g. silicon photonics (where InP lasers are a key component) and autonomous cars (where special wavelength InP-based lasers are used for object sensing and collision avoidance). Crystal growth process technology frequently contains steps and procedures that are considered proprietary secrets held by the producer, often including methods to control the temperature within the crucible. InP crystal growth relies on extreme pressure within the crucible. As such it requires not only temperature control methodologies, but also pressure control and stabilization process methodologies, many of which AXT considers proprietary trade secrets. It is this combination of variables and the required methods to control them that create a barrier to entry.

We believe our long-term investment in InP research and development has resulted in a substantive body of proprietary knowledge. In addition, to complement our VGF proprietary growth expertise, in July 2015, we acquired the InP proprietary process technology and crystal growth equipment from Crystacomm, Inc., thus adding the capability of growing polycrystalline and large diameter single crystal InP ingots using the Crystacomm proprietary Liquid Encapsulated Czochralski (LEC) technology. Crystacomm has a long history in development and experimentation in InP and this acquisition transfers that proprietary technology to us. A number of Crystacomm’s proprietary methods can also be used in our VGF processes.

After growing the crystalline ingot, the material is then sawed into individual substrates or wafers. We have continued to invest in wafer processing technology covering each step in the process from sawing to edge smoothing to final cleaning and we believe we have technology and trade secrets addressing the scope of wafer processing. One

focus in our recent development programs has been on automation. In this regard, in October 2015, we announced that we had acquired Hitachi Metals' automated equipment and a license covering the use of the proprietary equipment and Hitachi Metals' proprietary wafer processing technology. A significant body of knowledge in this portfolio is considered proprietary trade secrets. We have combined the acquired proprietary processing technology and equipment with our existing wafer processing capabilities to better serve our existing and future customer base.

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Ideally, all the atoms in a wafer or substrate are arrayed in a specific periodic order. However, sensitivities in the ingot growth process will cause some atoms to be improperly aligned and these are referred to as dislocations. The aggregate number of dislocations in a wafer is referred to as the dislocation density. Dislocation densities can be seen as a group of tiny marks or pits under a microscope by etching the wafer with acid and each wafer has an “etch pit density” (“EPD”). Certain micro devices, such as the array used for 3-D sensing, require wafers with very low EPD. AXT considers the process technology we use to achieve low EPD as proprietary process technology and we are one of only a few substrate manufacturing companies that can produce low EPD wafers.

Products

We have two product lines: specialty material substrates and raw materials. We design, develop, manufacture and distribute high-performance semiconductor substrates, also known as wafers. Through our subsidiaries in our supply chain, we also sell certain raw materials. InP is a high-performance semiconductor substrate used in fiber optic lasers and detectors, passive optical networks (PONs), data center connectivity, silicon photonics, photonic ICs (PICs), terrestrial solar cell (CPV), lasers, RF amplifiers (military wireless), infrared motion control and infrared thermal imaging. We make semi-insulating GaAs substrates used in making semiconductor chips in applications such as power amplifiers for wireless devices, high-performance transistors and high efficiency solar cells for drones. Our semi-conducting GaAs substrates are used to create opto-electronic products, which include High Brightness LEDs that are often used to backlight wireless handsets and LCD TVs and for automotive, signage, display and lighting applications. Our semi-conducting GaAs substrates could be used to create opto-electronic products for 3-D sensing using VCSELs. Ge substrates are used in emerging applications, such as triple junction solar cells for space and terrestrial photovoltaic applications and for optical applications.

Substrates. We currently sell compound substrates manufactured from InP and GaAs, as well as single element substrates manufactured from Ge. We supply InP substrates in two-, three and four-inch diameters, and Ge substrates in two-, four- and six-inch diameters. We supply both semi-insulating and semiconducting GaAs substrates in one-, two-, three , four-, five- and six-inch diameters. Many of our customers require customized specifications, such as special levels of iron or sulfur dopants or a special wafer thickness.

Raw Materials. Our consolidated subsidiaries produce and sell certain raw materials, some of which are used in our substrate manufacturing process and some of which are sold to other companies. Our raw materials include both raw gallium and purified gallium. We use purified gallium to produce our GaAs substrates and sell both raw gallium and purified gallium in the open market to other companies for use in magnetic materials, high temperature thermometers and single crystal ingots, including gallium arsenide, gallium nitride, gallium antimonide, gallium phosphide and other materials and alloys. We also produce pyrolytic boron nitride (pBN) crucibles used in the high temperature (typically in the range 500 C to 1,500 C) growth process of single crystal ingots and epitaxial layer growth in MBE reactors. We use these pBN crucibles in our own ingot growth processes and also sell them in the open market to other companies.

We promote our product diversity as a way to differentiate ourselves in the market place. Some competitors provide only gallium arsenide substrates. We provide gallium arsenide and also indium phosphide and germanium substrates. Some competitors provide only six-inch wafers. Our wafers range from one inch to up to six inches in diameter. We also produce substrates with customer defined specifications, which may range in thickness or smoothness and may include adding special additional materials, such as iron or sulfur. In addition to our wafers or substrates, we also generate revenue from our consolidated subsidiaries that sell raw materials. Product diversity can mitigate some of the down cycles in our market because we are not dependent on a single product or application for revenue.

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Customers

Before specialty material wafers can be processed in a typical wafer manufacturing facility that constructs the electronic circuit on a chip, a thin layer of structured chemicals is grown on the surface of the substrate. This is called an epitaxial layer. We sell our substrates to companies that apply the epitaxial layer, who then in turn sell the modified wafers to the wafer fabs, chip design companies, LED manufacturers and others. Some customers do both the epitaxial layer and wafer fabrication.

Epitaxial layer companies that form our customer base are located in Asia, the United States and Europe. We also sell our products to universities and other research organizations who use specialty materials for experimentation in various aspects of semiconducting and semi insulating applications. Our customers that purchase raw materials are located in Asia, the United States and Europe.

We have at times sold a significant portion of our products in any particular period to a limited number of customers. However, no customer represented more than 10% of our revenue for the year ended December 31, 2016. One customer, IQE Group, represented more than 12% of our revenue for the year ended December 31, 2015 while there was no customer who represented more than 10% of our revenue for the year ended December 31, 2014. Our top five customers, although not the same five customers for each period, represented 35%, 40% and 34% of our revenue for the years ended December 31, 2016, 2015 and 2014, respectively.

There were four third-party customers for the raw materials products from our consolidated subsidiaries that each accounted for over 10% of the revenue from raw materials sales for the year ended December 31, 2016 and three customers for the raw materials products from our consolidated subsidiaries that accounted for over 10% of the revenue from raw materials sales for each of the years ended December 31, 2015 and December 31, 2014. Our subsidiaries and joint ventures are a key strategic benefit for us as they further diversify our sources of revenue.

Manufacturing, Raw Materials and Supplies

We manufacture all of our wafers/substrate products at our facilities in Beijing, China. We believe this location generally has favorable costs for facilities and labor compared to the United States or compared to the location of some of our competitors in Japan and Germany.

We use a two-stage wafer manufacturing process. The first stage deploys our VGF technology for the crystal growth of single element or compound element ingots in diameters currently ranging from one inch to six inches. The growth process occurs in high temperature furnaces built using our proprietary designs. Growing the crystalline elements into cylindrical ingots can take four to twelve days, depending on the diameter and length of the ingot produced. The crystal growth stage utilizes AXT proprietary process technology. The second stage includes slicing or sawing the ingot into wafers or substrates, then processing each substrate to strict specifications, including grinding to reduce the thickness and then polishing, beveling the edges and cleaning each substrate. Many of the wafer processing steps use chemical baths and properly cleaning the wafer is a critical process. The wafer processing stage utilizes AXT proprietary process technology.

Wafers from each ingot will include some material that does not meet specifications or quality standards. Defects may occur as a result of inherent factors in the materials used in the crystalline growth process. They may also result from variances in the manufacturing process. We have many steps in our line that are partially or fully automated but other manufacturing steps are performed manually. We intend to increase the level of automation. In 2015, we purchased wafer processing equipment from Hitachi Metals that we expect will increase automation in our production line and, therefore, reduce variability and defects. In addition, we secured a manufacturing license from Hitachi Metals. This license includes detailed work instructions for using the equipment purchased and allows us to apply the proprietary

wafer processing technology at any step and on any form of equipment in our line. We deployed the equipment handling four-inch wafers in our InP line in 2016. The equipment for six-inch wafers will be deployed after we finalize the plan to relocate our gallium arsenide line. Due to potential defects, yield is a key factor in our manufacturing cost. Other key elements are the initial cost of the raw material elements, manufacturing equipment, factory loading, facilities and labor. Our Beijing facilities are approximately 300,000 square feet and, as of December 31, 2016, we employed approximately

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661 employees at this site. In 2015, we also acquired equipment from an InP company, Crystacomm, that specializes in the LEC method of crystal growth.

We have 10 partially owned subsidiaries and joint ventures companies in China that form the backbone of our supply chain model. These companies provide us with reliable supply, market trend visibility, and shorter lead-times for raw materials central to our manufactured products, including gallium, gallium alloys, indium phosphide poly-crystal, arsenic, germanium, germanium dioxide, high purity arsenic, pBN and boron oxide. We believe that these subsidiaries and joint ventures have been and will continue to be advantageous in allowing us to procure materials to support our planned growth. In addition, we purchase supply parts, components and raw materials from several other domestic and international suppliers. We depend on a single or limited number of suppliers for certain critical materials used in the production of our substrates, such as quartz tubing, arsenic and polishing solutions. We generally purchase our materials through standard purchase orders and not pursuant to long-term supply contracts.

Sales and Marketing

We sell our substrate products directly to customers through our direct salesforce in the United States and China and through independent sales representatives and distributors in Europe and other areas of Asia. Our direct salesforce is knowledgeable in the use of compound and single element substrates. Specialty material wafers are scientifically complicated. Our application engineers must work closely with customers during all stages of the substrate manufacturing process, from developing the precise composition of the substrate through manufacturing and processing the substrate to the customer's specifications. We believe that maintaining a close relationship with customers and providing them with engineering support improves customer satisfaction and provides us with a competitive advantage in selling. Six of our employees who frequently work with customers have PhDs in physics or material science.

International Sales. International sales are a substantial part of our business. Sales to customers outside North America (primarily the United States) accounted for approximately 90%, 87% and 88% of our revenue during 2016, 2015 and 2014, respectively. The primary markets for sales of our substrate products outside of the United States are to customers located in Asia and Western Europe.

Our subsidiaries and joint venture companies sell specialty raw materials including 4N, 5N, 6N, 7N and 8N gallium, boron oxide, germanium, arsenic, germanium dioxide, pyrolytic boron nitride crucibles used in crystal growth and parts for MBE. These subsidiaries and joint ventures have their own separate sales forces and sell directly to their own customers in addition to selling raw materials to us.

Research and Development

To maintain and improve our competitive position, we focus our research and development efforts on designing new proprietary processes and products, improving the performance of existing products, increasing yields and reducing manufacturing costs. We also conduct research and development focusing on larger diameter wafers and, in our history, we have consistently developed new products based on larger wafer diameters. Crystal growth of specialty earth materials becomes significantly more difficult as the ingot diameter increases because a consistent temperature, and in the case of InP, consistent control of pressure, must be applied over a larger surface area. In 2015, we acquired certain proprietary InP crystal growth technology and equipment from Crystacomm. There are several proprietary process steps that we believe we can adopt at AXT. We originally planned to deploy the equipment at our Fremont facility, but have subsequently decided to deploy it in China due to restrictions on the use of red phosphorus placed upon our Fremont facility by various government agencies.

Certain micro devices, such as the array used for 3-D sensing, require GaAs wafers with very low etch pit density. In anticipation of a growth in demand for low EPD six-inch wafers, we have focused our development efforts on increasing our yield of such wafers.

Our current substrate research and development activities focus on continued development and enhancement of GaAs, InP and Ge substrates, including improved yield, enhanced surface and electrical characteristics and uniformity, greater substrate strength and increased crystal length. In 2015, we acquired a significant number of proprietary wafer

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processing stations from Hitachi Metals. The Hitachi Metals purchase includes a license covering the use of the proprietary equipment and Hitachi Metals' proprietary wafer processing technology. A particular focus of the equipment and process technology is on cleaning the wafers. It is important to remove any residual cleaning agents from each wafer to ensure that the epitaxial growth process is not encumbered by residual chemicals on the wafer.

Our three consolidated subsidiaries conduct research and development, focusing on gallium alloys, gallium refinement and pyrolytic boron nitride crucibles used in high temperature crystal growth.

We have assembled a multi disciplinary team of skilled scientists, engineers and technicians to meet our research and development objectives. Research and development expenses were $5.9 million in 2016, compared with $5.7 million in 2015 and $4.1 million in 2014.

Competition

The semiconductor substrate industry is characterized by narrow technological boundaries, price erosion and generally intense competition. Certain substrates, such as low quality substrates for LED lighting, compete almost entirely on price. Other products, such as InP and low EPD GaAs wafers, have fewer competitors and quality is a key competitive factor in addition to price. We face actual and potential competition from a number of established companies who have the advantage of greater name recognition and more established relationships in the industry. In some cases, competitors have substantially greater financial, technical and marketing resources. They may utilize these advantages to expand their product offerings more quickly, adapt to new or emerging technologies and changes in customer requirements more quickly, and devote greater resources to the marketing and sale of their products. A critical element is technical support extended to the customer or prospective customer and we attempt to counter possible advantages of name recognition or size with superior technical support through the use of employees who have PhDs in physics or material science.

We believe that the primary competitive factors in the markets in which our substrate products compete are:

- quality;
- price;
- customer technical support;
- performance;
- meeting customer specifications; and
- manufacturing capacity.

Our ability to compete in target markets also depends on factors such as:

- the timing and success of the development and introduction of new products, including larger diameter wafers, and product features by us and our competitors;
- the availability of adequate sources of raw materials;
- protection of our proprietary methods, systems and process;
- protection of our products by effective use of intellectual property laws; and
- general economic conditions, which impact end markets using substrates.

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The large majority of our customers specialize in epitaxial growth, a chemical layer grown on top of our wafers. Typically our customer or prospective customer has at least two substrate suppliers qualified for the production of its products. Qualified suppliers must meet industry standard specifications for quality, on-time delivery and customer support. Once a substrate supplier has qualified with a customer, price, consistent quality and current and future product delivery lead times become the most important competitive factors. A supplier that cannot meet a customer's current lead times or that a customer perceives will not be able to meet future demand and provide consistent quality can lose market share. Our primary competition in the market for compound and single element semiconductor substrates includes Freiberger Compound Materials ("Freiberger"), Japan Energy ("JX"), Umicore, Sumitomo Electric Industries ("Sumitomo") and China Crystal Technology Corp., ("CCTC"). We believe that at least two of our competitors are shipping high volumes of GaAs substrates manufactured using a technique similar to our VGF technique. In addition, we also face competition from semiconductor device manufacturers that produce substrates for their own use, and for other companies, such as Skyworks and Qorvo, that are actively exploring alternative materials and marketing semiconductor devices using these alternative materials. For example, silicon-on-insulator (SOI) technology, a silicon wafer technology that produces satisfactory devices at lower cost, has been proven in the market. From 2011 to 2013, SOI technology displaced GaAs chips in key sectors, primarily the radio frequency (RF) switching function in cell phones.

Because of our vertically integrated, sophisticated supply chain through our subsidiaries and joint venture companies, we believe we are the only compound semiconductor substrate supplier to offer a full suite of raw materials. We believe this gives us a unique competitive advantage because we have greater control and stability over the needed materials. Further, we believe we have some advantage in manufacturing costs. In the event of a significant increase in demand we believe our raw materials supply chain strategy and our ability to rapidly increase capacity can provide us some advantage.

Intellectual Property

Our success and the competitive position of our VGF technology depend on our ability to maintain our proprietary process technology secrets and other intellectual property protections. We rely on a combination of patents, trademark and trade secret laws, non-disclosure agreements and other intellectual property protection methods to protect our proprietary technology. We believe that, due to the rapid pace of technological innovation in the markets for our products, our ability to establish and maintain a position of technology leadership depends as much on the skills of our research and development personnel as upon the legal protections afforded our existing technologies. To protect our trade secrets, we take certain measures to ensure their secrecy, such as executing non-disclosure agreements with our employees, customers and suppliers. However, reliance on trade secrets is only an effective business practice insofar as trade secrets remain undisclosed and a proprietary product or process is not reverse engineered or independently developed.

To date, we have been issued 42 patents that relate to our VGF products and processes, eight in the United States, five in Japan, 24 in China, one in Canada, one in Korea, and two in Taiwan. A U.S. patent has a protected life of 20 years from the filing date. Our patents have expiration dates ranging from 2017 to 2032. In some cases we may consider filing divisional, continuation or continuation-in-part of the existing patents for additional claims. We have two U.S. patent applications pending and 15 foreign patent applications pending, including three in Europe, nine in China, two in Japan and one in the Patent Cooperation Treaty stage. Furthermore, in aggregate, our three consolidated joint venture companies have been issued 46 patents in China, including five issued patents for JiYa, 19 issued patents for JinMei and 22 issued patents for BoYu.

We entered into a technology license and royalty agreement with Sumitomo, effective December 3, 2010, with a term of eight years, terminating December 31, 2018. We and our related companies are granted a worldwide, nonexclusive, royalty bearing, irrevocable license to certain patents for the term of the agreement.

In the normal course of business, we periodically receive and make inquiries regarding possible patent infringement. In dealing with such inquiries, it may become necessary or useful for us to obtain or grant licenses or other rights. However, there can be no assurance that such licenses or rights will be available to us on commercially reasonable terms. If we are not able to resolve or settle claims, obtain necessary licenses on commercially reasonable

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terms and/or successfully prosecute or defend our position, our business, financial condition and results of operations could be materially and adversely affected.

Environmental Regulations

We are subject to federal, state and local environmental laws and regulations, including laws in China as well as in the United States and Europe. These laws, rules and regulations govern the use, storage, discharge and disposal of hazardous chemicals during manufacturing, research and development and sales demonstrations. We maintain a number of environmental, health and safety programs that are primarily preventive in nature. As part of these programs, we regularly monitor ongoing compliance. If we fail to comply with applicable regulations, we could be subject to substantial liability for personal injury, clean-up efforts, fines and suspension or cessation of our operations. The regulatory landscape shifts and changes in China as that country attempts to address its environmental pollution. Because we manufacture all of our products in China, we are subject to an evolving regulatory administration requiring changes in our equipment and securing new permits.

Employees

As of December 31, 2016, we had approximately 686 employees, which consisted of approximately 25 employees in our headquarters in Fremont and approximately 661 employees in Beijing. In addition, our three consolidated subsidiaries had, in total, approximately 308 employees. In aggregate, we and our subsidiaries had 994 employees, of whom 813 were principally engaged in manufacturing, 115 in sales and administration, and 66 in research and development. Of these 994 employees, 25 were located in the United States and 969 in China.

Most workers in China are represented by unions. As of December 31, 2016, 853 employees in China including employees of our subsidiaries were represented by unions, but we have never experienced a work stoppage. We consider our relations with our employees to be good.

Geographical Information

Please see Note 15 of our Notes to Consolidated Financial Statements for information regarding our foreign operations, and see “Risks related to international aspects of our business” under Item 1A. Risk Factors for further information on risks attendant to our foreign operations and dependence.

Available Information

Our principal executive offices are located at 4281 Technology Drive, Fremont, CA 94538, and our main telephone number at this address is (510) 438-4700. Our Internet website address is www.axt.com. Our website address is given solely for informational purposes; we do not intend, by this reference, that our website should be deemed to be part of this Annual Report on Form 10-K or to incorporate the information available at our Internet address into this Annual Report on Form 10 K.

We file electronically with the 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 these reports available free of charge through our Internet website as soon as reasonably practicable after we have electronically filed such material with the SEC. These reports can also be obtained from the SEC’s Internet website at www.sec.gov or at the SEC's Public Reference Room at 100 F Street, N.E., Washington, D.C. 20549. The public may obtain information on the operation of the Public Reference Room by calling the SEC at 1-800-SEC-0330.

Item 1A. Risk Factors

For ease of reference, we have divided these risks and uncertainties into the following general categories:

I. Risks related to our general business;

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II. Risks related to international aspects of our business;
III. Risks related to our financial results and capital structure;
IV. Risks related to our intellectual property; and
V. Risks related to compliance, environmental regulations and other legal matters.

I. Risks Related to Our General Business

Silicon substrates (wafers) are significantly lower in cost compared to substrates made from specialty materials and new silicon-based technologies could allow silicon based substrates to replace specialty material based substrates for certain applications.

Historically silicon wafers or substrates are less expensive than specialty material substrates, such as those that we produce. Electronic circuit designers will generally consider silicon first and only turn to alternative materials if silicon cannot provide the required functionality in terms of power consumption, speed or other specifications. Beginning in 2011, certain applications that had previously used GaAs substrates adopted a new silicon-based technology called Silicon On Insulator, or SOI. SOI technology uses a silicon-insulator-silicon layered substrate in place of conventional silicon substrates in semiconductor manufacturing. SOI substrates cost less than GaAs substrates and, although their performance is not as robust as GaAs substrates in terms of power consumption, heat generation and speed, they became acceptable in mobile phone and other applications that were previously dominated by GaAs substrates. The adoption of SOI resulted in decreased GaAs wafer demand, and decreased revenue. If SOI or similar technologies gain more widespread market acceptance, or are used in more applications, our sales of specialty material based substrates could be reduced and our business and operating results could be significantly and adversely affected.

Our gross margin has fluctuated historically and may decline due to several factors.

Our gross profit margin has fluctuated from period to period as a result of shifts in the cost of raw materials, shifts in product mix, the introduction of new products, decreases in average selling prices for products, utilization of our manufacturing capacity and our ability to reduce product costs. These fluctuations are expected to continue in the future.

We do not control the prices at which our subsidiaries and other joint venture companies sell their raw materials products to third parties. However, because we consolidate the results of three of these companies with our own, any reduction in their gross margins could have a significant, adverse impact on our overall gross margins. One or more of our companies has in the past sold, and may in the future sell, raw materials at significantly reduced prices in order to gain volume sales or sales to new customers. In addition, in the three months ended December 31, 2015, the market price of gallium dropped below our per unit inventory cost and we incurred an inventory write down under the lower of cost or market accounting rules. In such events, our gross margin may be adversely impacted. In addition, one of our consolidated subsidiaries has in the past been subject to capacity constraints requiring it to source product from other third party suppliers in order to meet customer demand, resulting in decreased gross margin and adversely impacting our consolidated gross margin. This joint venture may in the future continue to experience such capacity restraints, causing our gross margin, and consequently our operating results, to be adversely impacted.

Underutilizing our manufacturing facilities may result in declines in our gross margins.

An important factor in our success is the extent to which we are able to utilize the available capacity in our manufacturing facilities. A number of factors and circumstances may reduce utilization rates, including periods of industry overcapacity, low levels of customer orders, operating inefficiencies, mechanical failures and disruption of operations due to expansion, power interruptions, fire, flood or other natural disasters or calamities. Because many portions of our manufacturing costs are relatively fixed, high utilization rates are critical to our gross margins and operating results. If we fail to achieve acceptable manufacturing volumes or experience product shipment delays, our

results of operations will be negatively affected. During periods of decreased demand, we have underutilized our manufacturing lines. If we are unable to improve utilization levels at our facilities during periods of decreased demand

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and correctly manage capacity, the fixed expense levels will have an adverse effect on our business, financial condition and results of operations. Our gross profit margins have fluctuated from period to period, and these fluctuations are expected to continue in the future. Our gross profit margin has fluctuated from 17.1% for the quarter ended December 31, 2015 to 37.1% in the quarter ended December 31, 2016.

In 2013, we concluded that incoming orders were insufficient and that we were significantly underutilizing our factory capacity. As a result, in February 2014, we announced a restructuring plan with respect to our wholly-owned subsidiary, Beijing Tongmei Xtal Technology Co, Ltd., or Tongmei, in order to better align manufacturing capacity with demand. Under the restructuring plan, we posted a charge of approximately $907,000 in the first quarter of 2014.

If we receive fewer customer orders than forecasted or if our customers delay or cancel orders, we may not be able to reduce our manufacturing costs in the short-term and our gross margins would be negatively affected. In addition, lead times required by our customers are shrinking, which reduces our ability to forecast orders and properly balance our capacity utilization.

If we have low product yields, the shipment of our products may be delayed and our product cost and operating results may be adversely impacted.

A critical factor in our product cost is yield. Our products are manufactured using complex technologies, and the number of usable substrates we produce can fluctuate as a result of many factors, including:

- poor control of furnace temperature and pressure;
- impurities in the materials used;
- contamination of the manufacturing environment;
- quality control and inconsistency in quality levels;
- lack of automation and inconsistent processing requiring manual manufacturing steps;
- substrate breakage during the manufacturing process; and
- equipment failure, power outages or variations in the manufacturing process.

A current example where yield is of special concern is for our six-inch semi-conducting gallium arsenide substrates, which can be used for manufacturing opto-electronic devices in cell phones, enabling 3-D sensing. This application requires very low defect densities, also called etch pit densities, and our yields will be lower than the yields achieved for the same substrate when it will be used in other applications. If we are unable to achieve the targeted quantity of low defect density substrates, then our manufacturing costs would increase and our gross margins would be negatively impacted.

In addition, we may modify our process to meet a customer specification, but this can impact our yields. If our yields decrease, our revenue could decline if we are unable to produce products to our customers' requirements. At the same time, our manufacturing costs could remain fixed, or could increase. Lower yields negatively impact our gross margin. We have experienced product shipment delays and difficulties in achieving acceptable yields on both new and older products, and delays and poor yields have adversely affected our operating results. We may experience similar problems in the future and we cannot predict when they may occur or their duration or severity.

If our manufacturing processes result in defects in our products making them unfit for use by our customers, our products would be rejected, resulting in compensation costs paid to our customers, and possible disqualification. This could lead to revenue loss and market share loss.

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Risks exist in relocating our gallium arsenide manufacturing operations.

The Chinese government has imposed, and may impose in the future, manufacturing restrictions and regulations that require us to move part of our manufacturing operations to a location outside of the Beijing area or temporarily cease or limit manufacturing. If we are required to relocate our manufacturing operations or cease or limit our manufacturing, such restrictions would materially and adversely impact our results of operations and our financial condition.

The Beijing city government has announced that it will expand its offices into the area where our manufacturing facility is located and we believe the Beijing city government intends to relocate thousands of government employees. The Beijing city government desires to upgrade this area and has applied pressure on manufacturing companies that use restricted materials to relocate, including us. It is our understanding that a master development plan of the area where our manufacturing facility is located has not yet been formally approved by the China central government and the timeline for relocating our gallium arsenide wafer production operations at our current site has not yet been determined by the China central government. We are working with the government and are forming a plan to identify a new manufacturing site, acquire land use rights for such a site, construct a facility and move our gallium arsenide production line. We intend to complete this relocation by the end of 2018 or the first half of 2019.

The anticipated relocation of all or part of our manufacturing operations will require us to develop and execute an orderly relocation plan. A failure to properly execute a relocation plan could result in disruption to our production and have a material adverse impact on our revenue and our results of operations and financial condition.

Once we complete the relocation of our gallium arsenide product line and commence manufacturing operations at our future manufacturing facility, we may be required to qualify our products with some of our customers. If we fail to meet the product qualification requirements of a customer, we may lose sales to that customer and may not have the opportunity to sell future products to that customer. Our reputation may also be damaged. Any loss of sales could have a material adverse effect on our revenue and our results of operations and financial condition.

We expect many of the key employees who are employed at our current manufacturing facility to relocate to the new manufacturing site and assist with the transition. There can be no assurances that the key employees will relocate or that we will be able to hire qualified employees for our new manufacturing facility. A loss of key employees and our inability to hire qualified employees for our new manufacturing facility could disrupt our production, which could materially and adversely impact our results of operations and our financial condition.

To date, we have not completed a land use rights purchase of our new manufacturing site. We do not yet have construction bids or third party estimates for the relocation costs of construction costs of our future manufacturing facility, but we currently believe the land use rights purchase amount, relocation costs and facility construction costs

will be in the range of $25 million to $35 million, but could be substantially more expensive. There can be no assurances that we may recover some or all of these costs by monetizing the vacated property at our current site in Beijing.

The Chinese government has in the past imposed temporary restrictions on manufacturing facilities, such as the restrictions imposed on polluting factories for the 2008 Olympics and the 2014 Asian Pacific Economic Cooperation event. These restrictions included a shut-down of the transportation of materials and power plants to reduce air pollution. To reduce air pollution in Beijing, the Chinese government has sometimes limited the construction of new, or expansion of existing, facilities by manufacturing companies in the Beijing area. If the government applied similar restrictions to us, then such restrictions could have an adverse impact on our results of operations and our financial condition. Our ability to supply current or new orders could be significantly impacted. Customers could then be required to purchase products from our competitors, causing our competitors to take market share from us.

In addition, from time to time, the Chinese government issues new regulations, which may require additional actions on our part to comply. On February 27, 2015, the China State Administration of Work Safety updated its list of hazardous substances. The previous list, which was published in 2002, did not restrict the materials that we use in our wafers. The new list added gallium arsenide. As a result of the newly published list, we were instructed to obtain a permit to continue to manufacture our gallium arsenide substrate wafers. The Beijing municipal authority accepted our

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permit application in May 2015, but has not issued to us the requisite permit while we continue to make preparations in good faith to eventually relocate our gallium arsenide production. If our application is denied in the future then our gallium arsenide production could be disrupted, which could materially and adversely impact our results of operations and our financial condition.

Demand for our products may decrease if demand for the end-user applications decrease or if manufacturers downstream in our supply chain experience difficulty manufacturing, marketing or selling their products.

Our products are used as components in electronic and opto-electronic products. Accordingly, demand for our products is subject to the demand for end-user applications which utilize our products, as well as factors affecting the ability of the manufacturers downstream in our supply chain to introduce and market their products successfully, including:

- the competition such manufacturers face in their particular industries;
- the technical, manufacturing, sales, marketing and management capabilities of such manufacturers;
- the financial and other resources of such manufacturers; and
- the inability of such manufacturers to sell their products if they infringe third party intellectual property rights.

If demand for the end-user applications for which our products are used decreases, or if manufacturers downstream in our supply chain are unable to develop, market and sell their products, demand for our products will decrease. For example, in the second half of 2016 manufacturers producing and selling passive optical network devices known as EPONs and GPONs experienced a slowdown in demand resulting in surplus inventory on hand. This resulted in a slowdown of sales of our InP substrates. We expect similar cycles of strong demand and then lower demand will occur for various InP, GaAs or Ge substrates in the future.

Our revenue, gross margins and profitability can be hurt if the average sales price of the various raw materials in our partially owned companies decreases.

Although the companies in our vertically integrated supply chain have historically made a positive contribution to our financial performance, the average selling prices for many of the raw materials produced have continued to decline and have had a negative impact on our recent financial performance. In particular, the selling prices for 4N gallium and for germanium have been driven down by oversupply and, in the second half of 2015 and in 2016, negatively impacted our financial results. In 2016 the seven companies accounted for under the equity method of accounting contributed a loss of $2.0 million to our financial statements. Low selling prices for raw materials continue and will have a detrimental impact on our 2017 financial performance. There can be no assurance that the oversupply will be corrected by the market. Further, in the fourth quarter of 2015, one of our consolidated subsidiaries incurred a lower of cost or market inventory write down, which negatively impacted our consolidated gross margin. If the pricing environment remains stressed by oversupply and our joint venture companies cannot reduce their production cost, then the reduced average selling prices of the raw materials produced by our joint venture companies will have a continuing adverse impact on our revenue, gross margins and net profit.

Problems incurred in our 10 partially owned joint venture companies or investment partners could result in a material adverse impact on our financial condition or results of operations.

We have invested in 10 subsidiaries and joint venture companies in China that produce materials including 99.99% pure gallium (4N Ga), high purity gallium (7N Ga), arsenic, germanium, germanium dioxide, pyrolytic boron nitride

(pBN) crucibles and boron oxide (B2O3). We purchase a portion of the materials produced by these companies for our use and they sell the remainder of their production to third parties. Our ownership and the ownership held by our consolidated subsidiaries in these entities ranges from 20% to 83%. We consolidate the companies in which we have a majority or controlling financial interest and employ equity accounting for the companies in which we have a smaller

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ownership interest. Several of these companies occupy space within larger facilities owned and/or operated by one of the other venture partners. Several of these venture partners are engaged in other manufacturing activities at or near the same facility. In some facilities, we share access to certain functions, including water, hazardous waste treatment or air quality treatment. If any of our joint venture partners in any of these ventures experiences problems with its operations, disruptions of our joint venture operations could result, having a material adverse effect on the financial condition and results of operation of our joint venture companies, and correspondingly on our financial condition or results of operations. For example, since gallium is a by-product of aluminum, our raw gallium joint venture in China, which is housed in and receives services from an affiliated aluminum plant, could generate lower production of gallium as a result of reduced services provided by the aluminum plant. Accordingly, in order to meet customer supply obligations, our supply chain may have to source materials from another independent third party supplier, resulting in reduced gross margin.

In addition, if any of our joint ventures or venture partners with which our joint ventures share facilities is deemed to have violated applicable laws, rules or regulations governing the use, storage, discharge or disposal of hazardous chemicals during manufacturing, research and development or sales demonstrations, the operations of our joint ventures could be adversely affected and we could be subject to substantial liability for clean-up efforts, personal injury and fines or suspension or cessation of our joint venture operations as a result of the actions of the joint ventures or other venture partners. Employees working for our joint ventures or any of the other venture partners could bring litigation against us as a result of actions taken at the joint venture or venture partner facilities, even though we are not directly controlling the operations, including actions for exposure to chemicals or other hazardous materials at the facilities of our joint ventures or the facilities of any venture partner that are shared by our joint ventures. While we would expect to defend ourselves vigorously in any litigation that is brought against us, litigation is inherently uncertain and it is possible that our business, financial condition, results of operations or cash flows could be affected. Even if we are not deemed responsible for the actions of the joint ventures or venture partners, litigation could be costly, time consuming to defend and divert management attention; in addition, if we are deemed to be the most financially viable of the partners, plaintiffs may decide to pursue us for damages.

Since all of our partially owned companies reside in China, their activities could subject us to a number of risks associated with conducting operations internationally, including:

- difficulties in managing geographically disparate operations;
- difficulties in enforcing agreements through non-U.S. legal systems;
- unexpected changes in regulatory requirements that may limit our ability to manufacture, export the products of our joint venture companies, sell into particular jurisdictions or impose multiple conflicting tax laws and regulations;
- political and economic instability, civil unrest or war;
- terrorist activities that impact international commerce;
- difficulties in protecting our intellectual property rights, particularly in countries where the laws and practices do not protect proprietary rights to as great an extent as do the laws and practices of the United States;
- changing laws and policies affecting economic liberalization, foreign investment, currency convertibility or exchange rates, taxation or employment; and
- nationalization of foreign owned assets, including intellectual property.

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Intense competition in the markets for our products could prevent us from increasing revenue and sustaining profitability.

The markets for our products are intensely competitive. We face competition for our substrate products from other manufacturers of substrates, such as Freiberger, JX, Umicore, Sumitomo and CCTC and from companies, such as Qorvo and Skyworks, that are actively considering alternative materials to GaAs and marketing semiconductor devices using these alternative materials. We believe that at least two of our major competitors are shipping high volumes of GaAs substrates manufactured using a technique similar to our VGF technology. Other competitors may develop and begin using similar technology. Sumitomo and JX also compete with us in the InP market. If we are unable to compete effectively, our revenue may not increase and we may not achieve profitability. We face many competitors that have a number of significant advantages over us, including:

· greater name recognition and market share in the business;
· more manufacturing experience;
· extensive intellectual property; and
· significantly greater financial, technical and marketing resources.

Our competitors could develop new or enhanced products that are more effective than our products.

The level and intensity of competition has increased over the past years and we expect competition to continue to increase in the future. Competitive pressures have resulted in reductions in the prices of our products, and continued or increased competition could reduce our market share, require us to further reduce the prices of our products, affect our ability to recover costs and result in reduced gross margins.

In addition, new competitors have and may continue to emerge, such as a crystal growing company established by a former employee in China that is supplying semi-conducting GaAs wafers to the LED market. Competition from sources such as this could increase, particularly if these competitors are able to obtain large capital investments.

The average selling prices of our substrates may decline over relatively short periods, which may reduce our revenue and gross margins.

Since the market for our products is characterized by declining average selling prices resulting from various factors, such as increased competition, overcapacity, the introduction of new products and decreased sales of products incorporating our products, the average selling prices for our products may decline over relatively short time periods. We have in the past experienced, and in the future may experience, substantial period-to-period fluctuations in operating results due to declining average selling prices. For example, for the year ended December 31, 2016, we experienced an average selling price decline of our substrate selling prices of approximately 5% to 10%, depending on the substrate product. It is possible that the pace of the decline of average selling prices could accelerate beyond these levels for certain products in a commoditizing market. We anticipate that average selling prices will decrease in the future in response to the unstable demand environment, product introductions by competitors or us, or by other factors, including pricing pressures from significant customers. When our average selling prices decline, our revenue and gross profit decline, unless we are able to sell more products or reduce the cost to manufacture our products. We generally attempt to combat an average selling price decline by improving yields and manufacturing efficiencies and working to reduce the costs of our raw materials and of manufacturing our products. We have in the past, and may in the future, experience declining selling prices, which could negatively impact our revenues, gross profits and financial results. We, therefore, need to sell our current products in increasing volumes to offset any decline in their average selling prices, and introduce new products, which we may not be able to do, or do on a timely basis.

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We may be unable to reduce the cost of our products sufficiently to enable us to compete with others. Our cost reduction efforts may not allow us to keep pace with competitive pricing pressures and could adversely affect our margins. In order to remain competitive, we must continually work to reduce the cost of manufacturing our products. There is no assurance that any changes effected by us will result in sufficient cost reductions to allow us to reduce the price of our products to remain competitive or improve our gross margins.

Defects in our products could diminish demand for our products.

Our products are complex and may contain defects, including defects resulting from impurities inherent in our raw materials or inconsistencies in our manufacturing processes. We have experienced quality control problems with some of our products, which caused customers to return products to us, reduce orders for our products, or both. If we experience quality control problems, or experience these or other problems in new products, customers may cancel or reduce orders or purchase products from our competitors and we may be unable to maintain or increase sales to our customers and sales of our products could decline. Defects in our products could cause us to incur higher manufacturing costs and suffer product returns and additional service expenses, all of which could adversely impact our operating results. If new products developed by us contain defects when released, our customers may be dissatisfied and we may suffer negative publicity or customer claims against us, lose sales or experience delays in market acceptance of our new products.

Our substrate products have a long qualification cycle that makes it difficult to forecast our revenue.

New customers typically place orders with us for our substrate products three months to a year or more after our initial contact with them. In addition, existing customers may be slow to purchase our products. The sale of our products is subject to our customers' lengthy internal evaluation and approval processes. During this time, we may incur substantial expenses and expend sales, marketing and management efforts while the customers evaluate our products. These expenditures may not result in sales of our products. If we do not achieve anticipated sales in a period as expected, we may experience an unplanned shortfall in our revenue. As a result, our operating results would be adversely affected. In addition, if we fail to meet the product qualification requirements of the customer, we may not have another opportunity to sell that product to that customer for many months or even years. In the current competitive climate, the average qualification and sales cycle for our products has lengthened even further and is expected to continue to make it difficult for us to forecast our future sales accurately. We anticipate that sales of any future substrate products will also have lengthy qualification periods and will, therefore, be subject to risks substantially similar to those inherent in the lengthy sales cycles of our current substrate products.

The loss of one or more of our key substrate customers would significantly hurt our operating results.

Although no customer represented more than 10% of our revenue for year ended December 31, 2016, we did have one customer over 10% of revenue for the year ended December 31, 2015 and if we were to lose a major customer it would negatively impact our revenue. Most of our customers are not obligated to purchase a specified quantity of our products or to provide us with binding forecasts of product purchases. In addition, our customers may reduce, delay or cancel orders at any time without any significant penalty. In the past, we have experienced a slowdown in bookings, significant push-outs and cancellation of orders from customers. If we lose a major customer or if a customer cancels, reduces or delays orders, or reduces the prices paid for our products, our revenue would decline. In addition, customers that have accounted for significant revenue in the past may not continue to generate revenue for us in any future period. Any loss of customers or any delay in scheduled shipments of our products could cause revenue to fall below our expectations and the expectations of market analysts or investors, causing our stock price to decline.

The cyclical nature of the semiconductor industry may limit our ability to maintain or increase net sales and operating results during industry downturns.

The semiconductor industry is highly cyclical and periodically experiences significant economic downturns characterized by diminished product demand, resulting in production overcapacity and excess inventory in the markets we serve. A downturn can result in lower unit volumes and rapid erosion of average selling prices. The semiconductor industry has experienced significant downturns, often in connection with, or in anticipation of, maturing product cycles

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of both semiconductor companies' and their customers' products or a decline in general economic conditions. This may adversely affect our results of operations and the value of our business.

Our continuing business depends in significant part upon manufacturers of electronic and opto-electronic compound semiconductor devices, as well as the current and anticipated market demand for these devices and products using these devices. As a supplier to the compound semiconductor industry, we are subject to the business cycles that characterize the industry. The timing, length and volatility of these cycles are difficult to predict. The compound semiconductor industry has historically been cyclical due to sudden changes in demand, the amount of manufacturing capacity and changes in the technology employed in compound semiconductors. The rate of changes in demand, including end demand, is high, and the effect of these changes upon us occurs quickly, exacerbating the volatility of these cycles. These changes have affected the timing and amounts of customers' purchases and investments in new technology. These industry cycles create pressure on our revenue, gross margin and net income.

Our industry has in the past experienced periods of oversupply and that has resulted in significantly reduced prices for compound semiconductor devices and components, including our products, both as a result of general economic changes and overcapacity. When this occurs our operating results and financial condition are adversely affected. Oversupply causes greater price competition and can cause our revenue, gross margins and net income to decline. During periods of weak demand, customers typically reduce purchases, delay delivery of products and/or cancel orders of component parts such as our products. Further order cancellations, reductions in order size or delays in orders could occur and would materially adversely affect our business and results of operations. Actions to reduce our costs may be insufficient to align our structure with prevailing business conditions. We may be required to undertake additional cost-cutting measures, and may be unable to invest in marketing, research and development and engineering at the levels we believe are necessary to maintain our competitive position. Our failure to make these investments could seriously harm our business.

We base our planned operating expenses in part on our expectations of future revenue, and a significant portion of our expense is relatively fixed. If revenue for a particular quarter is lower than we expect, we likely will be unable to proportionately reduce our operating expenses for that quarter, which would harm our operating results.

If we do not successfully develop new products to respond to rapidly changing customer requirements, our ability to generate revenue, obtain new customers, and retain existing customers may suffer.

Our success depends on our ability to offer new products, including larger diameter substrates, low defect density substrates and product features that incorporate leading technology and respond to technological advances. In addition, our new products must meet customer needs and compete effectively on quality, price and performance. The markets for our products are characterized by rapid technological change, changing customer needs and evolving industry standards. If our competitors introduce products employing new technologies or performance characteristics, our existing products could become obsolete and unmarketable. During the past few years, we have seen our competitors selling more substrates manufactured using a crystal growth technology similar to ours, which has eroded our technological differentiation.

The development of new products can be a highly complex process, and we may experience delays in developing and introducing new products. Any significant delay could cause us to fail to timely introduce and gain market acceptance of new products. Further, the costs involved in researching, developing and engineering new products could be greater than anticipated. If we fail to offer new products or product enhancements or fail to achieve higher quality products, we may not generate sufficient revenue to offset our development costs and other expenses or meet our customers' requirements.

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We have made and may continue to make strategic investments in raw materials suppliers, which may not be successful and may result in the loss of all or part of our investment.

We have made investments through our subsidiaries and joint ventures in ten raw material suppliers in China, which provide us with opportunities to gain supplies of key raw materials that are important to our substrate business. These affiliates each have a market beyond that provided by us. We do not have influence over all of these companies and in some we have made only a strategic, minority investment. We may not be successful in achieving the financial, technological or commercial advantage upon which any given investment is premised, and we could end up losing all or part of our investment. As a result of sharp declines in the average selling price of materials in 2016 the seven companies accounted for under the equity method of accounting contributed a loss of $2.0 million to our financial statements.

We purchase critical raw materials and parts for our equipment from single or limited sources, and could lose sales if these sources fail to fill our needs.

We depend on a limited number of suppliers for certain raw materials, components and equipment used in manufacturing our products, including key materials such as quartz tubing, and polishing solutions. Although several of these raw materials are purchased from suppliers in which we hold an ownership interest, we generally purchase these materials through standard purchase orders and not pursuant to long-term supply contracts, and no supplier guarantees supply of raw materials or equipment to us. If we lose any of our key suppliers, our manufacturing efforts could be significantly hampered and we could be prevented from timely producing and delivering products to our customers. Prior to investing in our subsidiaries and joint ventures, we sometimes experienced delays obtaining critical raw materials and spare parts, including gallium and we could experience such delays again in the future due to shortages of materials or for other reasons and may be unable to obtain an adequate supply of materials. Delays in receiving equipment or materials could result in higher materials costs and cause us to delay or reduce production of our products. If we have to delay or reduce production, we could fail to meet customer delivery schedules and our revenue and operating results could suffer.

We may not be able to identify additional complementary joint ventures.

Although we are not currently pursuing additional joint ventures, in the future we might invest in additional joint ventures in order to remain competitive in our marketplace and ensure a supply of critical raw materials. However, we may not be able to identify additional complementary joint venture opportunities or, even once opportunities are identified, we may not be able to reach agreement on the terms of the venture with the other venture partners. Additional joint ventures could cause us to incur contingent liabilities or other expenses, any of which could adversely affect our financial condition and operating results.

If any of our facilities are damaged by occurrences such as fire, explosion, power outage or natural disaster, we might not be able to manufacture our products.

The ongoing operation of our manufacturing and production facilities in China is critical to our ability to meet demand for our products. If we are not able to use all or a significant portion of our facilities for prolonged periods for any reason, we would not be able to manufacture products for our customers. For example, a fire or explosion caused by our use of combustible chemicals and high temperatures during our manufacturing processes or power interruption caused by severe weather conditions could render some or all of our facilities inoperable for an indefinite period of time. Actions outside of our control, such as earthquakes or other natural disasters, could also damage our facilities, rendering them inoperable. If we are unable to operate our facilities and manufacture our products, we would lose customers and revenue and our business would be harmed.

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If China places restrictions on freight and transportation routes and on port of entry and departure this could result in shipping delays or increased costs for shipping.

In August 2015, there was an explosion at the Port of Tianjin, China. As a result of this incident the government placed restrictions on importing certain materials and on freight routes used to transport these materials. We experienced some modest disruption from these restrictions. If the government were to place additional restrictions on the transportation of materials, then our ability to transport our raw materials or products could be limited and result in bottlenecks at shipping ports, affecting our ability to deliver products to our customers. During periods of such restrictions, we may increase our stock of critical materials (such as arsenic, gallium, and other chemicals) for use during the period that these restrictions are likely to last, which will increase our use of cash and increase our inventory level. Any of these restrictions could materially and adversely impact our results of operations and our financial condition.

The financial condition of our customers may affect their ability to pay amounts owed to us.

Many of our customers may be undercapitalized and cope with cash flow issues. Because of competitive market conditions, we frequently allow our customers extended payment terms when shipping products to them. Subsequent to our shipping a product, some customers have been unable to make payments when due, reducing our cash balances and causing us to incur charges to allow for a possibility that some accounts might not be paid. Customers may also be forced to file for bankruptcy. If our customers do not pay their accounts we will be required to incur charges that would reduce our earnings.

We depend on the continuing efforts of our senior management team and other key personnel. If we lose members of our senior management team or other key personnel, or are unable to successfully recruit and train qualified personnel, our ability to manufacture and sell our products could be harmed.

Our future success depends on the continuing services of members of our senior management team and other key personnel. Our industry is characterized by high demand and intense competition for talent, and the turnover rate can be high. We compete for qualified management and other personnel with other specialty material companies and semiconductor companies. Our employees could leave our company with little or no prior notice and would be free to work for a competitor. If one or more of our senior executives or other key personnel were unable or unwilling to continue in their present positions, we may not be able to replace them easily or at all, and other senior management may be required to divert attention from other aspects of the business. The loss of any of these individuals or our ability to attract or retain qualified personnel could adversely affect our business.

Our results of operations may suffer if we do not effectively manage our inventory.

We must manage our inventory of raw materials, work-in-process and finished goods effectively to meet changing customer requirements, while keeping inventory costs down and improving gross margins. Although we seek to maintain sufficient inventory levels of certain materials to guard against interruptions in supply and to meet our near term needs, and have to date been able to obtain sufficient supplies of materials in a timely manner, in the future, we may experience shortages of certain key materials. Some of our products and supplies have in the past and may in the future become obsolete while in inventory due to changing customer specifications, or become excess inventory due to decreased demand for our products and an inability to sell the inventory within a foreseeable period. This would result in charges that reduce our gross profit and gross margin. Furthermore, if market prices drop below the prices at which we value inventory, we may need to take a charge for a reduction in inventory values in accordance with the lower of cost or market valuation rule. We have in the past had to take inventory valuation and impairment charges.

Any future unexpected changes in demand or increases in costs of production that cause us to take additional charges for un-saleable, obsolete or excess inventory, or to reduce inventory values, could adversely affect our results of operations.

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Financial market volatility and adverse changes in the domestic and global economic environment could have a significant adverse impact on our business, financial condition and operating results.

We are subject to the risks arising from adverse changes and uncertainty in domestic and global economies. Uncertain global economic and political conditions and low or negative growth in China, Europe and the United States, along with volatility in the financial markets, increasing national debt and fiscal concerns in various regions, pose challenges to our industry. Currently China's economy is slowing and this could impact our financial performance. Although we remain well-capitalized, the cost and availability of funds may be adversely affected by illiquid credit markets. Turbulence in U.S. and international markets and economies may adversely affect our liquidity, financial condition and profitability. Another severe or prolonged economic downturn could result in a variety of risks to our business, including:

- increased volatility in our stock price;
- increased volatility in foreign currency exchange rates;
- delays in, or curtailment of, purchasing decisions by our customers or potential customers either as a result of overall economic uncertainty or as a result of their inability to access the liquidity necessary to engage in purchasing initiatives;
- increased credit risk associated with our customers or potential customers, particularly those that may operate in industries most affected by the economic downturn; and
- impairment of our intangible or other assets.

In the past we experienced delays in customer purchasing decisions and disruptions in normal volume of customer orders that we believe were in part due to the uncertainties in the global economy and an adverse impact on consumer spending. During challenging and uncertain economic times and in tight credit markets, many customers delay or reduce technology purchases. Should similar events occur again, our business and operating results could be significantly and adversely affected.

Global economic and political conditions may have an impact on our business and financial condition in ways that we currently cannot predict.

Our operations and financial results depend on worldwide economic conditions and their impact on levels of business spending, which had deteriorated significantly in many countries and regions in previous years. Uncertainties in the financial and credit markets may cause our customers to postpone deliveries of ordered systems and placement of new orders and extended uncertainties may reduce future sales of our products and services. The revenue growth and profitability of our business depends on the overall demand for our substrates, and we are particularly dependent on the market conditions for the wireless, solid state illumination, fiber optics and telecommunications industries. Because the end users of our products are primarily large companies whose businesses fluctuate with general economic and business conditions, a softening of demand for products that use our substrates, caused by a weakening economy, may result in decreased revenue. Customers may find themselves facing excess inventory from earlier purchases, and may defer or reconsider purchasing products due to the downturn in their business and in the general economy. If market conditions deteriorate, we may experience increased collection times and greater write-offs, either of which could have a material adverse effect on our profitability and our cash flow.

Future tightening of credit markets and concerns regarding the availability of credit may make it more difficult for our customers to raise capital, whether debt or equity, to finance their purchases of capital equipment or of the products we sell. Delays in our customers' ability to obtain such financing, or the unavailability of such financing, would adversely affect our product sales and revenues and therefore harm our business and operating results. We cannot predict the timing, duration of or effect on our business of any future economic downturn or the timing or strength of any subsequent recovery.

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The effect of terrorist threats and actions on the general economy could decrease our revenue.

Developed countries such as the United States and China continue to be on alert for terrorist activity. The potential near- and long-term impact terrorist activities may have in regards to our suppliers, customers and markets for our products and the economy is uncertain. There may be embargos of ports or products, or destruction of shipments or our facilities, or attacks that affect our personnel. There may be other potentially adverse effects on our operating results due to significant events that we cannot foresee. Since we perform all of our manufacturing operations in China, terrorist activity or threats against U.S. owned enterprises are a particular concern to us.

II. Risks Related to International Aspects of Our Business

We derive a significant portion of our revenue from international sales, and our ability to sustain and increase our international sales involves significant risks.

Our revenue growth depends in part on the expansion of our international sales and operations. Typically over 80% of our revenue is from international sales. We expect that sales to customers outside the United States, particularly sales to customers in Japan, Taiwan and China, will continue to represent a significant portion of our revenue.

Currently, a significant percentage of our revenue is to customers headquartered in Asia. All of our manufacturing facilities and most of our suppliers are also located outside the United States. Managing our overseas operations presents challenges, including periodic regional economic downturns, trade balance issues, varying business conditions and demands, political instability, variations in enforcement of intellectual property and contract rights in different jurisdictions, differences in the ability to develop relationships with suppliers and other local businesses, changes in U.S. and international laws and regulations, including U.S. export restrictions, fluctuations in interest and currency exchange rates, the ability to provide sufficient levels of technical support in different locations, cultural differences and perceptions of U.S. companies, shipping delays and terrorist acts or acts of war, among other risks. Many of these challenges are present in China, which represents a large potential market for semiconductor devices. Global uncertainties with respect to: (i) economic growth rates in various countries; (ii) sustainability of demand for electronics products; (iii) capital spending by semiconductor manufacturers; (iv) price weakness for certain semiconductor devices; (v) changing and tightening environmental regulations and (vi) political instability in regions where we have operations may also affect our business, financial condition and results of operations.

Our dependence on international sales involves a number of risks, including:

- changes in tariffs, import restrictions, export restrictions, or other trade barriers;
- unexpected changes in regulatory requirements;
- longer periods to collect accounts receivable;
- changes in export license requirements;
- political and economic instability;
- unexpected changes in diplomatic and trade relationships; and
- foreign exchange rate fluctuations.

Our sales are denominated in U.S. dollars, except for sales to our Chinese customers which are denominated in Renminbi and our Japanese customers which are denominated in Japanese yen. Increases in the value of the U.S. dollar could increase the price of our products in non-U.S. markets and make our products more expensive than competitors' products in these markets.

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Denominating some sales in Japanese yen subjects us to fluctuations in the exchange rates between the U.S. dollar and the Japanese yen. For example, in the second half of 2014, the exchange rate of Japanese yen to U.S. dollar moved from 101.55 to 119.95 from June 30, 2014 to December 31, 2014. As a result, in 2014 we incurred foreign currency transaction exchange losses which are included in "other income (expense), net" on the consolidated statements of operations of $1.0 million. We incur transaction gains or losses resulting from the purchase and sale activities denominated in foreign currencies other than functional currencies at the respective consolidated entities. We accumulate translation gain or losses resulting from marking certain balance sheet assets and liabilities to the current market rate for those consolidated entities whose functional currencies are other than the reporting currency, which are recorded as component of "accumulated other comprehensive income (loss)" on the consolidated balance sheets. Although we have instituted a foreign currency hedging program, we still experience losses on foreign exchange from time to time.

The functional currency of our Chinese subsidiary and joint ventures is the local currency. If we do not effectively manage the risks associated with international sales, our revenue, cash flows and financial condition could be adversely affected.

Uncertainty regarding the United States' foreign policy under the new administration could disrupt our business.

We manufacture our substrates in China and, in 2016, approximately 90% of our sales are to customers located outside of the United States. Further, we have partial ownership of 10 companies in China as part of our supply chain. The United States' foreign policy under the new administration could create uncertainty and caution in the international business community, resulting in possible disruptions in manufacturing, import/export, trade tariffs, sales, investments or other business activity. Such disruptions could have an adverse impact on our financial performance.

Changes in tariffs, import or export restrictions, Chinese regulations or other trade barriers may reduce gross margins.

We may incur increases in costs due to changes in tariffs, import or export restrictions, or other trade barriers, unexpected changes in regulatory requirements, any of which could reduce our gross margins. For example, in July 2012, we received notice of retroactive value-added taxes (VATs) levied by the tax authorities in China, which applied for the period from July 1, 2011 to June 30, 2012. We expensed the retroactive VATs of approximately $1.3 million in the quarter ended June 30, 2012, which resulted in a decrease in our gross margins. These VATs will continue to negatively impact our gross margins for the future quarters. Given the relatively fluid regulatory environment in China, there could be additional tax or other regulatory changes in the future. Any such changes could directly and materially adversely impact our financial results and general business condition.

Our operating results depend in large part on continued customer acceptance of our substrate products manufactured in China and continued improvements in product quality.

We manufacture all of our products in China, and source most of our raw materials in China. We have in the past experienced quality problems with our China manufactured products. Our previous quality problems caused us to lose market share to our competitors, as some of our customers reduced their orders from us until our wafer surface quality was as good and as consistent as that offered by our competitors and instead allocated their requirements for compound semiconductor substrates to our competitors. If we are unable to continue to achieve customer qualifications for our products, or if we are unable to control product quality, customers may not increase purchases of

our products, our China facility will become underutilized, and we will be unable to achieve revenue growth.

Changes in China's political, social, regulatory or economic environments may affect our financial performance.

Our financial performance may be affected by changes in China's political, social, regulatory or economic environments. The role of the Chinese central and local governments in the Chinese economy is significant. Chinese policies toward economic liberalization, and laws and policies affecting technology companies, foreign investment, currency exchange rates, taxation structure and other matters could change, resulting in greater restrictions on our ability to do business and operate our manufacturing facilities in China. Any imposition of surcharges or any increase in Chinese tax rates or reduction or elimination of Chinese tax benefits could hurt our operating results. The Chinese

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government could revoke, terminate or suspend our operating license for reasons related to environmental control over the use of hazardous materials, labor complaints, national security and similar reasons without compensation to us. If the Chinese government were to take any of these actions, we would be prevented from conducting all or part of our business. Any failure on our part to comply with governmental regulations could result in the loss of our ability to manufacture our products.

The Beijing city government has announced that it will expand its offices into the area where our manufacturing facility is located and we believe the Beijing city government intends to relocate thousands of government employees. The Beijing city government desires to upgrade this area and has applied pressure on manufacturing companies that use restricted materials to relocate, including us. It is our understanding that a master development plan of the area where our manufacturing facility is located has not yet been formally approved by the China central government and the timeline for relocating our gallium arsenide wafer production operations at our current site has not yet been determined by the China central government. We are working with the government and are forming a plan to identify a new manufacturing site, acquire land use rights, construct a facility and move our gallium arsenide production line. We intend to complete this relocation by the end of 2018 or the first half of 2019.

The anticipated relocation of all or part of our operations will require us to develop and execute an orderly relocation plan. A failure to properly execute a relocation plan could result in disruption to our production and have a material adverse impact on our revenue and our results of operations and financial condition.

Our international operations are exposed to potential adverse tax consequence in China.

Our international operations create a risk of potential adverse tax consequences. Taxes on income in our China-based companies are dependent upon acceptance of our operational practices and intercompany transfer pricing by local tax authorities as being on an arm's length basis. Due to inconsistencies among taxing authorities in application of the arm's length standard, transfer pricing challenges by tax authorities could, if successful, materially increase our consolidated income tax expense. We are subject to tax audits in China and an audit could result in the assessment of additional income tax against us. This could have a material adverse effect on our operating results or cash flows in the period or periods for which that determination is made and could result in increases to our overall tax expense in subsequent periods. Various taxing agencies in China are increasingly focused on tax reform and other legislative action to increase tax revenue. In addition to risks regarding income tax we have in the past been retroactively assessed value added taxes (“VAT” or sales tax) and such VAT assessments could occur again in the future.

If there are power shortages in China, we may have to temporarily close our China operations, which would adversely impact our ability to manufacture our products and meet customer orders, and would result in reduced revenue.

In the past, China has faced power shortages resulting in power demand outstripping supply in peak periods. Instability in electrical supply has caused sporadic outages among residential and commercial consumers causing the Chinese government to implement tough measures to ease the energy shortage. If further problems with power shortages occur in the future, we may be required to make temporary closures of our operations or of our subsidiary and joint venture operations. We may be unable to manufacture our products and would then be unable to meet customer orders except from inventory on hand. As a result, our revenue could be adversely impacted, and our relationships with our customers could suffer, impacting our ability to generate future revenue. In addition, if power is shut off at any of our facilities at any time, either voluntarily or as a result of unplanned brownouts, during certain phases of our manufacturing process including our crystal growth phase, the work in process may be ruined and rendered unusable, causing us to incur costs that will not be covered by revenue, and negatively impacting our cost of revenue and gross margins.

An outbreak of a contagious disease such as Ebola, Severe Acute Respiratory Syndrome (SARS) or the Avian Flu may adversely impact our manufacturing operations and some of our key suppliers and customers.

Any reoccurrence of SARS or an outbreak of a contagious disease, such as Avian Flu or Ebola, may cause us to temporarily close our manufacturing operations. Similarly, if one or more of our key suppliers is required to close for an

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extended period, we might not have enough raw material inventories to continue manufacturing operations. In addition, while we possess management skills among our China staff that enable us to maintain our manufacturing operations with minimal on-site supervision from our U.S. based staff, our business could also be harmed if travel to or from China and the United States is restricted or inadvisable. If our manufacturing operations were closed for a significant period, we could lose revenue and market share, which would depress our financial performance and could be difficult to recapture. Finally, if one of our key customers is required to close for an extended period, we might not be able to ship product to them, our revenue would decline and our financial performance would suffer.

III. Risks Related to Our Financial Results and Capital Structure

We may utilize our cash balances for relocation, expansion, or to offset a business downturn resulting in the decline of our existing cash, cash equivalents and investment balances, and if we need additional capital, those funds may not be available on acceptable terms, or at all.

Our liquidity is affected by many factors including, among others, our plans to secure land use rights and construct a new facility for the relocation of our gallium arsenide manufacturing operations, the extent to which we pursue on-going capital expenditures, the level of our production, the level of profits or losses, and other factors related to the uncertainties of the industry and global economies. Our relocation expenditures and any negative cash flow effects of these other factors will draw down our cash reserves, which could adversely affect our financial condition, reduce our value and possibly impinge our ability to raise debt and equity funding in the future, at a time when we might need to raise additional cash or elect to raise additional cash. Accordingly, there can be no assurance that events will not require us to seek additional capital or, if required, that such capital would be available on terms acceptable to us, if at all.

Unpredictable fluctuations in our operating results could disappoint analysts or our investors, which could cause our stock price to decline.

We have experienced, and may continue to experience, significant fluctuations in our revenue, gross margins and earnings. Our quarterly and annual revenue and operating results have varied significantly in the past and may vary significantly in the future due to a number of factors, including:

- our ability to develop, manufacture and deliver high quality products in a timely and cost-effective manner;
- disruptions during the relocation of our gallium arsenide product line;
- fluctuation of our manufacturing yields;
- decreases in the prices of our or our competitors' products;
- fluctuations in demand for our products;
- the volume and timing of orders from our customers, and cancellations, push-outs and delays of customer orders once booked;
    - decline in general economic conditions or downturns in the industry in which we compete;
- expansion of our manufacturing capacity;
- expansion of our operations in China;
- limited availability and increased cost of raw materials;
- costs incurred in connection with any future acquisitions of businesses or technologies; and

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· increases in our expenses, including expenses for research and development.

Due to these factors, we believe that period-to-period comparisons of our operating results may not be meaningful indicators of our future performance.

A substantial percentage of our operating expenses are fixed, and we may be unable to adjust spending to compensate for an unexpected shortfall in revenue. As a result, any delay in generating revenue could cause our operating results to fall below the expectations of market analysts or investors, which could also cause our stock price to decline.

If our operating results and financial performance do not meet the guidance that we have provided to the public, our stock price may decline.

We provide public guidance on our expected operating and financial results. Although we believe that this guidance provides our stockholders, investors and analysts with a better understanding of our expectations for the future, such guidance is comprised of forward-looking statements subject to the risks and uncertainties described in this report and in our other public filings and public statements. Our actual results may not meet the guidance we have provided. If our operating or financial results do not meet our guidance or the expectations of investment analysts, our stock price may decline.

We have adopted certain anti-takeover measures that may make it more difficult for a third party to acquire us.

Our board of directors has the authority to issue up to 800,000 shares of preferred stock in addition to the outstanding shares of Series A preferred stock and to determine the price, rights, preferences and privileges of those shares without any further vote or action by the stockholders. The rights of the holders of common stock will be subject to, and may be adversely affected by, the rights of the holders of any preferred stock that may be issued in the future. The issuance of shares of preferred stock could have the effect of making it more difficult for a third party to acquire a majority of our outstanding voting stock. We have no present intention to issue additional shares of preferred stock.

Provisions in our restated certificate of incorporation and amended and restated bylaws may have the effect of delaying or preventing a merger, acquisition or change of control, or changes in our management, which could adversely affect the market price of our common stock. The following are some examples of these provisions:

· the division of our board of directors into three separate classes, each with three-year terms;
· the right of our board to elect a director to fill a space created by a board vacancy or the expansion of the board;
· the ability of our board to alter our amended and restated bylaws; and
· the requirement that only our board or the holders of at least 10% of our outstanding shares may call a special meeting of our stockholders.

Furthermore, because we are incorporated in Delaware, we are subject to the provisions of Section 203 of the Delaware General Corporation Law. These provisions prohibit us from engaging in any business combination with any interested stockholder (a stockholder who owns 15% or more of our outstanding voting stock) for a period of three years following the time that such stockholder became an interested stockholder, unless:

· $66^{2}/_{3}$% of the shares of voting stock not owned by the interested stockholder approve the merger or combination, or
· the board of directors approves the merger or combination or the transaction which resulted in the stockholder becoming an interested stockholder.

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Our common stock may be delisted from The Nasdaq Global Select Market, which could negatively impact the price of our common stock and our ability to access the capital markets.

Our common stock is listed on The Nasdaq Global Select Market. The bid price of our common stock has in the past closed below the $1.00 minimum per share bid price required for continued inclusion on The Nasdaq Global Select Market under Marketplace Rule 5450(a). If the bid price of our common stock remains below $1.00 per share for thirty consecutive business days, we could be subject to delisting from the Nasdaq Global Select Market.

Any delisting from The Nasdaq Global Select Market could have an adverse effect on our business and on the trading of our common stock. If a delisting of our common stock were to occur, our common stock would trade in the over-the-counter market and be quoted on a service such as those provided by OTC Markets Group, Inc. Such alternatives are generally considered to be less efficient markets, and our stock price, as well as the liquidity of our common stock, may be adversely impacted as a result. Delisting from The Nasdaq Global Select Market could also have other negative results, including the potential loss of confidence by customers, suppliers and employees, the loss of institutional investor interest and fewer business development opportunities, as well as the loss of liquidity for our stockholders.

Our ability to use our net operating loss carryforwards and certain other tax attributes may be limited.

As of December 31, 2016, we had U.S. federal net operating loss carryforwards of approximately $178.4 million and state net operating loss carryforwards of approximately $1.0 million, which begin expiring in varying amounts from 2022 through 2017 if unused. Under Sections 382 and 383 of the Internal Revenue Code of 1986, as amended, if a corporation undergoes an “ownership change,” the corporation’s ability to use its pre-change net operating loss carryforwards and other pre-change tax attributes, such as research tax credits, to offset its post-change income and taxes may be limited. In general, an “ownership change” occurs if there is a cumulative change in our ownership by “5% shareholders” that exceeds 50 percentage points over a rolling three-year period. Similar rules may apply under state tax laws. We may have undergone prior ownership changes, and we may undergo ownership changes in the future, which may result in limitations on our net operating loss carryforwards and other tax attributes. Any such limitations on our ability to use our net operating loss carryforwards and other tax attributes could adversely impact our business, financial condition and results of operations.

IV. Risks Related to Our Intellectual Property

Intellectual property infringement claims may be costly to resolve and could divert management attention.

Other companies may hold or obtain patents on inventions or may otherwise claim proprietary rights to technology necessary to our business. The markets in which we compete are comprised of competitors that in some cases hold substantial patent portfolios covering aspects of products that could be similar to ours. We could become subject to claims that we are infringing patent, trademark, copyright or other proprietary rights of others. We have in the past been involved in lawsuits alleging patent infringement, and could in the future be involved in similar litigation. For example, we entered into a settlement agreement with Sumitomo in 2011 to settle its claim of patent infringement, which resulted in AXT paying them royalties.

If we are unable to protect our intellectual property, including our non-patented proprietary process technology, we may lose valuable assets or incur costly litigation.

We rely on a combination of patents, copyrights, trademarks, trade secrets and trade secret laws, non-disclosure agreements and other intellectual property protection methods to protect our proprietary technology. We believe that our internal, non-patented proprietary process technology methods, systems and processes are a valuable and critical element of our intellectual property. We must establish and maintain safeguards to avoid the theft of these processes. Our ability to establish and maintain a position of technology leadership also depends on the skills of our development personnel. Despite our efforts to protect our intellectual property, third parties can develop products or processes similar to ours. Our means of protecting our proprietary rights may not be adequate, and our competitors may independently develop similar technology, duplicate our products or design around our patents. We believe that at least two of our competitors

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ship GaAs substrates produced using a process similar to our VGF process. Our competitors may also develop and patent improvements to the VGF technology upon which we rely, and thus may limit any exclusivity we enjoy by virtue of our patents or trade secrets.

It is possible that pending or future United States or foreign patent applications made by us will not be approved, that our issued patents will not protect our intellectual property, or that third parties will challenge our ownership rights or the validity of our patents. In addition, the laws of some foreign countries may not protect our proprietary rights to as great an extent as do the laws of the United States and it may be more difficult to monitor the use of our intellectual property. Our competitors may be able to legitimately ascertain non-patented proprietary technology embedded in our systems. If this occurs, we may not be able to prevent the development of technology substantially similar to ours.

We may have to resort to costly litigation to enforce our intellectual property rights, to protect our trade secrets or know-how or to determine their scope, validity or enforceability. Enforcing or defending our proprietary technology is expensive, could cause us to divert resources and may not prove successful. Our protective measures may prove inadequate to protect our proprietary rights, and if we fail to enforce or protect our rights, we could lose valuable assets.

V. Risks Related to Compliance, Other Legal and Administrative Matters

If we fail to comply with environmental and safety regulations, we may be subject to significant fines or forced to cease our operations; in addition, we could be subject to suits for personal injuries caused by hazardous materials.

We are subject to federal, state and local environmental and safety laws and regulations in all of our operating locations, including laws and regulations of China, such as laws and regulations related to the development, manufacture and use of our products, the use of hazardous materials, the operation of our facilities, and the use of our real property. These laws and regulations govern the use, storage, discharge and disposal of hazardous chemicals during manufacturing, research and development, and sales demonstrations. If we fail to comply with applicable regulations, we could be subject to substantial liability for clean-up efforts, personal injury, fines or suspension or be forced to cease our operations, and/or suspend or terminate the development, manufacture or use of certain of our products, the use of our facilities, or the use of our real property, each of which could have a material adverse effect on our business, financial condition and results of operations.

In addition, from time to time, the Chinese government issues new regulations, which may require additional actions on our part to comply. On February 27, 2015, the China State Administration of Work Safety updated its list of hazardous substances. The previous list, which was published in 2002, did not restrict the materials that we use in our wafers. The new list added gallium arsenide. As a result of the newly published list, we were instructed to obtain a permit to continue to manufacture our gallium arsenide substrate wafers. The Beijing municipal authority accepted our permit application in May 2015, but has not yet issued to us the requisite permit while we continue to make preparations in good faith to eventually relocate our gallium arsenide production. If our application is denied in the future, then our gallium arsenide production could be disrupted, which could materially and adversely impact our results of operations and our financial condition.

For example, in 2005, a complaint was filed against us alleging personal injury, general negligence, intentional tort, wage loss and other damages, including punitive damages, as a result of exposure of plaintiffs to high levels of gallium arsenide in gallium arsenide wafers, and methanol. Other current and/or former employees could bring litigation against us in the future. Although we have put in place engineering, administrative and personnel protective equipment programs to address these issues, our ability to expand or continue to operate our present locations could be restricted or we could be required to acquire costly remediation equipment or incur other significant expenses if we

were found liable for failure to comply with environmental and safety regulations. Existing or future changes in laws or regulations in the United States and China may require us to incur significant expenditures or liabilities, or may restrict our operations. In addition, our employees could be exposed to chemicals or other hazardous materials at our facilities and we may be subject to lawsuits seeking damages for wrongful death or personal injuries allegedly caused by exposure to chemicals or hazardous materials at our facilities.

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Litigation is inherently uncertain and while we would expect to defend ourselves vigorously, it is possible that our business, financial condition, results of operations or cash flows could be affected in any particular period by litigation pending and any additional litigation brought against us. In addition, future litigation could divert management's attention from our business and operations, causing our business and financial results to suffer. We could incur defense or settlement costs in excess of the insurance covering these litigation matters, or that could result in significant judgments against us or cause us to incur costly settlements, in excess of our insurance limits.

We are subject to internal control evaluations and attestation requirements of Section 404 of the Sarbanes Oxley Act.

Pursuant to Section 404 of the Sarbanes Oxley Act of 2002, we must include in our Annual Report on Form 10-K a report of management on the effectiveness of our internal control over financial reporting. Ongoing compliance with this requirement is complex, costly and time-consuming. If: (1) we fail to maintain effective internal control over financial reporting; or (2) our management does not timely assess the adequacy of such internal control, we could be subject to regulatory sanctions and the public's perception of us may be adversely impacted.

We need to continue to improve or implement our systems, procedures and controls.

We rely on certain manual processes for data collection and information processing, as do our joint venture companies. If we fail to manage these procedures properly or fail to effectively manage a transition from manual processes to automated processes, our systems and controls may be disrupted. To manage our business effectively, we may need to implement additional management information systems, further develop our operating, administrative, financial and accounting systems and controls, add experienced senior level managers, and maintain close coordination among our executive, engineering, accounting, marketing, sales and operations organizations.

Item 1B. Unresolved Staff Comments

None.

Item 2. Properties

Our principal properties as of February 27, 2017 are as follows:

Location	Square Feet	Principal Use	Ownership
Fremont, CA	19,467	Administration	Operating lease, expires November 2017
Beijing, China	300,000	Production and Administration	Owned by AXT / Tongmei
Xianxi, China	56,500	Production	Owned by Beijing JiYa Semiconductor Material, Co., Ltd.*
Xianxi, China	7,500	Administration	Owned by Beijing JiYa Semiconductor Material, Co., Ltd.*
Beijing, China	1,500	Administration	Operating lease by Beijing JiYa Semiconductor Material, Co., Ltd., expires March 2017

Nanjing, China	22,000	Production	Owned by Nanjing Jin Mei Gallium Co., Ltd.*
Nanjing, China	5,700	R&D and Administration	Owned by Nanjing Jin Mei Gallium Co., Ltd.*
Nanjing, China	3,900	Production	Owned by Nanjing Jin Mei Gallium Co., Ltd.*
Beijing, China	14,720	Production	Owned by BoYu Semiconductor Vessel Craftwork Technology Co., Ltd.*
Beijing, China	7,600	Production and Administration	Operating leases by BoYu Semiconductor Vessel Craftwork Technology Co., Ltd., expire in various terms until June 2018.*

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*Joint ventures in which we hold an interest and consolidate in our financial statements. We hold a 46% interest in Beijing JiYa Semiconductor Material Co., Ltd., a 83% interest in Nanjing Jin Mei Gallium Co., Ltd., and a 70% interest in Beijing BoYu Semiconductor Vessel Craftwork Technology Co., Ltd.

We consider each facility to be in good operating condition and adequate for its present use, and believe that each facility has sufficient plant capacity to meet its current and anticipated operating requirements.

Item 3. Legal Proceedings

From time to time we may be involved in judicial or administrative proceedings concerning matters arising in the ordinary course of business. We do not expect that any of these matters, individually or in the aggregate, will have a material adverse effect on our business, financial condition, cash flows or results of operation.

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 has been trading publicly on the NASDAQ Global Select Market (NASDAQ) under the symbol “AXTI” since May 20, 1998, the date we consummated our initial public offering, and beginning on January 3, 2011, our common stock began trading on the NASDAQ Global Select Market under the same symbol. The following table sets forth the range of high and low sales prices of the common stock for the periods indicated, as reported by NASDAQ.

	High	Low
2016		
First Quarter	$ 2.97	$ 2.28
Second Quarter	$ 3.92	$ 2.49
Third Quarter	$ 5.21	$ 3.12
Fourth Quarter	$ 5.97	$ 4.35
2015		
First Quarter	$ 3.05	$ 2.36
Second Quarter	$ 2.70	$ 2.22
Third Quarter	$ 2.59	$ 1.91
Fourth Quarter	$ 2.70	$ 1.90

As of February 27, 2017, there were 66 holders of record of our common stock. Because many shares of AXT's common stock are held by brokers and other institutions on behalf of stockholders, we are unable to estimate the total number of beneficial owners of our common stock.

We have never paid or declared any cash dividends on our common stock and do not anticipate paying cash dividends in the foreseeable future. Dividends accrue on our outstanding Series A preferred stock at the rate of $0.20 per annum per share of Series A preferred stock, and must be paid before any dividend is paid on our common stock. The 883,000 shares of Series A preferred stock issued and outstanding as of December 31, 2016 are valued at $3,532,000 and are non-voting and non-convertible preferred stock with a 5.0% cumulative annual dividend rate payable when declared by our board of directors, and a $4.00 per share liquidation preference over common stock that must be paid before any distribution is made to the holders of our common stock. These shares of preferred stock were issued to shareholders of Lyte Optronics, Inc. in connection with the completion of our acquisition of Lyte Optronics, Inc. on May 28, 1999.

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Issuer Purchases of Equity Securities

On February 21, 2013, our Board of Directors approved a stock repurchase program pursuant to which we could repurchase up to $6.0 million of our outstanding common stock through February 27, 2014. The purchases could be made from time to time in the open market and were to be funded from our existing cash balances and cash generated from operations. During 2013, we repurchased approximately 285,000 shares at an average price of $2.52 per share for a total purchase price of $716,000 under the stock repurchase program. As of December 31, 2013, approximately $5.3 million remained available for future repurchases under this program. No shares were repurchased in 2014 under this program and the plan expired on February 27, 2014.

On October 27, 2014, our Board of Directors approved a stock repurchase program pursuant to which we may repurchase up to $5.0 million of our outstanding common stock. These repurchases can be made from time to time in the open market and are funded from our existing cash balances and cash generated from operations. During 2015, we repurchased approximately 908,000 shares at an average price of $2.52 per share for a total purchase price of approximately $2.3 million under the stock repurchase program. No shares were repurchased during 2016 under this program. As of December 31, 2016, approximately $2.7 million remained available for future repurchases under this program.

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Comparison of Stockholder Return

Set forth below is a line graph comparing the annual percentage change in the cumulative total return to the stockholders of the Company on our common stock with the CRSP Total Return Index for the Nasdaq Stock Market (U.S. Companies) and the Nasdaq Electronic Components Index for the period commencing December 31, 2011 and ending December 31, 2016.

	12/11	12/12	12/13	12/14	12/15	12/16
AXT, Inc.	100	67.39	62.59	67.15	59.47	115.11
NASDAQ Composite	100	116.41	165.5	189	200.32	216.54
NASDAQ Electronic Components	100	99.13	142.52	186.42	183.01	236.19

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Item 6. Selected Consolidated Financial Data

The following selected consolidated financial data is derived from and should be read in conjunction with our consolidated financial statements and related notes set forth in Item 8 below, and in our previously filed reports on Form 10 K. See also Item 7. “Management’s Discussion and Analysis of Financial Condition and Results of Operations” for further information relating to items reflecting our results of operations and financial condition.

	Year Ended December 31,				
	2016	2015	2014	2013	2012
	(in thousands, except per share data)				
Statements of Operations Data:					
Revenue	$ 81,349	$ 77,502	$ 83,499	$ 85,335	$ 88,374
Cost of revenue	54,968	60,673	66,332	73,507	63,522
Gross profit	26,381	16,829	17,167	11,828	24,852
Operating expenses:					
Selling, general and administrative	13,880	16,064	14,970	16,066	15,419
Research and development	5,850	5,664	4,144	3,424	3,468
Restructuring charge	226	—	907	—	—
Total operating expenses	19,956	21,728	20,021	19,490	18,887
Income (loss) from operations	6,425	(4,899)	(2,854)	(7,662)	5,965
Interest income, net	409	412	483	408	518
Equity in earnings (loss) of unconsolidated joint ventures	(1,995)	462	1,528	1,377	1,281
Other income (expense), net	860	2,023	361	(748)	(761)
Income (loss) before provision for income taxes	5,699	(2,002)	(482)	(6,625)	7,003
Provision for income taxes	733	531	215	188	853
Net income (loss)	4,966	(2,533)	(697)	(6,813)	6,150
Less: Net (income) loss attributable to noncontrolling interests	670	305	(691)	(1,145)	(3,040)
Net income (loss) attributable to AXT, Inc.	$ 5,636	$ (2,228)	$ (1,388)	$ (7,958)	$ 3,110
Net income (loss) attributable to AXT, Inc. per common share:					
Basic	$ 0.17	$ (0.07)	$ (0.05)	$ (0.25)	$ 0.09
Diluted	$ 0.17	$ (0.07)	$ (0.05)	$ (0.25)	$ 0.09
Shares used in per share calculations:					
Basic	32,139	32,183	32,452	32,700	32,144
Diluted	32,894	32,183	32,452	32,700	32,865

	December 31,				
	2016	2015	2014	2013	2012
	(in thousands)				
Balance Sheet Data:					
Cash and cash equivalents	$ 36,152	$ 24,875	$ 28,814	$ 24,961	$ 30,634
Investments	17,571	19,128	20,123	22,644	19,461

Working capital	94,236	84,047	88,422	84,114	93,376
Total assets	154,246	151,896	161,517	163,822	167,589
Current liabilities	13,050	12,841	14,771	15,426	13,096
Long-term debt, net of current portion	—	—	—	—	—
Stockholders' equity	140,291	137,561	144,688	145,546	150,914

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Item 7. Management's Discussion and Analysis of Financial Condition and Results of Operations

In addition to historical information, the following discussion contains forward looking statements that are subject to risks and uncertainties. Actual results may differ substantially from those referred to herein due to a number of factors, including but not limited to risks described in the section entitled Item 1A. "Risk Factors" and elsewhere in this Annual Report. This discussion should be read in conjunction with Item 6. "Selected Consolidated Financial Data" and our consolidated financial statements and related notes included elsewhere in this Form 10-K.

Restructuring Charges

On February 25, 2014, we announced a restructuring plan with respect to our wholly-owned subsidiary, Beijing Tongmei Xtal Technology Co, Ltd., or Tongmei, in order to better align manufacturing capacity with demand. Under the restructuring plan, Tongmei implemented certain workforce reductions with respect to its manufacturing facility in China. We reduced the workforce at Tongmei by approximately 93 positions that were no longer required to support production and operations, or approximately 11 percent of our workforce. We recorded a restructuring charge of approximately $907,000 related to the reduction in force for severance-related expenses.

In the second quarter of 2016, we restructured the operations of Beijing JiYa Semiconductor Material Co., Ltd., one of our partially owned consolidated subsidiaries, which resulted in a reduction in force of 28 positions that were no longer required to support production and operations. Accordingly, we recorded a restructuring charge of approximately $226,000 related to the reduction in force for severance-related expenses. As of June 30, 2016, we had completed this restructuring plan and the reduction in force.

Critical Accounting Policies and Estimates

We prepare our consolidated financial statements in accordance with accounting principles generally accepted in the United States of America. Accordingly, we make estimates, assumptions and judgments that affect the amounts reported on our consolidated financial statements. These estimates, assumptions and judgments about future events and their effects on our results cannot be determined with certainty, and are made based upon our historical experience and on other assumptions that are believed to be reasonable under the circumstances. These estimates may change as new events occur or additional information is obtained, and we may periodically be faced with uncertainties, the outcomes of which are not within our control and may not be known for a prolonged period of time.

We have identified the policies below as critical to our business operations and understanding of our financial condition and results of operations. Critical accounting policies are material to the presentation of our consolidated financial statements and require us to make difficult, subjective or complex judgments that could have a material effect on our financial condition and results of operations. They may require us to make assumptions about matters that are highly uncertain at the time of the estimate. Different estimates that we could have used, or changes in the estimate that are reasonably likely to occur, may have a material impact on our financial condition or results of operations. We also refer you to Note 1 to our consolidated financial statements included elsewhere in this Form 10-K.

Revenue Recognition

We manufacture and sell high-performance compound semiconductor substrates including indium phosphide, semi-conducting and semi-insulating gallium arsenide and germanium wafers, and our three consolidated subsidiaries sell certain raw materials including 99.99% pure gallium (4N Ga), high purity gallium (7N Ga), pyrolytic boron nitride (pBN) crucibles and boron oxide (B2O3). After we ship our products, there are no remaining obligations or customer acceptance requirements that would preclude revenue recognition. Our products are typically sold pursuant

to a purchase order placed by our customers, and our terms and conditions of sale do not require customer acceptance. We recognize revenue upon shipment and transfer of title of products to our customers, which is either upon shipment from our dock, receipt at the customer's dock, or removal from consignment inventory at the customer's location, provided that we have received a valid purchase order, the price is fixed or determinable, title and risk of ownership have transferred, collection of resulting receivables is probable, and product returns are reasonably estimable. We do not provide training, installation or commissioning services.

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We provide for future returns based on historical experience, current economic trends and changes in customer demand at the time revenue is recognized.

Accounts Receivable, Allowance for Doubtful Accounts and Allowance for sales returns

We periodically review the likelihood of collection on our accounts receivable balances and provide an allowance for doubtful accounts receivable primarily based upon the age of these accounts. We evaluate receivables from U.S. customers with an emphasis on balances in excess of 90 days and for receivables from customers located outside the U.S. with an emphasis on balances in excess of 120 days and establish a reserve on the receivable balances if needed. The reason for the difference in the evaluation of receivables between foreign and U.S. customers is that U.S. customers have historically made payments in a shorter period of time than foreign customers. Foreign business practices generally require us to allow customer payment terms that are longer than those accepted in the United States. We assess the probability of collection based on a number of factors, including the length of time a receivable balance has been outstanding, our past history with the customer and their creditworthiness.

As of December 31, 2016 and 2015, our accounts receivable, net balance was $14.5 million and $18.5 million, respectively, which was net of an allowance for doubtful accounts of $653,000 and $561,000, respectively. During 2016, we increased this allowance for doubtful accounts by $92,000 due to the poor financial condition of a few customers. During 2015, we increased this allowance for doubtful accounts by $151,000 primarily because of the poor financial condition of a few customers partially offset by recoveries. No amounts have been written off. If actual uncollectible accounts differ substantially from our estimates, revisions to the estimated allowance for doubtful accounts would be required, which could have a material impact on our financial results for future periods.

The allowance for sales returns is also deducted from gross accounts receivable. During 2016, we utilized $360,000 and charged an additional $296,000 resulting in the ending balance of allowance for sales returns of $360,000 as of December 31, 2016. During 2015, we utilized $423,000 and charged an additional $434,000 resulting in the ending balance of allowance for sales returns of $424,000 as of December 31, 2015.

Warranty Reserve

We maintain a warranty reserve based upon our claims experience during the prior twelve months and any pending claims and returns of which we are aware. Warranty costs are accrued at the time revenue is recognized. As of December 31, 2016 and 2015, accrued product warranties totaled $251,000 and $497,000, respectively. The decrease in accrued product warranties is primarily attributable to decreased claims for quality issues experienced by customers. If actual warranty costs or pending new claims differ substantially from our estimates, revisions to the estimated warranty liability would be required, which could have a material impact on our financial condition and results of operations for future periods.

Inventory Valuation

Inventories are stated at the lower of cost (approximated by standard cost) or market. Cost is determined using the weighted average cost method. Our inventory consists of raw materials as well as finished goods and work-in-process that include material, labor and manufacturing overhead costs. We routinely evaluate the levels of our inventory in light of current market conditions in order to identify excess and obsolete inventory, and we provide a valuation allowance for certain inventories based upon the age and quality of the product and the projections for sale of the completed products. As of December 31, 2016 and 2015, we had an inventory reserve of $12.0 million and $12.0 million, respectively, for excess and obsolete inventory and $254,000 and $625,000, respectively, for lower of cost or market reserves. If actual demand for our products were to be substantially lower than estimated, additional inventory adjustments for excess or obsolete inventory might be required, which could have a material impact on our business,

financial condition and results of operations.

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Impairment of Investments

We classify marketable investments in debt and equity securities as available-for-sale securities in accordance with ASC topic 320, Investments—Debt and Equity Securities ("ASC 320"). All available-for-sale securities with a quoted market value below cost (or adjusted cost) are reviewed in order to determine whether the decline is other-than-temporary. Factors considered in determining whether a loss is temporary include the magnitude of the decline in market value, the length of time the market value has been below cost (or adjusted cost), credit quality, and our ability and intent to hold the securities for a period of time sufficient to allow for any anticipated recovery in market value.

We also invest in equity instruments of privately-held companies in China for business and strategic purposes. Investments in our non-consolidated joint venture companies are classified as other assets and accounted for under either the equity or cost method, depending on whether we have the ability to exercise significant influence over their operations or financial decisions. We monitor our investments for impairment and record reductions in carrying value when events or changes in circumstances indicate that the carrying value may not be recoverable. Determination of impairment is highly subjective and is based on a number of factors, including an assessment of the strength of the subsidiary's management, the length of time and extent to which the fair value has been less than our cost basis, the financial condition and near-term prospects of the subsidiary, fundamental changes to the business prospects of the subsidiary, share prices of subsequent offerings, and our intent and ability to hold the investment for a period of time sufficient to allow for any anticipated recovery in our carrying value. We had no write downs in 2016, 2015 and 2014.

Fair Value of Investments

ASC topic 820, Fair Value Measurement ("ASC 820") establishes three levels of inputs that may be used to measure fair value.

Level 1 instruments represent quoted prices in active markets. Therefore, determining fair value for Level 1 instruments does not require significant management judgment, and the estimation is not difficult.

Level 2 instruments include observable inputs other than Level 1 prices, such as quoted prices for similar instruments in markets with insufficient volume or infrequent transactions (less active markets), issuer bank statements, credit ratings, non-binding market consensus prices that can be corroborated with observable market data, model-derived valuations in which all significant inputs are observable or can be derived principally from or corroborated with observable market data for substantially the full term of the assets or liabilities, or quoted prices for similar assets or liabilities. These Level 2 instruments require more management judgment and subjectivity compared to Level 1 instruments, including:

- Determining which instruments are most comparable to the instrument being priced requires management to identify a sample of similar securities based on the coupon rates, maturity, issuer, credit rating, and instrument type, and subjectively select an individual security or multiple securities that are deemed most similar to the security being priced.
- Determining which model-derived valuations to use in determining fair value requires management judgment. When observable market prices for similar securities or similar securities are not available, we price our marketable debt instruments using non-binding market consensus prices that are corroborated with observable market data or pricing models, such as discounted cash flow models, with all significant inputs derived from or corroborated with observable market data.

Level 3 instruments include unobservable inputs to the valuation methodology that are significant to the measurement of fair value of assets or liabilities. The determination of fair value for Level 3 instruments requires the most management judgment and subjectivity.

We place short-term foreign currency hedges that are intended to offset the potential cash exposure related to fluctuations in the exchange rate between the United States dollar and Japanese yen. We measure the fair value of these foreign currency hedges at each month end and quarter end using current exchange rates and in accordance with

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generally accepted accounting principles. At quarter end any foreign currency hedges not settled are netted in "accrued liabilities" on the consolidated balance sheet and classified as Level 3 assets and liabilities. As of December 31, 2016 and 2015, the net change in fair value from the placement of the hedge to settlement at each month end during the quarter had a de minimis impact to the consolidated results.

Impairment of Long-Lived Assets

We evaluate the recoverability of property, equipment and intangible assets in accordance with ASC topic 360, Property, Plant and Equipment ("ASC 360"). When events and circumstances indicate that long-lived assets may be impaired, we compare the carrying value of the long-lived assets to the projection of future undiscounted cash flows attributable to such assets. In the event that the carrying value exceeds the future undiscounted cash flows, we record an impairment charge against income equal to the excess of the carrying value over the asset's fair value. Fair values are determined based on quoted market values, discounted cash flows or internal and external appraisals, as applicable. Assets held for sale are carried at the lower of carrying value or estimated net realizable value. We had no "Assets held for sale" on the consolidated balance sheet as of December 31, 2016 and 2015.

Stock-Based Compensation

We account for stock-based compensation in accordance with ASC topic 718, Stock-based Compensation ("ASC 718"). Share-based awards granted include stock options and restricted stock awards. We utilize the Black Scholes option pricing model to estimate the grant date fair value of stock options, which requires the input of highly subjective assumptions, including estimating stock price volatility and expected term. Historical volatility of our stock price was used while the expected term for our options was estimated based on historical option exercise behavior and post-vesting forfeitures of options, and the contractual term, the vesting period and the expected term of the outstanding options. Further, we apply an expected forfeiture rate in determining the amount of share-based compensation. We use historical forfeitures to estimate the rate of future forfeitures. Changes in these inputs and assumptions can materially affect the measure of estimated fair value of our stock compensation. The cost of restricted stock awards is determined using the fair value of our common stock on the date of grant.

We recognize the compensation costs net of an estimated forfeiture rate over the requisite service period of the options award, which is generally the vesting term of four years. Compensation expense for restricted stock awards is recognized over the vesting period, which is generally one, three or four years. Stock-based compensation expense is recorded in cost of revenue, research and development, and selling, general and administrative expenses. (see Note 1—Summary of Significant Accounting Policies—Stock Based Compensation).

Income Taxes

We account for income taxes in accordance with ASC topic 740, Income Taxes ("ASC 740"), which requires that deferred tax assets and liabilities be recognized using enacted tax rates for the effect of temporary differences between the book and tax bases of recorded assets and liabilities. ASC 740 also requires that deferred tax assets be reduced by a valuation allowance if it is more likely than not that a portion of the deferred tax asset will not be realized.

We provide for income taxes based upon the geographic composition of worldwide earnings and tax regulations governing each region, particularly China. The calculation of tax liabilities involves significant judgment in estimating the impact of uncertainties in the application of complex tax laws, particularly in foreign countries such as China.

See Note 13—"Income Taxes" in the consolidated financial statements for additional information.

Results of Operations

Overview

We were founded in 1986 to commercialize and enhance our proprietary vertical gradient freeze (VGF) technology for producing high-performance compound semiconductor substrates or wafers. We have one operating

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segment and two product lines: specialty material substrates and raw materials used to make such substrates or other related products. We recorded our first substrate sales in 1990 and our substrate products currently include indium phosphide (InP), gallium arsenide (GaAs) and germanium (Ge) substrates used to produce semiconductor devices for use in applications such as fiber optic and wireless telecommunications, light emitting diodes (LEDs), lasers and for solar cells for space and terrestrial photovoltaic applications. We also sell raw materials, including gallium and germanium, through our participation in majority and minority owned subsidiaries and joint ventures.

Operating Results

We manufacture all of our products in the People's Republic of China (PRC or China), which generally has favorable costs for facilities and labor compared with comparable facilities in the United States, Europe or Japan. Our supply chain includes partial ownership of 10 companies in China (joint ventures). We believe this supply chain arrangement provides us with pricing advantages, reliable supply and enhanced sourcing lead-times for key raw materials which are central to our final manufactured products.

Our annual revenue declined for four consecutive years during the period from 2012 to 2015. Our annual revenue increased in 2016 by 5 percent. The period of decline was primarily a result of silicon chips replacing GaAs chips in the mobile phone switching function. Before 2012, silicon chips did not perform adequately in this function due to power consumption, heat and speed issues. The development of the silicon-on-insulator technique overcame these deficiencies and provided a lower cost solution for mobile phone switches and our annual revenue declined from $104 million in 2011 to $88 million in 2012. The decline in GaAs revenue was partially mitigated by revenue growth in our InP wafers. We believe our product and customer diversity also mitigated the decline in revenue. In 2016 GaAs revenue increased, as did revenue of all of our substrate material revenue. However, this increase was partially offset by a decrease in revenue from our raw materials product line.

In the first quarter of 2014, we reduced our work force by approximately 11% and embarked on a number of additional cost reduction programs, primarily in our substrate manufacturing, which has the highest costs as compared to research and development or selling and administrative expenses. In 2015, we invested in wafer manufacturing equipment to increase automation and decrease the number of manually operated processing steps in our production flow. We believe this can improve our manufacturing yields, product quality and product consistency. In addition to revenue growth in 2016, we also increased our gross margins as a result of increased yields and manufacturing efficiencies. We intend to continue to focus on InP substrates as we believe InP can continue to be an engine for growth if, for example, the data center expansion and upgrade cycle begins. We are also investing in six-inch low defect density ("low EPD") GaAs substrates that are required for 3D-Sensing using vertical cavity surface emitting lasers ("VCSELs"). In the second quarter of 2016, we implemented a cost reduction program and reduced our workforce by 28 positions.

Revenue

	Years Ended Dec. 31			2015 to 2016 Increase		2014 to 2015 Increase	
	2016	2015	2014	(Decrease)	% Change	(Decrease)	% Change
Product Type:							
Substrates	$ 65,633	$ 58,220	$ 60,178	$ 7,413	12.7 %	$ (1,958)	(3.3) %
Raw Materials and Others	15,716	19,282	23,321	(3,566)	(18.5) %	(4,039)	(17.3) %
Total revenue	$ 81,349	$ 77,502	$ 83,499	$ 3,847	5.0 %	$ (5,997)	(7.2) %

Revenue increased $3.8 million, or 5.0% in 2016 from $77.5 million in 2015. The $7.4 million increase in substrate sales was partially offset by the decrease of our raw material sales from our consolidated subsidiaries. The average selling price of each type of wafer was unchanged or it declined. The revenue increase is the result of higher unit volume and a shift towards wafers with higher selling prices. Raw material sales decreased by $3.6 million or 18.5%, partially offsetting the increase in our substrate product line. The decline of raw material sales is the result of decreasing average selling prices of both raw gallium and purified gallium by 29% while quantity sold remains consistence, which were partially offset by the increase of average selling price of pBN.

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Revenue decreased $6.0 million, or 7.2%, to $77.5 million in 2015 from $83.5 million in 2014. In particular, our sales of GaAs substrate materials that are used to produce LEDs declined by $6.3 million. The LED market encountered severe pricing pressure and we withdrew from the lower performance segment of the LED market. We also experienced a slowdown in the satellite solar cell market, which resulted in an additional decline in the sale of Ge substrate materials of $2.5 million. In addition, in 2015 raw material sales decreased approximately $4.0 million due to a reduction of the average selling price of gallium. These declines were partially offset by our sales of InP substrate materials used in the production of passive optical networks (PONs) for fiber-to-the-home and office networks in the amount of $7.3 million.

Revenue by Geographic Region

	Year Ended Dec. 31,			2015 to 2016 Increase		2014 to 2015 Increase	
	2016	2015	2014	(Decrease)	% Change	(Decrease)	% Change
	($ in thousands)						
Europe (primarily Germany)	$ 18,637	$ 19,518	$ 21,535	$ (881)	(4.5) %	$ (2,017)	(9.4) %
% of total revenue	23 %	25 %	26 %				
China	17,448	13,728	17,451	3,720	27.1 %	(3,723)	(21.3) %
% of total revenue	21 %	18 %	21 %				
Japan	11,015	9,138	11,550	1,877	20.5 %	(2,412)	(20.9) %
% of total revenue	14 %	11 %	14 %				
Asia Pacific (excluding China, Taiwan and Japan)	10,796	11,482	11,207	(686)	(6.0) %	275	2.5 %
% of total revenue	13 %	15 %	13 %				
Taiwan	15,369	13,799	11,464	1,570	11.4 %	2,335	20.4 %
% of total revenue	19 %	18 %	14 %				
North America (primarily the United States)	8,084	9,837	10,292	(1,753)	(17.8) %	(455)	(4.4) %
% of total revenue	10 %	13 %	12 %				
Total revenue	$ 81,349	$ 77,502	$ 83,499	$ 3,847	5.0 %	$ (5,997)	(7.2) %

Sales to customers located outside of North America represented approximately 90%, 87% and 88% of our revenue during 2016, 2015 and 2014, respectively.

Revenue from customers in China increased by 27.1% in 2016, primarily due to increased sales of Ge substrates used in the satellite solar cell market as compared to 2015. In addition, InP substrate sales used in fiber-to-the-home and

office networks grew in China, although the growth did slow in the second half of 2016. Increased revenues in China from these markets were offset by decreased sales of GaAs substrates used for LED applications. Further, our revenue from the sale of raw materials in China also declined. Revenue from customers in Japan increased in 2016 by 20.5% due to increased substrate sales which was partially offset by the decrease of raw materials sales. Revenue from customers in Europe decreased by 4.5% primarily due to decreased demand from the sales of raw materials. Revenue from customers in Taiwan increased by 11.4% primarily due to increased demand from two customers that perform a foundry service for epitaxial growth, a process step required on all of our wafers before they can be sold to chip and optical companies. Revenue from customers in Asia Pacific declined modestly by 6.0% due to a lower volume of substrate sales. Revenue from customers in North America decreased by 17.8% due to decreased sales from both substrates and raw materials.

In 2015, revenue from customers in China decreased by 21.3% primarily due to decreased sales of GaAs substrates for LED applications and lower sales of raw materials. Revenue from customers in Japan decreased by 20.9% primarily due to decreased sales to a customer that performs a foundry service for epitaxial growth that terminated its epi processing business. In addition, the Japanese yen further weakened against the dollar in 2015. Revenue from customers in Europe decreased by 9.4% primarily due to decreased sales of substrates used in solar cells and optical sensors applications. Revenue from customers in Taiwan increased by 20.4%, primarily due to increased demand from two customers that perform a foundry service for epitaxial growth. In aggregate, our 2015 decrease in revenue was partially

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offset by the increased demand for our InP substrates in all regions as a result of expanding applications in the marketplace, such as fiber optic lasers and data connectivity.

Gross Margin

	Year Ended Dec. 31,			2015 to 2016 Increase		2014 to 2015	
	2016	2015	2014	(Decrease)	% Change	(Decrease)	% Change
	($ in thousands)						
Gross profit	$ 26,381	$ 16,829	$ 17,167	$ 9,552	56.8 %	$ (338)	(2.0) %
Gross Margin %	32.4 %	21.7 %	20.6 %				

Gross margin increased to 32.4% of total revenue in 2016 from 21.7% of total revenue in 2015. Gross margin increased in 2016 as a result of an increase in gross margins from sales of both substrates and raw materials. Substrate gross margin increased to 34.7% of substrate revenue in 2016 from 23.2% of revenue in 2015 and raw materials gross margin increased to 23.0% of raw materials revenue in 2016 from 17.1% of raw materials revenue in 2015. Gross margin increased primarily due to improvements in yields, manufacturing efficiencies, higher production volumes and the sale of an increased number of InP substrates used in optical applications, such as passive optical networks.

Gross margin increased to 21.7% of total revenue in 2015 from 20.6% of total revenue in 2014. Gross margin increased primarily due to a change in product mix, lower material costs and the continuation of a company-wide cost-saving campaign, which was first implemented in 2014. The 2015 quarterly gross margins for the first quarter to the fourth quarter were 23.7%, 20.9%, 25.1% and 17.1%, respectively. In the fourth quarter of 2015 our gross margin declined from the previous quarter as a result of a lower-of-cost-or-market inventory write down at one of our consolidated subsidiaries due to a decline of the market price of gallium.

Selling, General and Administrative Expenses

	Years Ended Dec. 31			2015 to 2016 Increase		2014 to 2015 Increase	
	2016	2015	2014	(Decrease)	% Change	(Decrease)	% Change
	($ in thousands)						
Selling, general and administrative expenses	$ 13,880	$ 16,064	$ 14,970	$ (2,184)	(13.6) %	$ 1,094	7.3 %
% of total revenue	17.1 %	20.7 %	17.9 %				

Selling, general and administrative expenses decreased $2.2 million, or 13.6%, to $13.9 million for 2016 compared to $16.1 million for 2015. The decrease in selling, general and administrative expenses in 2016 was primarily due to the absence of professional service fees incurred in connection with an investigation of potential related-party transactions that concluded in 2015, lower personnel-related costs, lower outside professional consulting service costs, lower stock-based compensation and a decrease in allowance for doubtful accounts. The decrease was partially offset by an increase in sales commission paid in 2016 resulting from increased revenue.

Selling, general and administrative expenses increased $1.1 million, or 7.3%, to $16.1 million for 2015 compared to $15.0 million for 2014. The increase in 2015 primarily resulted from an increase in professional services of $0.7 million related to an investigation of certain potential related-party transactions, which was completed in the second quarter of 2015, an increase in consulting services and higher stock-based compensation expenses. The increase was partially offset by lower personnel related costs and lower facilities maintenance cost resulting from the implementation of cost-saving activities.

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Research and Development Expenses

	Years Ended Dec. 31			2015 to 2016 Increase (Decrease)	% Change	2014 to 2015 Increase (Decrease)	% Change
	2016	2015	2014				
	($ in thousands)						
Research and development	$ 5,850	$ 5,664	$ 4,144	$ 186	3.3 %	$ 1,520	36.7 %
% of total revenue	7.2 %	7.3 %	5.0 %				

Research and development expenses increased $0.2 million, or 3.3%, to $5.9 million for 2016 from $5.7 million for 2015. Research and development expenses increased in 2016 primarily due to higher personnel-related costs directed towards low defect density GaAs wafers, and higher consulting expenses, which are partially offset by lower product development costs at one of our raw material subsidiaries in 2016 as compared to the same period in 2015.

Research and development expenses increased $1.5 million, or 36.7%, to $5.7 million for 2015 from $4.1 million for 2014. Research and development expenses increased primarily due to higher product development costs a one of our raw material subsidiaries, and testing costs and personnel related costs, partially offset by lower consulting expenses for product testing.

Restructuring Charges

In the second quarter of 2016, we restructured the operations of Beijing JiYa Semiconductor Material Co., Ltd., which resulted in a reduction in force of 28 positions that were no longer required to support production and operations. Accordingly, we recorded a restructuring charge of approximately $226,000 related to the reduction in force for severance-related expenses. As of June 30, 2016, we had completed this restructuring plan and the reduction in force.

In the first quarter of 2014, we reduced the workforce at Tongmei by approximately 93 positions that were no longer required to support production and operations, or approximately 11 percent of the workforce. We recorded a restructuring charge of approximately $907,000 related to the reduction in force for severance-related expenses. We had no restructuring charges in 2015.

Interest Income, Net

	Years Ended Dec. 31			2015 to 2016 Increase (Decrease)	% Change	2014 to 2015 Increase (Decrease)	% Change
	2016	2015	2014				
	($ in thousands)						
Interest income, net	$ 409	$ 412	$ 483	$ (3)	(0.7) %	$ (71)	(14.7) %
% of total revenue	0.5 %	0.5 %	0.6 %				

Interest income, net remained virtually unchanged for 2016 as compared to 2015. This small fluctuation in interest income resulted from our mix of investment securities held.

Interest income, net decreased $71,000 to $412,000 for 2015 from $483,000 for 2014. The decrease was primarily due to lower returns from our mix of investment securities held due to lower market interest rates.

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Equity in Earnings (loss) of Unconsolidated Joint Venture Companies

	Years Ended Dec. 31			2015 to 2016 Increase		2014 to 2015 Increase	
	2016	2015	2014	(Decrease)	% Change	(Decrease)	% Change
	($ in thousands)						
Equity in earnings (loss) of unconsolidated joint ventures	$ (1,995)	$ 462	$ 1,528	$ (2,457)	(531.8) %	$ (1,066)	(69.8) %
% of total revenue	(2.5) %	0.6 %	1.8 %				

Equity in earnings (loss) of unconsolidated joint ventures is primarily net income (loss) from our seven minority-owned joint venture companies that are not consolidated. Equity in earnings (loss) of unconsolidated joint ventures decreased $2.5 million to a loss of $2.0 million for 2016 from income of $0.5 million for 2015. The decrease in 2016 was a result of a sharp decline in the average selling prices of raw materials, which began in 2015.

Equity in earnings (loss) of unconsolidated joint ventures decreased $1.1 million to $462,000 for 2015 from $1.5 million for 2014 primarily due to lower net income from declining average selling prices and selling volume in the raw materials businesses.

Other Income (Expense), Net

	Years Ended Dec. 31			2015 to 2016 Increase		2014 to 2015 Increase	
	2016	2015	2014	(Decrease)	% Change	(Decrease)	% Change
	($ in thousands)						
Other income, net	$ 860	$ 2,023	$ 361	$ (1,163)	(57.5) %	$ 1,662	460.4 %
% of total revenue	1.1 %	2.6 %	0.4 %				

Other income, net decreased $1.2 million to $0.8 million for 2016 from $2.0 million for 2015 primarily due to due to a lower realized gain of $0.4 million recognized from sales of available-for-sale investments, lower foreign exchange gain of $0.5 million and a lower government subsidy received from our China subsidiary.

Other income, net increased $1.7 million to $2.0 million for 2015 from $361,000 for 2014 primarily due to a foreign exchange gain of $717,000 in 2015 as compared to a foreign exchange loss of $1.0 million in 2014 and from manufacturing subsidies received from several government agencies in China. These items were offset by a lower gain recognized from the sales of common stock of Intelligent Epitaxy Technology, Inc (“IntelliEpi”), a Taiwan publicly traded company in 2015 in which we recognized $859,000 gain as compared to 2014 in which we recognize $1.3 million gain.

Provision for Income Taxes

	Years Ended Dec. 31			2015 to 2016 Increase (Decrease)	% Change	2014 to 2015 Increase (Decrease)	% Change
	2016	2015	2014				
	($ in thousands)						
Provision for income taxes	$ 733	$ 531	$ 215	$ 202	38.0 %	$ 316	147.0 %
% of total revenue	0.9 %	0.7 %	0.3 %				

Provision for income taxes for 2016 and 2015 were $0.7 million and $0.5 million, respectively, which were mostly related to our China subsidiary and our China joint venture operations. No income taxes or benefits have been provided for U.S. operations due to the loss in the U.S. and the uncertainty of generating future profit in the U.S. which

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has resulted in our deferred tax assets being fully reserved. Our estimated tax rate can vary greatly from year to year because of the change or benefit in the mix of taxable income between our U.S. and China based operations.

Due to our uncertainty regarding our future profitability in the U.S., we recorded a full valuation allowance against our net deferred tax assets of $68 million in 2016, $66 million in 2015 and $62 million in 2014.

Noncontrolling Interests

	Years Ended Dec. 31			2015 to 2016 Increase		2014 to 2015 Increase	
	2016	2015	2014	(Decrease)	% Change	(Decrease)	% Change
	($ in thousands)						
Noncontrolling interests	$ (670)	$ (305)	$ 691	$ (365)	119.7 %	$ (996)	(144.1) %
% of total revenue	(0.8) %	(0.4) %	0.8 %				

Net loss attributable to noncontrolling interests of the three consolidated joint venture companies for the years ended December 31, 2016 and 2015 were $670,000 and $305,000, respectively, and net income attributable to noncontrolling interests for the year ended December 31, 2014 was $691,000. The downward trend in noncontrolling interest's share of earnings starting from 2014 and eventual switch to a share of losses in 2015 and 2016 was due to lower profitability from our China joint venture operations as profits from sales of raw materials have decreased due to declining average selling prices, which also led to a write down in inventory at one of the consolidated joint ventures.

Liquidity and Capital Resources

	Year Ended December 31,		
	2016	2015	2014
	($ in thousands)		
Net cash provided by (used in):			
Operating activities	$ 12,504	$ 1,878	$ 3,497
Investing activities	(1,113)	(2,483)	469
Financing activities	1,298	(2,234)	(32)
Effect of exchange rate changes	(1,412)	(1,100)	(81)
Net change in cash and cash equivalents	11,277	(3,939)	3,853
Cash and cash equivalents—beginning year	24,875	28,814	24,961
Cash and cash equivalents—end of year	36,152	24,875	28,814
Short and long-term investments—end of year	17,571	19,128	20,123
Total cash, cash equivalents and short-term and long-term investments	$ 53,723	$ 44,003	$ 48,937

We consider cash and cash equivalents, short-term investments and long-term investments as liquid and available for use within two years in our current operations. Short-term investments and long-term investments are comprised of

U.S. government securities and investment-grade corporate notes and bonds. Also included in short-term investments is our investment in common stock of IntelliEpi and GCS Holdings, Inc. (“GHI”). We began classifying IntelliEpi stock as an available-for-sale security upon its initial public offering in 2013 and sold our remaining IntelliEpi stock in the second quarter of 2015. In 2015, we re-categorized our GHI investment from the cost method to short-term investments when we determined that there was sufficient trading volume in the exchange for the stock to be determined readily marketable.

Total cash and cash equivalents, short term and long term investments increased by $9.7 million in 2016. As of December 31, 2016, our principal source of liquidity was $53.8 million, which consisted of cash and cash equivalents of $36.2 million, short-term investments of $11.4 million and long-term investments of $6.2 million. In 2016, cash and cash equivalents increased by $11.3 million and short-term and long-term investments decreased by $1.6 million. The

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increase in cash and cash equivalents of $11.3 million in 2016 was primarily due to net cash provided by operating activities of $12.5 million and net cash provided by financing activities of $1.3 million, and was partially offset by net cash used in investing activities of $1.1 million and the effect of exchange rate changes of $1.4 million. As of December 31, 2016, we and our consolidated joint ventures held approximately $22.6 million in cash and investments in foreign bank accounts. This consists of $14.5 million held by our wholly owned subsidiary in China and $8.1 million held by our three partially-owned consolidated subsidiaries in China. Of this $22.6 million, approximately $16.6 million would not be available for use in the United States without paying United States income taxes. We believe that the current value of our net operating loss carry forward would offset the taxes due.

Net cash provided by operating activities of $12.5 million for 2016 was primarily comprised of our net income of $5.0 million, an adjustment of non-cash items of depreciation of $4.9 million, loss on equity method investments of $2.0 million, stock-based compensation of $1.1 million, provision for doubtful accounts of $0.3 million, amortization of marketable securities premium of $94,000, loss on disposal property and equipment of $5,000 offset by realized gain on sales of investments of $0.4 million and a net change of $0.4 million in assets and liabilities. The $0.4 million net change in operating assets and liabilities primarily resulted from a $3.0 million increase in inventories, a $1.2 million increase in prepaid expenses and other current assets, an $0.9 million decrease in other long-term liabilities, offset by a $3.5 million decrease in accounts receivable, a $0.5 million decrease in other assets, a $0.5 million increase in accounts payable and a $0.2 million increase in accrued liabilities

Net cash provided by operating activities of $1.9 million for 2015 was primarily comprised of an adjustment of non-cash items of depreciation of $5.5 million, amortization of marketable securities premium of $218,000, stock-based compensation of $1.3 million, provision for doubtful accounts of $211,000, loss on disposal property and equipment of $17,000 offset by our net loss of $2.5 million, realized gain on sales of investments of $859,000, gain on equity investments of $462,000 and a net change of $1.6 million in assets and liabilities. The $1.6 million net change in operating assets and liabilities primarily resulted from a $1.4 million decrease in prepaid expenses and other current assets, a $542,000 decrease in other assets, offset by a $1.1 million increase in accounts receivable, a $1.1 million decrease in accrued liabilities, an $813,000 decrease in other long-term liabilities, and a $485,000 decrease in accounts payable.

Net cash provided by operating activities of $3.5 million for 2014 was primarily comprised of our net loss of $697,000, adjusted for non-cash items of depreciation and amortization of $5.6 million, stock based compensation of $1.1 million, provision for doubtful accounts of $9,000, amortization of marketable securities premium of $432,000, offset by gain on sales of investment of $1.3 million, a gain on disposal of property, plant and equipment of $13,000 and a net change of $211,000 in operating assets and liabilities. The $211,000 net change in operating assets and liabilities primarily resulted from a $479,000 decrease in inventories, a $2.4 million decrease in prepaid expenses and other current assets, a $946,000 decrease in other assets, offset by a $3.0 million increase in accounts receivable, a $979,000 decrease in accounts payable, a $742,000 increase in accrued liabilities and a $833,000 decrease in other long-term liabilities.

Net cash used in investing activities of $1.1 million for 2016 was primarily from the purchases of marketable investment securities of $11.9 million and the purchase of property, plant and equipment of $2.7 million, which were partially offset by proceeds from maturities and sales of available-for-sales securities of $13.5 million.

Net cash used in investing activities of $2.5 million for 2015 was primarily from the purchases of marketable investment securities of $12.8 million and the purchase of property, plant and equipment of $4.2 million and investment in non-marketable equity investments of $162,000, partially offset by proceeds from maturities and sales of available-for-sales securities of $14.3 million and dividends received from equity method investments of $305,000.

Net cash provided by investing activities of $469,000 for 2014 was primarily from the sale of investments totaling $13.9 million offset by the purchase of investments totaling $11.8 million and the purchase of property, plant and equipment of $2.0 million.

Net cash provided by financing activities was $1.3 million for 2016, which mainly consisted of proceeds from common stock exercised.

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Net cash used in financing activities was $2.2 million for 2015, which consisted of $2.3 million for the repurchase of the Company's common stock, including commission and fees, and $112,000 net dividends paid by our joint ventures, partially offset by net proceeds of $165,000 on the issuance of common stock pursuant to stock option exercises.

Net cash used in financing activities was $32,000 for 2014, which consisted of $166,000 net dividends paid by our consolidated joint ventures, partially offset by net proceeds of $134,000 on the issuance of common stock pursuant to stock option exercises.

On February 21, 2013, our Board of Directors approved a stock repurchase program pursuant to which we may repurchase up to $6.0 million of our outstanding common stock through February 27, 2014. These purchases can be made from time to time in the open market and are funded from our existing cash balances and cash generated from operations. During 2013, we repurchased approximately 285,000 shares at an average price of $2.51 per share for a total purchase price of $716,000 under the stock repurchase program. As of December 31, 2013, approximately $5.3 million remained available for future repurchases under this program. No shares were repurchased in 2014 under this program and the plan expired on February 27, 2014.

On October 27, 2014, our Board of Directors approved a stock repurchase program pursuant to which we may repurchase up to $5.0 million of our outstanding common stock. These repurchases can be made from time to time in the open market and are funded from our existing cash balances and cash generated from operations. During 2015, we repurchased approximately 908,000 shares at an average price of $2.52 per share for a total purchase price of approximately $2.3 million under the stock repurchase program. No shares were repurchased during 2016 under this program. As of December 31, 2016, approximately $2.7 million remained available for future repurchases under this program.

Dividends accrue on our outstanding Series A preferred stock, and are payable as and when declared by our board of directors. We have never paid or declared any dividends on the Series A preferred stock. By the terms of the Series A preferred stock, so long as any shares of Series A preferred stock are outstanding, neither the Company nor any subsidiary of the Company shall redeem, repurchase or otherwise acquire any shares of common stock, unless all accrued dividends on the Series A preferred stock have been paid. During 2013 and 2015, we repurchased shares of our outstanding common stock. As of December 31, 2015, the Series A preferred stock had cumulative dividends of $2,930,592. If we are required to pay the cumulative dividends on the Series A preferred stock, our cash and cash equivalents would be reduced. We account for the cumulative dividends on the Series A preferred stock when calculating our earnings per share, but do not classify these cumulative dividends as a liability on our consolidated balance sheet. See Item 5, Market for Registrant's Common Equity, Related Stockholder Matters and Issuer Purchases of Equity Securities in Part II.

The China central government is working with the Beijing city government to design a master development plan of the area where our manufacturing facility is located, which will result in the relocation of many of the manufacturing companies in our district. We have been asked to relocate our gallium arsenide production line. We are working with the government and are forming a plan to identify a new manufacturing site, acquire land use rights for such site, construct a facility and move our gallium arsenide production line. We intend to complete this relocation by the end of 2018 or the first half of 2019. To date, we have not completed a land use rights purchase of our new manufacturing site. We do not yet have construction bids or third party estimates for the relocation costs or construction costs of our future manufacturing facility, but we currently believe the land use rights purchase amount, relocation costs and facility construction costs will be in the range of $25 million to $35 million, but could be substantially more expensive.

We believe that we have adequate cash and investments to meet our operating needs over the next twelve months. If our sales decrease, however, our ability to generate cash from operations will be adversely affected which could adversely affect our future liquidity, require us to use cash at a more rapid rate than expected, and require us to seek additional capital. Further, while we believe we have sufficient funds for the relocation project we may still considering adding liquidity.

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On October 24, 2016, we filed with the SEC a registration statement on Form S-3, pursuant to which we may offer up to $60,000,000 of common stock, preferred stock, depositary shares, warrants, debt securities and/or units in one or more offerings and in any combination. A prospectus supplement, which we will provide each time we offer securities, will describe the specific amounts, prices and terms of the securities we determine to offer. We intend to use the net proceeds from the sale of securities under the shelf registration statement for general corporate purposes, which may include the construction of a facility for our China manufacturing operations, other capital expenditures, working capital, other corporate expenses and acquisitions of complementary products, technologies or businesses.

Cash from operations could be affected by various risks and uncertainties, including, but not limited to those set forth below under Item 1A. “Risk Factors” above.

Line of Credit

Prior to 2015, we had an unused credit facility with a bank that provided for a line of credit of $10.0 million. The line of credit was secured by marketable securities we had with the bank at that time. This line of credit was never used and there were no outstanding borrowings under this line of credit as of December 31, 2015 and 2014. This line of credit was terminated in January 2015 when we closed our investment account with this institution and moved all of our funds from this bank to a different bank.

Off-Balance Sheet Arrangements

We did not have any off-balance sheet financing arrangements and have never established any special purpose entities as defined under SEC Regulation S-K Item 303(a)(4)(ii). We have not entered into any options on non-financial assets.

Contractual Obligations

We lease certain office space, warehouse facilities and equipment under long-term operating leases expiring at various dates through December 2025. The majority of our lease obligations relate to our lease agreement for the facility in Fremont, California with approximately 19,467 square feet. Total rent expenses under these operating leases were approximately $331,000, $313,000and $260,000 for the years ended December 31, 2016, 2015 and 2014, respectively.

We entered into a royalty agreement with a competitor effective December 3, 2010 with a term of eight years, terminating December 31, 2018. We and our related companies are granted a worldwide, nonexclusive, royalty bearing, irrevocable license to certain patents for the term on the agreement. We shall pay up to $7.0 million royalty payment over eight years that began in 2011 based on future royalty bearing sales. This agreement contains a clause that allows us to claim a credit, starting in 2013, in the event that the royalty bearing sales for the year is lower than a pre-determined amount set forth in this agreement. Royalty expense under this agreement was $447,000, which was net of claim for credit of $128,000 for the year ended December 31, 2016. Royalty expense for year ended December 31, 2015 was $583,000, which was net of claim for credit of $217,000. Royalty expense for year ended December 31, 2014 was $577,000, which was net of claim for credit of $233,000.

The following table summarizes our contractual obligations as of December 31, 2016 (in thousands):

	Payments due by period				
Contractual Obligations	Total	Less than 1 year	1-3 years	4-5 years	More than 5 years
Operating leases	$ 355	$ 174	$ 65	$ 50	$ 66
Royalty agreement	1,150	575	575	—	—
Total	$ 1,505	$ 749	$ 640	$ 50	$ 66

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Selected Quarterly Results of Operations

The following table sets forth unaudited quarterly results for the eight quarters ended December 31, 2016. The information for each of these quarters is unaudited but has been prepared on the same basis as the audited consolidated financial statements. We believe that all necessary adjustments, consisting only of normal recurring adjustments, have been included in the amounts stated below to present fairly such quarterly information. The operating results for any quarter are not necessarily indicative of results for any subsequent period.

	Quarters Ended							
(in thousands, except for per share amounts)	Dec. 31, 2016	Sept. 30, 2016	June 30, 2016	Mar. 31, 2016	Dec. 31, 2015	Sept. 30, 2015	June 30, 2015	Mar. 31, 2015
Revenue	$ 20,269	$ 21,872	$ 20,495	$ 18,713	$ 18,057	$ 18,371	$ 21,010	$ 20,064
Cost of revenue	12,746	14,294	14,468	13,460	14,967	13,766	16,625	15,315
Gross profit	7,523	7,578	6,027	5,253	3,090	4,605	4,385	4,749
Operating expenses:								
Selling, general and administrative	3,774	3,313	3,419	3,374	3,379	3,659	3,775	5,251
Research and development	1,431	1,566	1,472	1,381	1,377	1,657	1,389	1,241
Restructuring charge	—	—	226	—	—	—	—	—
Total operating expenses	5,205	4,879	5,117	4,755	4,756	5,316	5,164	6,492
Income (loss) from operations	2,318	2,699	910	498	(1,666)	(711)	(779)	(1,743)
Interest income, net	106	105	100	98	105	102	108	97
Equity in earnings (loss) of unconsolidated joint ventures	(558)	(581)	(400)	(456)	(315)	167	410	200
Other income, net	178	164	328	190	268	496	626	633
Income (loss) before provision for income taxes	2,044	2,387	938	330	(1,608)	54	365	(813)
Provision for income taxes	20	176	140	397	197	7	241	86
Net income (loss)	2,024	2,211	798	(67)	(1,805)	47	124	(899)
Less: Net (income) loss attributable to noncontrolling interest	190	18	353	109	562	(5)	(127)	(125)
Net income (loss) attributable to AXT, Inc	$ 2,214	$ 2,229	$ 1,151	$ 42	$ (1,243)	$ 42	$ (3)	$ (1,024)
Net income (loss) attributable to								

AXT, Inc. per common share:								
Basic	$ 0.07	$ 0.07	$ 0.03	$ (0.00) *	$ (0.04)	$ (0.00) *	$ (0.00)	$ (0.03)
Diluted	$ 0.06	$ 0.07	$ 0.03	$ (0.00) *	$ (0.04)	$ (0.00) *	$ (0.00)	$ (0.03)
Weighted average number of common shares outstanding:								
Basic	32,431	32,110	32,020	32,002	31,951	31,988	32,242	32,553
Diluted	33,734	33,138	32,451	32,002	31,951	31,988	32,242	32,553

* Net loss to AXT, Inc. per common share resulted due to the accrual of preferred dividend liquidation preference during the three months ended September 30, 2015 and March 31, 2016.

Recent Accounting Pronouncements

Recent accounting pronouncements are detailed in Note 1 to our Consolidated Financial Statements included in this Annual Report on Form 10-K.

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Item 7A. Quantitative and Qualitative Disclosures about Market Risk

Foreign Currency Risk

A significant portion of our business is conducted in currencies other than the U.S. dollar. Foreign exchange losses have had a material adverse effect on our operating results and cash flows in the past and could have a material adverse effect on our operating results and cash flows in the future. If we do not effectively manage the risks associated with this currency risk, our revenue, cash flows and financial condition could be adversely affected. For example, during 2014, we recorded net foreign exchange losses of $1.0 million, included as part of other income (expense), net in our consolidated statements of operations. Although during 2016 and 2015, we recorded a foreign exchange gain of $232,000 and $717,000, respectively, we cannot guarantee to have the same gain in the future. We incur foreign currency transaction exchange gains and losses due to operations in general. In the future we may experience foreign exchange losses on our non-functional currency denominated receivables and payables to the extent that we have not mitigated our exposure. Foreign exchange losses could have a materially adverse effect on our operating results and cash flows.

Our product sales to Japanese customers are typically invoiced in Japanese yen. As such we have foreign exchange exposure on our accounts receivable and on any Japanese yen denominated cash deposits. In 2014 and the first half of 2015, the Japanese yen depreciated against the dollar. The major portion of our 2014 exchange loss is attributable to the Japanese yen’s movement.

To partially protect us against fluctuations in foreign currency resulting from accounts receivable in Japanese yen, starting in 2015, we instituted a foreign currency hedging program. We place short term hedges that are intended to offset the potential cash exposure related to fluctuations in the exchange rate between the United States dollar and Japanese yen. We measure the fair value of these hedges at each month end and quarter end using current exchange rates and in accordance with generally accepted accounting principles. At quarter end and year end any foreign currency hedges not settled are netted on the condensed consolidated balance sheet and consolidated balance sheet, respectively, and classified as Level 3 assets and liabilities. As of December 31, 2016 the net change in fair value from the placement of the hedge to settlement at each month end during the quarter had a de minimis impact to the consolidated results.

The functional currency for our foreign operations is the Renminbi, the local currency of China, and in the future we may establish short term hedges covering Renminbi. Most of our operations are conducted in China and most of our costs are incurred in Chinese Renminbi, which subjects us to fluctuations in the exchange rates between the U.S. dollar and the Chinese Renminbi. We incur transaction gains or losses resulting from consolidation of expenses incurred in local currencies for our Chinese subsidiaries, as well as in translation of the assets and liabilities at each balance sheet date. Our financial results could be adversely affected by factors such as changes in foreign currency exchange rates or weak economic conditions in foreign markets, including the revaluation by China of the Renminbi, and any future adjustments that China may make to its currency such as any move it might make to a managed float system with opportunistic interventions. We may also experience foreign exchange losses on our non-functional currency denominated receivables and payables.

We currently are using a hedging program to minimize the effects of currency fluctuations relating to the Japanese yen. While we may apply this program to other currencies, such as the Chinese Renminbi, our hedging position is partial and may not exist at all in the future. It may not succeed in minimizing our foreign currency fluctuation risks. Our primary objective in holding these instruments is to reduce the volatility of earnings and cash flows associated with changes in foreign currency. The program is not designated for trading or speculative purposes. The company may choose not to hedge certain foreign exchange exposures for a variety of reasons, including but not limited to accounting considerations and the prohibitive economic cost of hedging particular exposures. However, even with our hedging program, we still experience losses on foreign exchange from time to time.

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Interest Rate Risk

Cash and cash equivalents earning interest and certain variable rate debt instruments are subject to interest rate fluctuations. The following table sets forth the probable impact of a 10% change in interest rates (in thousands):

Instrument	Balance as of December 31, 2016	Current Interest Rate	Projected Annual Interest Income	Proforma 10% Interest Rate Decline Income	Proforma 10% Interest Rate Increase Income
Cash and cash equivalents	$ 36,152	0.53 %	$ 192	$ 173	$ 211
Investments in marketable debt	17,412	1.20 %	209	188	230
			$ 401	$ 361	$ 441

The primary objective of our investment activities is to preserve principal while maximizing income without significantly increasing risk. Financial instruments that potentially subject us to concentration of credit risk consist primarily of cash and cash equivalents, short-term investments, and trade accounts receivable. We invest primarily in money market accounts, certificates of deposits, corporate bonds and notes, and government securities. We are exposed to credit risks in the event of default by the issuers to the extent of the amount recorded on the consolidated balance sheets. These securities are generally classified as available-for-sale and consequently are recorded on the balance sheet at fair value with unrealized gains or losses reported as a separate component of accumulated other comprehensive income, net of estimated tax. Our cash, cash equivalents and short-term investments and long-term investments are in high-quality securities placed with major banks and financial institutions and commercial paper. We have no investments in auction rate securities.

Credit Risk

We perform ongoing credit evaluations of our customers' financial condition, and limit the amount of credit extended when deemed necessary, but generally do not require collateral. The credit risk in our accounts receivable is mitigated by our credit evaluation process and the geographical dispersion of sales transactions. One customer accounted for 13% of our trade accounts receivable as of December 31, 2016 and one customer accounted for 22% of our trade accounts receivable as of December 31, 2015.

Equity Risk

As part of our supply chain strategy, we maintain minority investments in privately-held companies located in China either invested directly by us and our wholly-own subsidiary or indirectly through our three consolidated joint venture companies. These minority investments are reviewed for other than temporary declines in value on a quarterly basis. These investments are classified as other assets in the consolidated balance sheets and accounted for under either the equity or cost method, depending on whether we have the ability to exercise significant influence over their operations or financial decisions. We monitor our investments for impairment and record reductions in carrying value when events or changes in circumstances indicate that the carrying value may not be recoverable. Reasons for other than temporary declines in value include whether the related company would have insufficient cash flow to operate for the next twelve months, significant changes in the operating performance and changes in market conditions. As of December 31, 2016 and 2015, we did not maintain any direct investments under the cost method. Our direct minority investments under the equity method totaled $6.6 million and $7.9 million, respectively, and our indirect minority investments through our consolidated joint ventures totaled $4.7 million and $5.8 million, respectively. In

aggregate, as of December 31, 2016 and 2015 the total of our direct and indirect investments in the seven companies under the equity method totaled $11.3 million and $13.7 million, respectively.

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Item 8. Consolidated Financial Statements and Supplementary Data

The consolidated financial statements, related notes thereto and financial statement schedules required by this item are listed and set forth beginning on page 83, and are incorporated by reference here. Supplementary financial information regarding quarterly financial information required by this item is set forth under the caption "Selected Quarterly Results of Operations" in Item 7, "Management's Discussion and Analysis of Financial Condition and Results of Operations," and is incorporated by reference here.

Item 9. Changes in and Disagreements with Accountants on Accounting and Financial Disclosure

None.

Item 9A. Controls and Procedures

Evaluation of disclosure controls and procedures.

Our management, with the participation of our Chief Executive Officer and our Chief Financial Officer, evaluated the effectiveness of the design and operation of our disclosure controls and procedures as of the end of the period covered by this Annual Report on Form 10-K. Based upon this evaluation, our Chief Executive Officer and Chief Financial Officer have concluded that our disclosure controls and procedures as defined under Exchange Act Rules 13a-15(e) and 15d-15(e) were effective at the reasonable assurance level to ensure that information required to be disclosed in our Securities Exchange Act reports is recorded, processed, summarized and reported within the time periods specified by the Securities and Exchange Commission and is accumulated and communicated to management, including our Chief Executive Officer and our Chief Financial Officer, as appropriate to allow timely decisions regarding required disclosure.

Our disclosure controls and procedures include components of our internal control over financial reporting. Management's assessment of the effectiveness of our internal control over financial reporting is expressed at the level of reasonable assurance because a control system, no matter how well designed and operated, can provide only reasonable assurance that the control system's objectives will be met.

Management's report on internal control over financial reporting

Our management is responsible for establishing and maintaining adequate internal control over financial reporting, as such term is defined in Rules 13a-15(f) and 15d-15(f) under the Exchange Act. Internal control over financial reporting is a process designed by, or under the supervision of, our Chief Executive Officer and Chief Financial Officer, and implemented by our Board of Directors, management and other personnel to provide reasonable assurance regarding the reliability of financial reporting and the preparation of financial statements for external purposes in accordance with accounting principles generally accepted in the United States. Internal control over financial reporting includes those policies and procedures that:

- pertain to the maintenance of records that in reasonable detail accurately and fairly reflect our transactions and dispositions of our assets;
- provide reasonable assurance that transactions are recorded as necessary to permit preparation of financial statements in accordance with GAAP, and that receipts and expenditures are being made only in accordance with authorizations of our management and directors; and
- 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 consolidated financial statements.

Because of 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

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may become inadequate because of changes in conditions, or that the degree of compliance with the policies or procedures may deteriorate.

Our management, under the supervision and with the participation of our Chief Executive Officer and Chief Financial Officer, has assessed the effectiveness of our internal control over financial reporting as of December 31, 2016 based on the criteria established in Internal Control—Integrated Framework (2013) issued by the Committee of Sponsoring Organizations of the Treadway Commission (COSO). Management has concluded that our internal control over financial reporting was effective as of December 31, 2016.

Our independent registered public accounting firm, BPM LLP, has audited the consolidated financial statements included in this Annual Report on Form 10-K and has issued its report on the effectiveness of our internal control over financial reporting as of December 31, 2016.

Changes in internal control over financial reporting.

There were no changes in our internal control over financial reporting that occurred during the year ended December 31, 2016 that has materially affected, or is reasonably likely to materially affect, our internal control over financial reporting.

Item 9B. Other Information

None.

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Report of Independent Registered Public Accounting Firm

To the Board of Directors and Stockholders of

AXT, Inc.

We have audited the internal control over financial reporting of AXT, Inc. and its subsidiaries' (the Company") as of December 31, 2016, based on the criteria established in Internal Control—Integrated Framework (2013 Framework) issued by the Committee of Sponsoring Organizations of the Treadway Commission (COSO). 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 conducted our audit in accordance with the standards of the Public Company Accounting Oversight Board (United States). 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 of internal control over financial reporting included obtaining an understanding of internal control over financial reporting, assessing the risk that a material weakness exists, and testing and evaluating the design and operating effectiveness of internal control based on the assessed risk. Our audit also included performing such other procedures as we considered necessary in the circumstances. We believe that our audit provides a reasonable basis for our opinion.

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.

In our opinion, the Company maintained, in all material respects, effective internal control over financial reporting as of December 31, 2016, based on criteria established in Internal Control—Integrated Framework (2013 Framework) issued by COSO.

We have also audited, in accordance with the standards of the Public Company Accounting Oversight Board (United States), the consolidated balance sheets of AXT, Inc. and subsidiaries as of December 31, 2016 and 2015 and the related consolidated statements of operations, comprehensive income (loss), stockholders' equity, and cash flows for each of the three years in the period ended December 31, 2016 and our report dated February 27, 2017, expressed an unqualified opinion.

/s/ BPM LLP

San Jose, California

February 27, 2017

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PART III

Item 10. Directors, Executive Officers and Corporate Governance

We have a classified Board of Directors consisting of two Class I directors, one Class II director and one Class III director, who will serve until the annual meetings of stockholders to be held in 2017, 2018 and 2019, respectively, and until their respective successors are duly elected and qualified. At each annual meeting of stockholders, directors are elected for terms of three years to succeed those directors whose terms expire at the annual meeting dates.

The term of the Class I directors will expire on the date of the 2017 annual meeting. Accordingly, two nominees are to be elected to serve as the Class I directors of the Board of Directors at the annual meeting. Our Nominating and Corporate Governance Committee of the Board of Directors has recommended to the Board of Directors, and the Board of Directors has nominated, Dr. Morris S. Young and Dr. David C. Chang, the current Class I members of the Board of Directors, as the nominees for election by the stockholders to these positions. If elected, these nominees will serve as Class I directors until our annual meeting of stockholders in 2020 and until their respective successors are elected and qualified.

The following table sets forth, for our current directors, including the Class I nominees to be elected at Company's 2017 annual meeting of stockholders, and non-director Executive Officers, information with respect to their ages as of February 27, 2017 and their background:

Name	Principal Occupation	Age	Director Since
Class I directors whose terms expire at the 2017 Annual Meeting of Stockholders:			
Morris S. Young	Director, Chief Executive Officer	72	1989
David C. Chang	Director	75	2000
Class II director whose term expires at the 2018 Annual Meeting of Stockholders:			
Jesse Chen	Chairman of the Board	59	1998
Class III director whose term expires at the 2019 Annual Meeting of Stockholders:			
Leonard J. LeBlanc	Director	76	2003
Non-director Executive Officers:			
Gary L. Fischer	Chief Financial Officer and Corporate Secretary	66	
Robert G. Ochrym	Vice President, Business Development, Strategic Sales and Marketing	65	

Members of the Board of Directors

Morris S. Young, Ph.D. co-founded AXT in 1986 and has served as a director since 1989. Dr. Young served as our chairman of the Board of Directors from February 1998 to May 2004 and as our president and chief executive officer from 1989 to May 2004. From 2004 until his retirement in 2006, Dr. Young served as our chief technology officer. He was reappointed as our chief executive officer on July 16, 2009. From 1985 to 1989, Dr. Young was a physicist at Lawrence Livermore National Laboratory. Dr. Young has a B.S. degree in metallurgical engineering from National Cheng Kung University, Taiwan, a M.S. degree in metallurgy from Syracuse University, and a Ph.D. in metallurgy from Polytechnic University.

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The Board has determined that Dr. Young's long history with the Company, as well as his breadth of experience and on-going, active involvement in the semiconductor industry, make him a valuable asset to the Board.

David C. Chang, Ph.D. has served as one of our directors since December 2000. Dr. Chang co-founded The Global Maximum Educational Opportunities, Inc., which provides study abroad programs in China for U.S. undergraduate students, in 2011 and became its Chairman and Chief Executive Officer in August 2013. Dr. Chang has served as president of Polytechnic University in New York (now known as Tandon School of Engineering, New York University) from 1994 to 2005 and President Emeritus and chancellor from 2005 to present. Previously, Dr. Chang was dean of the College of Engineering and Applied Sciences at Arizona State University. Dr. Chang served as a director of the NSF/Industry Corporate Research Center for Microwave and Millimeter-Wave Computer Aided Design from 1981 to 1989. Dr. Chang was a member of the board of directors of Time Warner Cable Inc. from 2004 to 2016. Dr. Chang has a M.S. degree and a Ph.D. in applied physics from Harvard University and a B.S. degree in electrical engineering from National Cheng Kung University, Taiwan.

The Board has determined that Dr. Chang's extensive experience in the semiconductor industry allows him to make significant contributions to the strategic direction of the Company.

Jesse Chen has served as one of our directors since February 1998 and was Chairman of the Board of Directors from May 2004 until October 2007, at which time he was appointed our lead independent director. Since March 2009, Mr. Chen has served as our Chairman of the Board of Directors. Since May 1997, Mr. Chen has served as a managing director of Maton Ventures, an investment company. From 1990 to 1996, Mr. Chen served as chief executive officer of BusLogic, Inc., a fabless semiconductor and computer peripherals company. Mr. Chen serves on the board of directors of several private companies. Mr. Chen has a B.S. degree in aeronautical engineering from National Cheng Kung University, Taiwan and a M.S. degree in electrical engineering from Loyola Marymount University.

The Board has determined that Mr. Chen's experience as a CEO and his investment background provides him with the experience and knowledge in compensation and governance matters for technology companies to enhance his contributions to the Board and its committees.

Leonard J. LeBlanc has served as one of our directors since April 2003. Mr. LeBlanc served as the acting chief financial officer and vice president of corporate development for Ebest, Inc., a privately held applications software company, from February 2001 to September 2003. Mr. LeBlanc was the executive vice president and chief financial officer of Vantive Corporation, a customer relationship management software and solution company, from August 1998 to January 2000. From March 1996 to July 1997, Mr. LeBlanc was the executive vice president of finance and administration and chief financial officer at Infoseek Corporation, an internet search and navigation company. From September 1993 to December 1994, Mr. LeBlanc served as senior vice president, finance and administration of GTECH Corporation, a manufacturer of lottery equipment and systems. From May 1987 to December 1992, Mr. LeBlanc served as executive vice president, finance and administration and chief financial officer of Cadence Design Systems, Inc., an electronic design automation software company. Mr. LeBlanc served on the board of

directors and as chairman of the audit committee of Oplink Communications, Inc., a provider of optical manufacturing solutions and optical networking components from 2000 to 2009 and as chairman of the Board from 2006 to 2009. From November 2009 to November 2010, he was a consultant to Oplink Communications, Inc. Mr. LeBlanc has B.S. and M.S. degrees from the College of Holy Cross, and an M.S. degree in finance from George Washington University.

The Board has determined that Mr. LeBlanc's financial expertise, his background and experience in the finance function in a number of companies make him a valuable contributor to the Board as well as to the Audit Committee.

Executive Officers

The following sets forth information regarding our current non-director executive officers.

Information regarding Dr. Morris Young, our Chief Executive Officer, is set forth under Members of the Board of Directors.

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Robert G. Ochrym joined AXT as Vice President, Business Development in June 2005. On October 26, 2009, Mr. Ochrym was appointed as our Vice President, Business Development, Strategic Sales and Marketing. From 2003 to May 2005, Mr. Ochrym was national sales manager at Aixtron, Inc., where he was responsible for North American sales and marketing functions. From 1973 to 2003, Mr. Ochrym held various positions in sales and marketing, business development and product management at Uniroyal Optoelectronics, Northrop Grumman and Rhone Poulenc, and had extensive involvement with rare earths and gallium businesses. Mr. Ochrym has a B.A. degree in Biology from Le Moyne College in Syracuse, New York.

Gary L. Fischer was appointed as our Vice President, Chief Financial Officer and Corporate Secretary in August, 2014. From June 2014 to August 2014, Mr. Fischer served as a financial consultant to the Company. Prior to serving as a financial consultant to the Company, Mr. Fischer served as a consultant to eRide, Inc., a fabless semiconductor company that develops both GPS devices and software for location-based services, since 2009. Prior to that position, Mr. Fischer served as Vice President and Chief Financial Officer of eRide from 2005 until 2009, when eRide was acquired. From 1993 to 2005, Mr. Fischer held various positions at Integrated Silicon Solution, Inc.(“ISSI”), a leader in advanced memory solutions, most recently as President and Chief Operating Officer. Mr. Fischer has a B.A. degree from the University of California, Santa Barbara, and an M.B.A. from Santa Clara University.

In August 2007, the SEC filed a complaint against ISSI and Mr. Fischer. The complaint alleged violations of securities laws related to the backdating of stock option grants. In September 2007, Mr. Fischer, without admitting or denying the allegations of the SEC’s complaint, agreed to settle the matter by consenting to (i) a permanent injunction against violations of the securities laws and rules thereunder, including in particular knowingly circumventing or failing to implement a system of internal accounting controls or knowingly falsifying any book, record or account, (ii) the disgorgement of profits and interest thereon that the SEC alleged he gained from backdating options and civil penalties, and (iii) consenting to an order barring him from acting as an officer or director of a public company for five years, which expired in September 2012.

Section16 (a) Beneficial Ownership Reporting Compliance

Section 16(a) of the Securities Exchange Act of 1934, as amended, requires our executive officers and directors and persons who beneficially own more than 10% of our Common Stock to file initial reports of beneficial ownership and reports of changes in beneficial ownership with the SEC. Such persons are required by SEC regulations to furnish us with copies of all Section 16(a) forms filed by such person.

Based solely on our review of such forms furnished to us and written representations from certain reporting persons, we believes that all filing requirements applicable to our executive officers, directors and greater-than-10% stockholders were complied with in a timely manner in 2016.

No Material Changes to the Procedures to Recommend Nominees to the Board of Directors

There have been no material changes to the procedures by which security holders may recommend nominees to the Company's Board of Directors since the Company's proxy statement for the 2016 annual meeting of stockholders filed with the SEC on April 13, 2016.

Audit Committee

The members of the Audit Committee during 2016 were Dr. David C. Chang, Jesse Chen and Leonard J. LeBlanc. The Board has determined that all Audit Committee members are "independent" as defined under the applicable Nasdaq listing standards and SEC rules and regulations and as such rules apply to audit committee members. The Board has determined that each of Mr. Leonard LeBlanc and Mr. Jesse Chen is an "audit committee financial expert" as defined by the rules and regulations of the SEC.

Code of Business Conduct and Ethics

The Board has adopted a Code of Business Conduct and Ethics applicable to all of our employees and directors,

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including our Chief Executive Officer, Chief Financial Officer and Corporate Controller, which is available under the "Investors" section on our website at www.axt.com. In addition, we will provide a copy of the Code of Business Conduct and Ethics upon request made in writing to us at AXT, Inc., 4281 Technology Drive, Fremont, CA 94538, attention: Corporate Secretary. We will disclose any amendment to the Code of Business Conduct and Ethics, or waiver of any of its provisions, applicable to an executive officer or director under the "Investors" section on our website at www.axt.com.

Item 11. Executive Compensation

Compensation Discussion and Analysis

Overview of Compensation Programs and Philosophy

Our philosophy is to provide a total compensation package that is competitive with the prevailing practices for our industry and markets. We believe that there should be a strong link between pay and performance, both at the Company level and the individual level. Although we believe that exceptional individual performance should be rewarded, we believe that such rewards should not be made unless there has been strong Company performance as well as strong individual performance.

Our compensation programs are intended to assure that our compensation and benefits policies attract, motivate and retain the key employees necessary to support our operations and our strategic growth. To meet these objectives, we have adopted the following overriding policies:

· Pay total compensation that is competitive with the practices of other companies of similar size and in similar industries;

· Use total cash compensation (salary plus annual cash bonus, payable quarterly) to recognize appropriately each individual officer's scope of responsibility, role in the organization, experience and contributions;

· Reward performance by:

· providing short-term bonus compensation by establishing a bonus plan to reward achievement at specified levels of financial and individual performance, with a significant portion of each executive's goals related to key financial measures, including company specific measures comprising achievement of targeted revenue, gross profit, operating expense and net income levels all being line items upon which executive officer performance can have a significant impact and that can show beneficial financial performance improvement and ,therefore, value to stockholders, and a portion of each executive's goals related to individual metrics for each individual executive officer that represent an improvement over such officer's performance in the prior fiscal year; and

- providing long-term incentives in the form of stock options and restricted stock awards, in order to retain those individuals with the leadership abilities necessary for increasing long-term stockholder value while aligning the interests of our officers with those of our stockholders.

On May 26, 2016, we held a stockholder advisory vote on the compensation of our named executive officers, commonly referred to as a say-on-pay vote. Our stockholders approved the compensation of our named executive officers, with over 91.50% of the votes cast in favor of our say-on-pay resolution. As we evaluated our compensation practices throughout fiscal 2016, we were mindful of the strong support our stockholders expressed for our philosophy of linking compensation to performance. For fiscal 2016, our Compensation Committee (the "Committee") decided to retain our general approach to executive compensation. Moreover, in determining how often to hold a stockholder advisory vote on executive compensation, our Board took into account our stockholders' preference for an annual vote at our 2011 annual meeting of stockholders. Based on stockholder input, the Board determined that we will continue to hold an annual advisory stockholder vote on our named executive officer compensation until the frequency is modified by a stockholder vote.

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Components of Our Compensation Program

There are five major elements that comprise our executive officer compensation programs: (i) base salary; (ii) annual cash bonus, payable quarterly; (iii) long-term incentives, such as stock options and restricted stock awards; (iv) retirement benefits provided under a 401(k) plan; and (v) perquisites and benefit programs that are generally available to all of our employees. In addition, we provide certain benefits to U.S. employees who spend a significant amount of their time in our Beijing facilities. We have selected these elements because each is considered useful and/or necessary to meet one or more of the principal objectives of our compensation policy. For instance, base salary and bonus target percentages are set with the goal of attracting and retaining employees, adequately compensating them on a day-to-day basis for the time spent and the services they perform, and rewarding them for achievement at specified levels of financial and individual performance. Our stock option grants and restricted stock awards are intended to provide an incentive and reward for the achievement of long-term business objectives, including achievement of our financial goals, our growth, and retaining key employees. We believe that these elements of compensation, when combined, are effective, and will continue to be effective, in achieving the objectives of our compensation programs.

These policies were established by our Committee in setting executive officer compensation, including the assessment of the appropriate allocation between current cash compensation, short-term bonus compensation, and long-term compensation. Other considerations include our business objectives, competitive practices and trends, and regulatory requirements

Oversight of Executive Compensation and Role of Management

Our executive compensation program is overseen and administered by the Committee, which is comprised entirely of independent directors as determined in accordance with various Nasdaq and SEC rules and the Internal Revenue Code. The Committee operates under a written charter adopted by our Board. A copy of the charter is available under the “Investors” section on our website at www.axt.com.

During fiscal 2016, the Committee met regularly with our Chief Executive Officer, Dr. Young, to obtain recommendations with respect to Company compensation programs, practices and packages for executives, other employees and directors. Dr. Young made recommendations to the Committee on the base salary, bonus targets and equity compensation for the executive team and other employees for fiscal 2016 compensation. The Committee considers, but is not bound by and does not always accept, Dr. Young’s recommendations with respect to executive compensation. For fiscal 2016, the Committee determined that Dr. Young was well placed to know what would motivate his team financially, both in terms of long-term and short-term compensation.

Dr. Young attended most of the Committee's meetings, but the Committee also regularly held executive sessions not attended by any members of management or the non-independent directors. The Committee discussed Dr. Young's compensation package with him, but made decisions with respect to Dr. Young's compensation without him present. The Committee has not delegated any of its authority with respect to the compensation of executive officers.

The Committee reviews the compensation programs applicable to executive officers on an annual basis, other than deferred compensation and retirement benefits, which are reviewed from time to time to ensure that benefit levels remain competitive but are not included in the annual determination of an executive's compensation package. In setting compensation levels for a particular executive, the Committee takes into consideration the proposed compensation package as a whole and each element individually, as well as the executive's past and expected future contributions to our business

Reliance on Compensation Consultants

The Committee has the authority to engage its own independent advisors to assist in carrying out its responsibility. For 2015, the Committee retained Compensia, an independent compensation consulting firm, to review our executive compensation practices. In 2015, Compensia advised the Committee on the principal aspects of executive compensation, including base salaries, bonuses and long-term equity incentives. Compensia also reported on its

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evaluation of the competitiveness of our executive officer compensation program as compared to peer companies. Compensia provided market information about the competitive framework for executive pay and performance benchmarking. For fiscal 2016, the Committee relied upon the information provided by Compensia in 2015 and did not further retain Compensia during 2016 for any specific compensation determinations.

In 2015, representatives of Compensia communicated with the chair of the Committee outside of meetings with the Committee. In 2015, Compensia reported to the Committee and did not perform services for the Company other than for the Committee. Based on the consideration of the various factors as set forth in the rules of Nasdaq, the Committee does not believe that its relationship with Compensia and the work of Compensia on behalf of the Committee has raised any conflict of interest.

Compensation Benchmarking

For fiscal 2016, in order to determine each officer's target total annual cash compensation (salary and bonuses) for upcoming periods, the Committee reviewed compensation information from a peer group of 15 companies identified by Compensia in 2015, with input from our management. The peer group included companies with market capitalizations and annual revenues similar to ours, and that are in the same high-technology industries in which we compete for executive officer talent. The peer group consisted of the following companies:

Alliance Fiber Optic Products

ANADIGICS

Audience

EMCORE

GSI Technology

GT Advanced Technologies

Intermolecular

Intevac

Molycorp

Oclaro

Pericom Semiconductor

Pixelworks

QuickLogic

Rubicon Technology

Zhone Technologies

Data on the compensation practices of the above mentioned peer group was gathered by Compensia in 2015 through searches of publicly available information, including publicly available databases. The Committee relied upon Compensia to benchmark target cash compensation levels against the above peer group. Peer group data was gathered by Compensia with respect to base salary, bonuses and long term equity incentives. It does not include deferred compensation benefits or generally available benefits, such as 401(k) plans or health care coverage.

Base Salary

For fiscal 2016, the annual and actual base salaries for our current named executive officers were as follows:

	Fiscal 2016 Base Salary
Morris S. Young, Chief Executive Officer	$ 410,000
Gary L. Fischer, Chief Financial Officer and Corporate Secretary	$ 275,000
Robert G. Ochrym, Vice President Business Development, Strategic Sales and Marketing	$ 249,500

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Key Executive Non-Equity Incentive Plan/Bonus Plan

We maintain an incentive bonus program for key executive officers to encourage and award achievement of our business goals and to assist us in attracting and retaining executives by offering an opportunity to earn a competitive level of compensation (the "Bonus Plan"). Based on these and the objectives described above, the form of the Bonus Plan was initially approved by the Committee for fiscal 2006. Thereafter, the Committee extended operation of the Bonus Plan for fiscal years 2007 to 2015, with revised metrics to reflect the revisions in the operating plans for each fiscal year. In February 2016, the Committee recommended, and the Board approved, the Executive Incentive Plan (the "Executive Incentive Plan"), which revised and updated the Bonus Plan. The Executive Incentive Plan is intended to increase shareholder value and the success of the Company by motivating employees to perform to the best of their abilities, and achieve the Company's objectives

In recommending the Executive Incentive Plan, the Committee confirmed that its philosophy was to use total cash compensation (salary plus cash bonus) to recognize appropriately each individual officer's scope of responsibility, role in the organization, experience and contributions. The Committee believes that the Executive Incentive Plan appropriately reflects the benchmarking information provided by Compensia.

The Executive Incentive Plan is administered by the Committee. The Committee, in its sole discretion, will select the eligible employees who will be participants for any performance period. The eligible employees are any executive, officer, or key employee of the Company or of an affiliate, whether such individual is so employed at the time the Executive Incentive Plan is adopted or becomes so employed subsequent to the adoption of the Executive Incentive Plan. Participation in the Executive Incentive Plan is in the sole discretion of the Committee, on a performance period by performance period basis.

The Committee, in its sole discretion, will establish a target award for each participant, which may be a percentage of a participant's annual base salary as of the beginning or end of the performance period, a fixed dollar amount, or such other amount or based on such other formula as the Committee determines. Each performance period, the Committee, in its sole discretion, will establish a bonus pool, which pool may be established before, during or after the applicable performance period. Actual awards will be paid from the bonus pool. Notwithstanding any contrary provision of the Executive Incentive Plan, the Committee will, in its sole discretion, determine the performance goals applicable to any target award, which may include subjective or objective criteria.

Each actual award will be paid solely from the general assets of the Company. Payment of each actual award shall be made as soon as practicable after the end of the performance period to which the actual award relates and after the actual award is approved by the Committee, but in no event later than (i) the 15th day of the third month of the fiscal year immediately following the fiscal year in which the participant's actual award for any performance period is first no longer is subject to a substantial risk of forfeiture, and (ii) March 15 of the calendar year immediately following the calendar year in which the participant's actual award for any performance period is first no longer is subject to a substantial risk of forfeiture. Each actual award will be paid in cash (or its equivalent) in a single lump sum.

For fiscal year 2016, the Committee selected Dr. Morris Young, Gary Fischer and Robert Ochrym as the participants of the Executive Incentive Plan and divided the fiscal year into four quarterly performance periods. The Committee determined that actual awards were based upon achievement of corporate financial targets (the "Corporate Targets") and individual targets established for each participant (the "Individual Targets"). Achievement of the Corporate Targets represented 60% of the actual award, and achievement of the Individual Targets represented 40% of the actual award.

The Corporate Targets were comprised of four financial targets: (1) total revenue ("Total Revenue Target"), (2) gross profit ("Gross Profit Target"), (3) operating expense ("Operating Expense Target") and (4) net income ("Net Income Target"). The actual quarterly Corporate Targets were set forth in the operating plan for the year ending December 31, 2016, and approved by the Board. The Corporate Targets were weighted 10% for each of the Total Revenue Target, Gross Profit Target and Operating Expense Target and 30% for the Net Income Target for a total of 60% of the target award.

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Achievement of the Individual Targets, representing 40% of a participant's target award, were determined each quarter by the Committee, pursuant to objectives established by the Committee for each such participant. Each participant's target award was based on a percentage of such participant's annual base salary at the beginning of each quarterly performance period.

In February 2016, the Committee determined the fiscal year 2016 terms and conditions under the Executive Incentive Plan. The fiscal 2016 target awards were as follows:

Named Executive Officer	Amount	Percentage of Base Salary of Fiscal 2016 Award	
Morris S. Young	$ 307,500	75.0	%
Gary L. Fischer	$ 137,500	50.0	%
Robert G. Ochrym	$ 112,500	45.0	%

In fiscal 2016, executive officers achieved approximately 71.4% of the target bonus amounts, based on Company and individual performance. The bonuses were paid quarterly.

Actual bonuses paid to our named executive officers for fiscal 2016 were:

Named Executive Officer	Amount	Percentage of Base Salary Earned in Fiscal 2016	
Morris S. Young	$ 236,665	57.7	%
Gary L. Fischer	$ 99,029	36.0	%
Robert G. Ochrym	$ 62,143	24.9	%

Determination of Target Bonus Amounts for Fiscal 2017

In February 2017, the Committee recommended, and the Board approved, the fiscal year 2017 terms and conditions under the Executive Incentive Plan. For fiscal year 2017, the Committee selected Dr. Morris Young, Gary Fischer and Robert Ochrym as the participants of the Executive Incentive Plan and divided the fiscal year into four quarterly performance periods. Achievement of the Corporate Targets represents 60% of the actual award, and achievement of the Individual Targets represents 40% of the actual award. The Corporate Targets are weighted 10% for each of the Total Revenue Target, Gross Profit Target and Operating Expense Target and 30% for the Net Income Target for a total of 60% of the target award. Achievement of the Individual Targets, representing 40% of a participant's target award, will be determined each quarter by the Committee, pursuant to objectives established by the Committee for each such participant. Each participant's target award will be based on a percentage of such participant's annual base salary at the beginning of each quarterly performance period. The Committee made no changes for the target bonus amounts, which are as follows:

Named Executive Officer	Percentage of Base Salary of Fiscal 2017 Target Bonus	
Morris S. Young	75	%
Gary L. Fischer	50	%
Robert G. Ochrym	45	%

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Other Bonuses

At its discretion, the Committee may award management bonuses to certain of our named executive officers outside of the Executive Incentive Plan. Further, the Board and/or the Committee may amend or terminate the Executive Incentive Plan, or any part thereof, at any time and for any reason.

Long-Term Incentive Compensation

Historically we have provided long-term incentive compensation through grants of stock options and restricted stock awards that generally vest over multiple years. Our equity compensation program is intended to align the interests of our officers with those of our stockholders by creating an incentive for our officers to maximize stockholder value. The equity compensation program also is designed to encourage our officers to remain employed with us despite a very competitive labor market. The Committee believes that appropriate equity incentives are critical to attracting and retaining the best employees in the industry, and that stock awards can be an effective tool for meeting our compensation goal of increasing long-term stockholder value by tying the value of the stock awards to our performance in the future.

The number of stock awards the Committee grants to each executive officer and the vesting schedule for each grant is determined based on a variety of factors, including the Committee's goal to increase the proportion of compensation awarded to executive officers as long-term incentive compensation. In 2015 we determined that the value of our equity awards was below the 25th percentile of the peer group mentioned above, based on the benchmarking information provided at that time by Compensia.

The Committee typically grants equity awards to executive officers at its regularly scheduled quarterly meetings. All grants of stock options and restricted stock awards or other equity awards to newly hired employees are also made by the Committee at scheduled meetings, unless the Board or the Committee determines that unusual circumstances, such as in the case of retention of an executive officer, directors or other employees, call for consideration of the grant of awards other than at a regular quarterly meeting, in which case consideration of and action with respect to such awards shall take place at a special meeting and not by unanimous written consent. The Committee has not granted, nor does it intend in the future to grant, equity compensation awards to executives in anticipation of the release of material nonpublic information that is likely to result in changes to the price of our common stock, such as a significant positive or negative earnings announcement. Similarly, the Committee has not timed, nor does it intend in the future to time, the release of material nonpublic information based on equity award grant dates. Further, because equity compensation awards to executive officers typically vest over a three or four-year period, the value to recipients of any immediate increase in the price of our stock following a grant will be attenuated.

All equity awards approved during scheduled meetings become effective and are priced as of the second trading day after the earnings release for the quarter in which the grants were approved (the "Grant Date"), provided that if public announcement of material information is anticipated, the Grant Date may be deferred at the discretion of the Board or Committee until the second trading day after release of such information. With respect to grants of incentive stock options, the exercise price of all options granted at regular quarterly meetings shall be the closing price of our common stock on the Grant Date, as reported by the Nasdaq Global Select Market.

Retirement Benefits under the 401(k) Plan, Executive Perquisites and Generally Available Benefit Programs

We do not maintain a deferred compensation plan, other than our AXT, Inc. Employee Savings and Retirement Plan (the "401(k) Plan"). The 401(k) Plan is available to all full-time U.S. based employees, including named executive officers. Under the 401(k) Plan, participating employees are eligible to receive matching contributions from us that are subject to vesting over time. We also make an annual "reconciling match" designed to more evenly determine the amount of matching contributions that each eligible employee receives. This reconciling match works by recalculating the regular matching contribution as if it were paid on an annualized, instead of payroll-by-payroll, basis. If the annualized matching contribution would have been higher, we contribute a matching contribution equal to the difference between the two. We do not provide defined benefit pension plans or defined contribution retirement plans to our executives or other employees other than the 401(k) Plan.

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We also offer a number of other benefits to our US based employees, including the named executive officers, pursuant to benefit programs that provide for broad based employee participation. These benefits programs include medical, dental and vision insurance, long-term and short-term disability insurance, life and accidental death and dismemberment insurance, health and dependent care flexible spending accounts, wellness programs, relocation/expatriate programs and services, educational assistance and certain other benefits.

The 401(k) Plan and other generally available benefit programs allow us to remain competitive for key employees, and we believe that the availability of the benefit programs generally enhances employee productivity and loyalty. The main objectives of our benefits programs are to give our employees access to quality healthcare, assistance in achieving retirement financial goals and enhanced health and productivity. These generally available benefits typically do not specifically factor into decisions regarding an individual executive's total compensation or equity award package.

Stock Ownership Guidelines

The Board has not adopted stock ownership guidelines applicable to our executive officers or directors.

Accounting and Tax Considerations

In designing our compensation programs, we take into consideration the accounting and tax effect that each element will or may have on us and the executive officers and other employees as a group. We have not provided any executive officer or director with a gross-up or other reimbursement for tax amounts the executive might pay pursuant to Section 280G or Section 409A of the Internal Revenue Code. Section 280G and related Internal Revenue Code sections provide that executive officers, directors who hold significant stockholder interests and certain other service providers could be subject to significant additional taxes if they receive payments or benefits in connection with a change of control that exceeds certain limits, and that we or our successor could lose a deduction on the amounts subject to the additional tax. Section 409A also imposes additional significant taxes in the event that an executive officer, director or service provider receives "deferred compensation" that does not meet the requirements of Section 409A. We structure our equity awards in a manner intended to comply with the applicable Section 409A requirements.

In determining which elements of compensation are to be paid, and how they are weighted, we also take into account whether a particular form of compensation will be considered "performance based" compensation for purposes of Section 162(m) of the Internal Revenue Code. Under Section 162(m), we generally receive a federal income tax deduction for compensation paid to any of our named executive officers only if the compensation is less than $1 million during any fiscal year or is "performance based" under Section 162(m). Our Committee currently intends to continue seeking a tax deduction for all of our executive compensation, to the extent we determine it is in our best

interests. All of the stock options granted to our executive officers qualify under Section 162(m) as performance based compensation.

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Summary Compensation Table

The following table sets forth information concerning the compensation earned during the fiscal years ended December 31, 2016, 2015 and 2014, by our current Chief Executive Officer, our Chief Financial Officer, and each of our other executive officers (together, the "named executive officers"):

me and Principal Position	Year	Salary ($)	Bonus ($)	Stock Awards ($)(1)	Option Awards ($)(1)	Non-Equity Incentive Plan Compensation ($)(2)	All Other Compensation ($)	Total ($)
rris S. Young	2016	$ 410,000	$ —	$ 303,738	$ 341,414	$ 236,665	$ 34,009(4)	$ 1,325,82
ief Executive Officer	2015	$ 435,712(3)	$ —	$ 261,600	$ 322,668	$ 152,772	$ 30,971(5)	$ 1,203,72
	2014	$ 329,567	$ —	$ 79,040	$ 116,698	$ 200,082	$ 29,593(6)	$ 754,980
ry L. Fischer	2016	$ 275,000	$ —	$ 114,073	$ 128,224	$ 99,029	$ 18,384(7)	$ 634,710
ief Financial Officer	2015	$ 260,345	$ —	$ 71,940	$ 88,734	$ 67,511	$ 15,207(8)	$ 503,737
d Corporate Secretary	2014	$ 91,346 (9)	$ —	$ 9,880	$ 231,331	$ 49,631	$ 5,980 (10)	$ 388,168
bert G. Ochrym	2016	$ 249,500	$ —	$ 36,470	$ 40,994	$ 62,143	$ 15,964(11)	$ 405,071
ce President,	2015	$ 275,005(12)	$ —	$ 15,260	$ 18,822	$ 45,238	$ 13,205(13)	$ 367,530
siness Development,	2014	$ 212,241	$ —	$ 19,760	$ 29,174	$ 70,100	$ 11,912(14)	$ 343,187
ategic Sales and rketing								

(1) Valuation based on the dollar amount recognized for financial statement reporting purposes pursuant to ASC topic 718, Stock Compensation ("ASC 718"). Amounts shown do not reflect compensation actually received by the named executive officer. Instead, the amounts shown are the value of option awards and stock awards calculated based on the grant date fair value as determined pursuant to ASC 718.

(2) Amounts consist of bonuses earned for services rendered in fiscal years 2014 to 2016. Performance based bonuses are generally paid under our Bonus Plan and reported as Non-Equity Incentive Plan Compensation. Includes amounts earned for the fourth quarter of fiscal 2016, but not paid until March 2017.

(3) Includes payment of $55,904, amount equal to Dr. Young's salary reduction between March 2014 and March 2015, which was approved by the Committee in March 2015.

(4)

Includes our matching contribution of $16,400 under the tax-qualified 401(k) Plan, travel allowance of $5,142, and our payment on behalf of Dr. Young of $12,467 in term life insurance premiums.

(5) Includes our matching contribution of $15,538 under the tax-qualified 401(k) Plan, travel allowance of $2,966, and our payment on behalf of Dr. Young of $12,467 in term life insurance premiums.

(6) Includes our matching contribution of $13,183 under the tax-qualified 401(k) Plan, travel allowance of $7,262, and our payment on behalf of Dr. Young of $9,149 in term life insurance premiums.

(7) Includes our matching contribution of $11,000 under the tax-qualified 401(k) Plan, and our payment on behalf of Mr. Fischer of $7,382 in term life insurance premiums.

(8) Includes our matching contribution of $10,385 under the tax-qualified 401(k) Plan, and our payment on behalf of Mr. Fischer of $4,822 in term life insurance premiums.

(9) Mr. Fischer was hired in August 2014 and his annual salary was $250,000.

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(10) Includes our matching contribution of $3,077 under the tax-qualified 401(k) Plan, and our payment on behalf of Mr. Fischer of $2,903 in term life insurance premiums.

(11) Includes our matching contribution of $9,980 under the tax-qualified 401(k) Plan and our payment on behalf of Mr. Ochrym of $5,984 in term life insurance premiums.

(12) Includes payment of $36,402, amount equal to Mr. Ochrym's salary reduction between March 2014 and March 2015, which was approved by the Committee in March 2015.

(13) Includes our matching contribution of $9,783 under the tax-qualified 401(k) Plan and our payment on behalf of Mr. Ochrym of $3,422 in term life insurance premiums.

(14) Includes our matching contribution of $8,490 under the tax-qualified 401(k) Plan, and our payment on behalf of Mr. Ochrym of $3,422 in term life insurance premiums.

Grants of Plan-Based Awards

The following table sets forth certain information with respect to option awards and other plan-based awards granted to our named executive officers during the fiscal year ended December 31, 2016:

2016 GRANTS OF PLAN-BASED AWARDS FROM THE 2015 PLAN

Name	Grant Date	Estimated Future Payouts Under Non-Equity Incentive Bonus Plan Awards (1) Threshold ($)	Target ($)	Maximum ($)	All Other Stock Option: Number of Securities Underlying Options (#)	All Other Restricted Stock Awards: Number of Shares of Stock or Units (#)	Exercise or Base Price of Option Awards ($/Sh)	Grant Date Fair Value of Stock and Option Awards ($)(2)
Morris S. Young	10/28/16				174,896	58,299	$ 5.21	$ 645,152
	02/20/17	$ 0	$ 307,500	$ 369,000				
Gary L. Fischer	10/28/16				65,685	21,895	$ 5.21	$ 242,297

	02/20/17	$ 0	$ 137,500	$ 165,000				
Robert G. Ochrym	10/28/16				21,000	7,000	$ 5.21	$ 77,464
	02/20/17	$ 0	$ 112,500	$ 135,000				

(1) We award bonuses pursuant to the Bonus Plan, which provides for the award of annual cash bonuses based upon threshold, target and maximum payout amounts set by the Board at the beginning of each fiscal year. See "Compensation Discussion and Analysis—Plan-Based Awards." The actual amount paid to each named executive officer for the fiscal year ended December 31, 2016 is set forth in the Summary Compensation Table under the heading, "Non-Equity Incentive Bonus Plan Compensation."

(2) The value of an option or stock award is based on the fair value as of the grant date of such award determined pursuant to ASC topic 718, Stock Compensation ("ASC 718"), excluding the impact of estimated forfeitures related to service-based vesting conditions. The exercise price for all options granted to the named executive officers is 100% of the fair market value of the shares on the grant date. The option exercise price has not been deducted from the amounts indicated above. Regardless of the value placed on a stock option on the grant date, the actual value of the option will depend on the market value of our common stock at such date in the future

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when the option is exercised. The proceeds to be paid to the individual following this exercise do not include the option exercise price.

Outstanding Equity Awards at Fiscal Year-End

The following table sets forth certain information with respect to the value of all unexercised options previously awarded to our named executive officers as of December 31, 2016.

OUTSTANDING EQUITY AWARDS AS OF DECEMBER 31, 2016

	Options Awards					Stock Awards	
Name	Grant Date(1)	Number of Securities Underlying Unexercised Options (#) Exercisable	Number of Securities Underlying Unexercised Options (#) Unexercisable	Option Exercise Price ($)	Option Expiration Date	Number of Shares or Units of Stock That Have Not Vested(#)	Market Value of Shares or Units of Stock That Have Not Vested($)(2)
Morris S. Young	07/16/2009	92,896	—	$ 1.59	07/16/19	—	—
	08/02/2010	110,000	—	$ 5.83	08/02/20	—	—
	10/28/2011	90,000	—	$ 4.79	10/28/21	—	—
	11/05/2012	108,000	—	$ 2.91	11/05/22	—	—
	11/04/2013	69,375	20,625	$ 2.36	11/04/23	—	—
	11/03/2014	50,000	46,000	$ 2.47	11/03/24	—	—
	11/02/2015	97,500	262,500	$ 2.18	11/02/25	—	—
	10/28/2016	—	174,896	$ 5.21	10/28/26	—	—
	11/04/2013	—	—	—	—	7,500	$ 36,000
	11/03/2014	—	—	—	—	16,000	$ 76,800
	11/02/2015	—	—	—	—	90,000	$ 432,000
	10/28/2016	—	—	—	—	58,299	$ 279,835
Gary L. Fischer	06/02/2014	125,000	75,000	$ 2.29	06/02/24	—	—
	11/03/2014	6,250	5,750	$ 2.47	11/03/24	—	—
	11/02/2015	26,813	72,187	$ 2.18	11/02/25	—	—
	10/28/2016	—	65,685	$ 5.21	10/28/26		
	11/03/2014	—	—	—	—	2,000	$ 9,600
	11/02/2015	—	—	—	—	24,750	$ 118,800
	10/28/2016	—	—	—	—	21,895	$ 105,096

Robert G. Ochrym	10/22/2007	431	—	$ 6.31	10/22/17	—	—
	08/02/2010	33,000	—	$ 5.83	08/02/20	—	—
	11/04/2013	500	5,500	$ 2.36	11/04/23	—	—
	11/03/2014	500	11,500	$ 2.47	11/03/24	—	—
	11/02/2015	438	15,312	$ 2.18	11/02/25	—	—
	10/28/2016	—	21,000	$ 5.21	10/28/26	—	—
	11/04/2013	—	—	—	—	2,000	$ 9,600
	11/03/2014	—	—	—	—	4,000	$ 19,200
	11/02/2015	—	—	—	—	5,250	$ 25,200
	10/28/2016	—	—	—	—	7,000	$ 33,600

(1) Except as otherwise noted, all options awards granted to named executive officers vest at the rate of $1/_4$ of the underlying shares on the first anniversary of the date of grant and $1/_{48}$ of the shares each month thereafter. After four years, the shares become fully vested and exercisable. Restricted stock awards granted to named executive officers vest over a four-year period, at a rate of 25% on the each anniversary of the vesting commencement

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date.

(2) The market value of the restricted stock awards that have not vested is calculated by multiplying the number of units that have not vested by the closing price of our common stock at December 31, 2016, which was $4.80.

Option Exercises and Stock Vested During Last Fiscal Year

The following table shows all stock options exercised and value realized upon exercise, and the number of shares acquired on vesting and the value realized on vesting by the named executive officers during the fiscal year ended December 31, 2016:

OPTION EXERCISES AND STOCK VESTED FOR FISCAL 2016

	Stock Options		Restricted Stock	
Name	Number of Shares Acquired on Exercise (#)	Value Realized on Exercise ($)(1)	Number of Shares Acquired on Vesting (#)	Value Realized on Vesting ($)(2)
Morris S. Young	120,000	$ 395,200	54,500	$ 273,825
Gary L. Fischer	—	$ —	9,250	$ 46,050
Robert G. Ochrym	126,375	$ 240,019	8,500	$ 42,950

(1) Based on the difference between the market price of our common stock on the date of exercise and the exercise price.

(2) Reflects the market price of our common stock on the vesting date.

Potential Payments upon Termination or Change in Control

Acceleration of Stock Options

Stock option grants were made to employees under our 1997 Stock Option Plan (the “1997 Plan”) pursuant to a standard form of stock option agreement. The standard form of stock option agreement provided that in the event of a “change in control,” as defined therein, and termination of employment or resignation for “good reason” as defined therein, within twelve months after the change in control, the vesting and exercisability of the option will accelerate such that the option will become immediately exercisable and vested in full as of the date of termination or resignation. Options

granted to all of our employees from 2002 until the adoption of our 2007 Equity Incentive Plan (the "2007 Plan"), including options granted to our named executive officers and directors, include these provisions which provide for acceleration in full upon a change of control event in which the employee is terminated or constructively dismissed within 12 months after the change in control. Options granted to our directors accelerate in full upon the change in control event, whether or not there is a termination of their service to the Company. All options so accelerated remain exercisable for the earlier of the term of the option or six months after the effective date of the termination.

The following are the applicable definitions under the 1997 Plan:

A "Change in Control" shall mean an event or a series of related events (collectively, the "Transaction") wherein the stockholders of the Company immediately before the Transaction do not retain immediately after the Transaction, in substantially the same proportions as their ownership of shares of our voting stock immediately before the Transaction, direct or indirect beneficial ownership of more than fifty percent (50%) of the total combined voting power of the outstanding voting stock of the Company or the corporation or corporations to which the assets of the Company were transferred (the "Transferee Corporation(s)"), as the case may be. For purposes of the preceding sentence, indirect beneficial ownership shall include, without limitation, an interest resulting from ownership of the voting stock of one or more corporations which, as a result of the Transaction, own the Company or the Transferee Corporation(s), as the case may be, either directly or through one or more subsidiary corporations. The Board shall have the right to determine whether multiple sales or exchanges of the voting stock of the Company or multiple Ownership Change Events are related, and its determination shall be final, binding and conclusive.

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An "Ownership Change Event" shall be deemed to have occurred if any of the following occurs with respect to the Company:

- the direct or indirect sale or exchange in a single or series of related transactions by the stockholders of the Company of more than fifty percent (50%) of the voting stock of the Company;

- a merger or consolidation in which the Company is a party;

- the sale, exchange, or transfer of all or substantially all of the assets of the Company; or

- a liquidation or dissolution of the Company.

"Termination After Change in Control" shall mean any of the following events occurring within twelve (12) months after a Change in Control:

- termination by the Participating Company Group of the Optionee's Service with the Participating Company Group for any reason other than for Cause (as defined below); or

- the Optionee's resignation for Good Reason (as defined below) from all capacities in which the Optionee is then rendering Service to the Participating Company Group within a reasonable period of time following the event constituting Good Reason.

- Notwithstanding any provision herein to the contrary, Termination After Change in Control shall not include any termination of the Optionee's Service with the Participating Company Group which (1) is for Cause (as defined below); (2) is a result of the Optionee's death or disability; (3) is a result of the Optionee's voluntary termination of Service other than for Good Reason; or (4) occurs prior to the effectiveness of a Change in Control.

"Cause" shall mean any of the following: (i) the Optionee's theft, dishonesty, or falsification of any Participating Company documents or records; (ii) the Optionee's improper use or disclosure of a Participating Company's confidential or proprietary information; (iii) any action by the Optionee which has a detrimental effect on a Participating Company's reputation or business; (iv) the Optionee's failure or inability to perform any reasonable assigned duties after written notice from a Participating Company of, and a reasonable opportunity to cure, such failure or inability; (v) any material breach by the Optionee of any employment agreement between the Optionee and a Participating Company, which breach is not cured pursuant to the terms of such agreement; or (vi) the Optionee's conviction (including any plea of guilty or nolo contendere) of any criminal act which impairs the Optionee's ability to perform his or her duties with a Participating Company.

"Good Reason" shall mean any one or more of the following:

- without the Optionee's express written consent, the assignment to the Optionee of any duties, or any limitation of the Optionee's responsibilities, substantially inconsistent with the Optionee's positions, duties, responsibilities and status with the Participating Company Group immediately prior to the date of the Change in Control;

- without the Optionee's express written consent, the relocation of the principal place of the Optionee's Service to a location that is more than thirty (30) miles from the Optionee's principal place of Service immediately prior to the date of the Change in Control, or the imposition of travel requirements substantially more demanding of the Optionee than such travel requirements existing immediately prior to the date of the Change in Control; or

- any failure by the Participating Company Group to pay, or any material reduction by the Participating Company Group of, (1) the Optionee's base salary in effect immediately prior to the date of the Change in Control by more than 15% (unless reductions comparable in amount and duration are concurrently made

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for all other employees of the Participating Company Group with responsibilities, organizational level and title comparable to the Optionee's), or (2) the Optionee's bonus compensation, if any, in effect immediately prior to the date of the Change in Control (subject to applicable performance requirements with respect to the actual amount of bonus compensation earned by the Optionee).

Stock option grants and restricted stock awards made to our named executive officers and directors under our 2007 Plan provide that in the event of a "Change in Control," as defined therein, the vesting and exercisability of the option will accelerate such that the option will become immediately exercisable and vested in full as of the date of termination or resignation.

Under the 2007 Plan, a "Change in Control" is defined as any of the following:

- any person becomes the direct or indirect beneficial owner of more than 50% of the voting power of our stock;
- any one or related series of the following in which the stockholders immediately before the transaction do not retain immediately after the transaction direct or indirect beneficial ownership of more than 50% of our voting securities, our successor or the entity to which our assets were transferred;
- the sale or exchange by the stockholders of more than 50% of our voting stock or a merger to which we are a party; or
- the sale of all or substantially all of our assets.

Under our 2015 Equity Incentive Plan (the "2015 Plan"), in the event of a merger or our "change in control" (as defined in the 2015 Plan), the administrator of the 2015 Plan (the "Administrator") will have authority to determine the treatment of outstanding awards, including, without limitation, that awards be assumed or substituted by the successor corporation or a parent or subsidiary of the successor corporation. The Administrator will not be required to treat all outstanding awards similarly.

If the successor corporation does not assume or substitute outstanding awards, then options and stock appreciation rights will become fully vested and exercisable, all restrictions on restricted stock and restricted stock units will lapse, and, with respect to awards with performance-based vesting, unless determined otherwise by the Administrator, all performance goals or other vesting criteria will be deemed achieved at 100% of target levels and all other terms and conditions met. In addition, if an option or stock appreciation right is not assumed or substituted for in the event of a change in control, the Administrator will notify the participant that the option or stock appreciation right will be fully vested and exercisable for a period of time determined by the Administrator in its sole discretion, and the option or stock appreciation right will terminate upon the expiration of such period.

If the successor corporation assumes or substitutes outstanding awards held by a non-employee director and the non-employee director's status as a director of the Company or a director of the successor company terminates other than upon voluntary resignation by the non-employee director (unless such resignation is at the request of the acquirer), then his or her options and stock appreciation rights will fully vest and become immediately exercisable, all restrictions on restricted stock and restricted stock units held by such non-employee director will lapse, and all performance goals or other vesting requirements will be deemed achieved at 100% and all other terms and conditions met.

If we had been the subject of a change in control that resulted in the termination of employment or resignation for good reason of any of our executive officers or a merger or change in control in which the successor corporation did not assume or substitute outstanding awards as of December 31, 2016, the last business day of our fiscal 2016, the number of options to purchase our common stock and restricted shares held by each executive officer as indicated below would have accelerated and become immediately exercisable and vested in full as of such date. In addition, based on the difference between the weighted average exercise price of the options and $4.80, the closing price of our common stock on December 31, 2016, the net value of these options and of unvested restricted shares would be as set forth below:

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Name	Number of Options/Shares Accelerated	Value of Accelerated Options/Shares(1)
Morris S. Young	675,820	$ 1,669,890
Gary L. Fischer	267,267	$ 624,273
Robert G. Ochrym	71,562	$ 167,932

(1) Based on a common stock price of $4.80 per share, the closing price of our common stock on the Nasdaq Global Select Market on December 31, 2016, less the applicable exercise price for each in-the-money option for which vesting is accelerated. In this calculation, restricted stock awards are valued at $4.80.

Young Employment Contract

On December 4, 2012, we entered into an amended and restated employment offer letter with Dr. Morris Young, Chief Executive Officer. In the event that Dr. Young is terminated without cause, we shall pay Dr. Young an amount equal to twelve (12) months of his then current salary and reimbursement of twenty-four (24) months of health benefits.

Alternatively, if, after a Change of Control (as defined below), Dr. Young's employment is terminated by us without cause or by Dr. Young as a result of a defined constructive termination, and provided that Dr. Young executes a general release of claims in a form acceptable to AXT or the acquiring company, Dr. Young will receive the following severance benefits: (a) continuing payment of his last base salary for eighteen (18) months after the date his employment terminates; (b) provided he timely elects to continue his health insurance benefits under the applicable COBRA laws, the Company will reimburse him for the premiums necessary to maintain his health insurance coverage for a period of twenty-four (24) months following termination of his employment; and (c) full vesting acceleration and exercisability of his outstanding equity awards.

Further, notwithstanding any provision to the contrary contained in any plan or agreement evidencing the options held by Dr. Young, in the event of a Change of Control in which the surviving, continuing, successor, or purchasing corporation or other business entity or parent thereof, as the case may be (the "Acquiror"), does not assume the Company's rights and obligations under the then-outstanding portion of options held by Dr. Young or substitute for such portion of such options substantially equivalent options for the Acquiror's stock, then the vesting and exercisability of such options shall be accelerated in full effective as of the date ten (10) days prior to but conditioned upon the consummation of the Change of Control, provided that Dr. Young remains an employee or other service provider with the Company immediately prior to the Change of Control. Except as set forth above, the treatment of stock-based compensation upon the consummation of a Change of Control shall be determined in accordance with the terms of the plans or agreements providing for such awards or options.

For purposes of Dr. Young's employment agreement, a "Change of Control" means a merger, consolidation, sale of substantially all assets of the Company or transfer of beneficial ownership (as determined pursuant to Rule 13d-3 under the Exchange Act) of outstanding shares of the capital stock of the Company by 1 (one) or more shareholders of the Company, in which the shareholders of the Company immediately prior to such merger, consolidation, sale or transfer do not own at least 50% (fifty percent) of the combined voting power of the capital stock of the Company or surviving or successor corporation or entity immediately after such transaction.

In addition, in the event of a change in control, if Dr. Young's employment is terminated or he resigns for "good reason" within twelve months after the change in control or a merger or change in control in which the successor corporation did not assume or substitute outstanding awards, then Dr. Young's stock options will become immediately exercisable and vested as of the date of termination or resignation. See "Acceleration of Stock Options" above.

If we had terminated Dr. Young's employment without cause and not as a result of a Change of Control on December 31, 2016, the last business day of our fiscal 2016, Dr. Young would have received severance benefits under his employment agreement equal to (a) a payment of $410,000, equal to twelve (12) months of his current base salary, and (b) reimbursement of twenty-four (24) months of health benefits of $26,617.

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Ochrym Employment Contract

On October 26, 2009, we entered into an employment agreement with Mr. Robert Ochrym, our Vice President Business Development, Strategic Sales and Marketing. In the event that Mr. Ochrym is terminated without cause, we shall pay Mr. Ochrym an amount limited to the payment of his salary and other earned compensation through the effective date of termination in addition to any severance to which he may be entitled under our severance pay plan or policy or may be granted by the Compensation Committee.

If a change in control of AXT takes place, and within twelve (12) months thereafter, Mr. Ochrym incurs an involuntary separation from service (within the meaning of Treas. Reg. § 1.409A-1(n)), our total liability to Mr. Ochrym will be limited to the payment of his salary and other earned compensation through the effective date of the involuntary separation from service plus severance in a gross amount equal to one (1) year of his then current annual salary, plus continuation of coverage in our group health plan for twelve months and acceleration of stock options and any other equity awards.

Fischer Employment Contract

On August 11, 2014, we entered into an employment agreement with Mr. Gary L. Fischer, our Vice President and Chief Financial Officer. In the event that Mr. Fischer is terminated without cause, we shall pay Mr. Fischer an amount limited to the payment of his salary and other earned compensation through the effective date of termination in addition to any severance to which he may be entitled under our severance pay plan or policy or may be granted by the Compensation Committee.

If a change in control of AXT takes place, and within twelve (12) months thereafter, Mr. Fischer incurs an involuntary separation from service (within the meaning of Treas. Reg. § 1.409A-1(n)), our total liability to Mr. Fischer will be limited to the payment of his salary and other earned compensation through the effective date of the involuntary separation from service plus severance in a gross amount equal to one (1) year of his then current annual salary, plus continuation of coverage in the our group health plan for twelve months and acceleration of stock options and any other equity awards.

Release of Claims

As a condition to each executive's entitlement to receive the base salary amounts and equity award acceleration referenced in the tables on page 63 and page 74, respectively, the executive is required to execute a release of claims against us, which may include a non-competition agreement, which prohibits the executive from working in the our industry for a period equal to the greater of one year from the executive's termination of employment, or, in the case of a change in control, two years from the date of the change in control.

Compensation of Directors

Directors who are also our employees do not receive any additional compensation for their services as directors. Non-employee directors are paid a cash retainer and retainers for service on committees of the Board of Directors. In addition, each non-employee director is reimbursed for reasonable expenses incurred. We additionally granted restricted stock awards to non-employee directors in 2016 equal to such number of shares determined by dividing the sum of $60,000 by the closing prices of our common stock on The Nasdaq Global Select Market on the dates of grant, which resulted in the awards of 16,260 shares of restricted stock to each of our non-employee directors. These awards vest on the anniversary of the dates of grant, conditioned upon the recipient's continued service as a member of the Board or employee or other consultant on each relevant vesting date. During 2016, each of our non-employee directors received the following fees for board and committee meeting attendance.

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Board cash retainer:	• $35,000 per annum ($8,750 per quarter)
Annual Equity Grant	• Restricted stock awards valued at $60,000, based upon the closing stock price on the date of the grant vesting on the anniversary of the date of grant.
Annual cash retainers for committee service:	• Audit: $10,000 • Compensation: $5,000 • Nominating and Corporate Governance: $2,000
Annual cash retainers for committee chairs:	• Audit: $20,000 • Compensation: $10,000 • Nominating and Corporate Governance: $4,000
Non-executive Chairman of the Board:	• Annual cash retainer of $25,000

The following table sets forth information concerning the compensation earned during the last fiscal year by each individual who served as a director at any time during the fiscal year ended December 31, 2016:

Name	Fees Earned or Paid in Cash ($)	Restricted Stock Awards ($)	Non-Equity Incentive Plan Compensation ($)	All Other Compensation ($)	Total ($)
Jesse Chen	$ 79,000	$ 60,000	—	4,896	$ 143,896
David C. Chang	$ 57,000	$ 60,000	—	$ 12,029	$ 129,029
Leonard LeBlanc	$ 62,000	$ 60,000	—	543	$ 122,543

Compensation Committee Interlocks and Insider Participation

None of the members of the Committee is or has been an officer or employee of AXT. During fiscal year 2016, no member of the Committee had any relationship with us requiring disclosure under Item 404 of Regulation S-K.

During fiscal year 2016, none of our executive officers served on the compensation committee (or its equivalent) or on a board of directors of another entity any of whose executive officers served on the Committee or our Board.

Compensation Committee Report

We, the Compensation Committee of the Board of Directors of AXT, Inc., have reviewed and discussed the Compensation Discussion and Analysis included in this Annual Report on Form 10-K with management. Based on such review and discussion, we have recommended to the Board of Directors that the Compensation Discussion and Analysis be included in this Annual Report on Form 10-K for the fiscal year ended December 31, 2016.

THE COMPENSATION COMMITTEE

David C. Chang, Chair
Leonard J. LeBlanc
Jesse Chen

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Item 12. Security Ownership of Certain Beneficial Owners and Management and Related Stockholder Matters

Principal Stockholders and Stock Ownership by Management

The following table sets forth, as of February 27, 2017, certain information with respect to the beneficial ownership of our common stock by:

- each stockholder known by us to be the beneficial owner of more than 5% of our common stock;
- each of our directors and director nominees;
- each of our named executive officers; and
- all executive officers and directors as a group.

Except as otherwise indicated, the address of each beneficial owner is c/o AXT, Inc., 4281 Technology Drive, Fremont, California 94538.

Except as indicated in the footnotes to the table, we believe that the persons named in the table have sole voting and dispositive power with respect to all shares of common stock shown as beneficially owned by them, subject to community property laws, where applicable. For each named person, this percentage includes common stock, including restricted common stock, and stock options or other right to acquire beneficial ownership of common stock either currently or within 60 days of February 27, 2017. However, such common stock shall not be deemed outstanding for the purpose of completing the percentage owned by any other person. Percentages of beneficial ownership are based upon 33,031,479 shares of common stock outstanding on February 27, 2017.

Beneficial Owner(1)	Number of Shares Beneficially Owned(2)	Percent(3)	
5% Stockholders:			
Perritt Capital Management, Inc. (4)			
300 South Wacker, Suite 2880 Chicago, Illinois 60606	1,810,181	5.48	%
Dimensional Fund Advisors LP (5)	2,251,705	6.82	%

Building One, 6300 Bee Cave Road, Austin, Texas 78746			
Directors and Named Executive Officers:			
Morris S. Young (6)	1,783,575	5.29	%
Robert G. Ochrym (7)	76,619	*	
Gary L. Fischer (8)	242,875	*	
Jesse Chen (9)	209,259	*	
David C. Chang (10)	164,984	*	
Leonard LeBlanc (11)	159,134	*	
Directors and executive officers as a group (6 persons)(12)	2,636,446	7.77	%

* Less than 1%.

(1) Except as otherwise indicated, the persons named in this table have sole voting and investment power with respect to all shares of Common Stock shown as beneficially owned by them, subject to community property laws where applicable and to the information contained in the footnotes to this table.

(2) Under the rules of the Securities and Exchange Commission, a person is deemed to be the beneficial owner of shares that can be acquired by such person within 60 days upon the exercise of options or other rights.

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(3) Calculated on the basis of 33,031,479 shares of Common Stock outstanding as of February 27, 2017, provided that any additional shares of Common Stock that a stockholder has the right to acquire within 60 days after February 27, 2017 are deemed to be outstanding for the purpose of calculating that stockholder's percentage beneficial ownership.

(4) Based on the most recently available Schedule 13G/A filed with the SEC on February 14, 2017 by Perritt Capital Management, Inc. ("Perritt Capital Management") and Perritt Funds, Inc. ("Perritt Funds"). According to its Schedule 13G/A, Perritt Capital Management reported as having sole voting power over 78,450 shares, shared voting power over 1,731,731 shares, sole dispositive power over 78,450 shares, shared dispositive power over 1,731,731 shares and beneficial ownership of 1,810,181 shares. Perritt Capital Management reported that it has shared voting power and dispositive power over 1,731,731 shares that are beneficially owned by Perritt Funds. The Schedule 13G/A contained information as of December 31, 2016 and may not reflect current holdings of AXT's stock.

(5) Based on a Schedule 13G/A filed with the SEC on February 9, 2017 by Dimensional Fund Advisors LP ("Dimensional Fund Advisors"). According to its Schedule 13G/A, Dimensional Fund Advisors reported as having sole voting power over 2,155,801 shares, shared voting power over no shares, sole dispositive power over 2,251,705 shares, shared voting power over no shares and beneficial ownership of 2,251,705 shares. Dimensional Fund Advisors reported that it furnishes investment advice to four investment companies registered under the Investment Company Act of 1940, as amended, and serves as investment manager or sub-adviser to certain other commingled funds, group trusts and separate accounts (such investment companies, trusts and accounts, collectively referred to as the "Funds"). The securities reported on the Schedule 13G/A are beneficially owned by the Funds. Dimensional Fund Advisors disclaims beneficial ownership of such securities. The Schedule 13G/A contained information as of December 31, 2016 and may not reflect current holdings of AXT's stock.

(6) Includes 1,120,304 shares held by the Young Family Trust, the Morris S. Young 2016 Annuity Trust, the Vickie Young 2016 Annuity Trust and the Morris Young Family Ltd. Partnership, of which Morris Young serve as trustee. Also includes 663,271 shares subject to options that may be exercised within 60 days after February 27, 2017.

(7) Includes 40,619 shares subject to options that may be exercised within 60 days after February 27, 2017.

(8) Includes 183,980 shares subject to options that may be exercised within 60 days after February 27, 2017.

(9) Includes 209,259, whether vested or unvested, shares of restricted stock awards.

(10) Includes 164,984, whether vested or unvested, shares of restricted stock awards.

(11) Includes 159,134, whether vested or unvested, shares of restricted stock awards.

(12)

See notes (6) through (12). Includes 1,748,576 shares of restricted stock awards, whether vested or unvested, and 887,870 shares subject to options that may be exercised and released within 60 days after February 27, 2017 beneficially owned by executive officers and directors.

Equity Compensation Plan Information

We currently maintain one equity compensation plan that provides for the issuance of common stock to officers and other employees, directors, and consultants. This plan is the 2015 Plan, which was approved by stockholders in May 2015. Our 1997 Plan was amended and restated as the 2007 Plan and all outstanding options originally issued under the 1997 Plan are reflected in the 2007 Plan. We continue to have outstanding options issued under the 2007 Plan as well as options issued and outstanding from the 2015 Plan. The following table sets forth information regarding outstanding

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options issued under the 2007 Plan and 2015 Plan and shares reserved for future issuance under the 2015 Plan as of December 31, 2016:

Plan Category	Number of shares to be issued upon exercise of outstanding options, warrants and rights (a)	Weighted-average exercise price of outstanding options, warrants and rights (b)	Number of shares remaining available for future issuance under 2015 Equity Incentive Plan (excluding shares reflected in column (a)) (c)
Equity compensation plans approved by stockholders 2007 and 2015 Equity Incentive Plan	3,779,040	$ 3.38	1,941,464
Equity compensation plans not approved by stockholders - None	N/A	N/A	N/A
Total	3,779,040	$ 3.38	1,941,464

Item 13. Certain Relationships and Related Transactions and Director Independence

Certain Relationships and Related Transactions

Since January 1, 2016, there has not been, nor is there currently proposed, any transaction or series of similar transactions to which we were or are to be a party in which the amount involved exceeds $120,000, and in which any director, executive officer or holder of more than 5% of any class of our voting securities or members of that person's immediate family had or will have a direct or indirect material interest other than the transactions described below.

Beijing Kaide Quartz Co. Ltd. ("Kaide") has been a supplier of customized quartz tubes to the Company since 2004. Beijing XiangHeMing Trade Co. Ltd., ("XiangHeMing") is a significant shareholder of Kaide. XiangHeMing was previously owned by, among others, certain immediate family members of Davis Zhang, our former President, China Operations, until at least sometime in 2004, at which time the official Chinese government records indicate that Mr. Zhang's immediate family members transferred their ownership of XiangHeMing to a third party. However, we are

currently unable to conclusively determine whether Mr. Zhang's immediate family members retained any economic interest in XiangHeMing after the transfer.

Procedures for Approval of Related Person Transactions

The Board is committed to upholding the highest legal and ethical conduct in fulfilling its responsibilities and recognizes that related party transactions can present a heightened risk of potential or actual conflicts of interest. Accordingly, as a general matter, it is our preference to avoid related party transactions. The Board adopted a formal related party transactions policy in February 2010. Our Related Party Transactions Policy seeks to prohibit all conflicts of interest in transactions between the Company and related parties, unless they have been approved by the Board of Directors of the Company. This policy applies to all employees and directors of the Company, our subsidiaries and our joint ventures.

The Audit Committee Charter requires that members of the Audit Committee, all of whom are independent directors, review and approve all related party transactions for which such approval is required under applicable law, including SEC and NASDAQ rules.

Pursuant to our Code of Business Conduct and Ethics, our employees, executive officers, and directors, including their immediate family members and affiliates, are prohibited from entering into a related party transaction with us without the prior consent of our Audit Committee (or other independent committee of our Board of Directors in cases where it is inappropriate for our Audit Committee to review such transaction due to a conflict of interest). Any

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request for us to enter into a transaction with an executive officer, director, principal stockholder, or any of such persons' immediate family members or affiliates, in which the amount involved exceeds $120,000 must first be presented to our Audit Committee for review, consideration and approval.

Director Independence

The Board has determined that each of Dr. David C. Chang, Jesse Chen and Leonard J. LeBlanc is an independent director for purposes of the Nasdaq Stock Market listing standards.

Item 14. Principal Accountant Fees and Services

The following table sets forth the aggregate fees billed to us for the fiscal years ended December 31, 2016 and 2015 by BPM LLP, our independent registered public accounting firm:

	Fiscal 2016	Fiscal 2015
Audit Fees (1)	$ 676,400	$ 657,787
Audit-Related Fees	$ —	$ —
Tax Fees	$ —	$ —
All Other Fees (2)	$ 19,425	$ 13,717

(1) Audit fees represent fees for professional services provided in connection with the audit of our annual consolidated financial statements, review of our quarterly condensed consolidated financial statements and services that are normally provided by BPM LLP in connection with statutory and regulatory filings or engagements.

(2) All other fees represent fees for professional services provided in connection with a transfer price study for 2016 and the review of a registration statement on Form S-3 filed on October 24, 2016.

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PART IV

Item 15. Exhibits and Financial Statement Schedules

(a)The following documents are filed as part of this report:

(1)Financial Statements:

INDEX TO CONSOLIDATED FINANCIAL STATEMENTS

Report of Independent Registered Public Accounting Firm, BPM LLP	82
Consolidated Balance Sheets	83
Consolidated Statements of Operations	84
Consolidated Statements of Comprehensive Income (Loss)	85
Consolidated Statements of Stockholders' Equity	86
Consolidated Statements of Cash Flows	87
Notes to Consolidated Financial Statements	88

(2)Financial Statement Schedules

All schedules have been omitted because the required information is not applicable or because the information required is included in the consolidated financial statements or notes thereto.

(b)Exhibits

See Index to Exhibits attached elsewhere to this Form 10-K. The exhibits listed in the accompanying Index to Exhibits are filed as part of, or incorporated by reference into, this report on Form 10-K.

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Report of Independent Registered Public Accounting Firm

To the Board of Directors and Stockholders of

AXT, Inc.

We have audited the accompanying consolidated balance sheets of AXT, Inc. and its subsidiaries (the "Company") as of December 31, 2016 and 2015, and the related consolidated statements of operations, comprehensive income (loss), stockholders' equity, and cash flows for each of the three years in the period ended December 31, 2016. The Company's management is responsible for these consolidated financial statements. Our responsibility is to express an opinion on these consolidated financial statements based on our audits.

We conducted our audits in accordance with the standards of the Public Company Accounting Oversight Board (United States). Those standards require that we plan and perform the audit to obtain reasonable assurance about whether the consolidated financial statements are free of material misstatement. An audit includes examining, on a test basis, evidence supporting the amounts and disclosures in the financial statements. An audit also includes assessing the accounting principles used and significant estimates made by management, as well as evaluating the overall financial statement presentation. We believe that our audits provide a reasonable basis for our opinion.

In our opinion, the consolidated financial statements referred to above present fairly, in all material respects, the financial position of AXT, Inc. and its subsidiaries. as of December 31, 2016 and 2015, and the results of their operations and their cash flows for each of the three years in the period ended December 31, 2016, in conformity with accounting principles generally accepted in the United States of America.

We also have audited, in accordance with the standards of the Public Company Accounting Oversight Board (United States), the Company's internal control over financial reporting as of December 31, 2016, based on criteria established in Internal Control—Integrated Framework (2013 Framework) issued by the Committee of Sponsoring Organizations of the Treadway Commission (COSO), and our report dated February 27, 2017, expressed an unqualified opinion thereon.

/s/ BPM LLP

San Jose, California

February 27, 2017

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AXT, INC.

CONSOLIDATED BALANCE SHEETS

(In thousands, except per share data)

	December 31, 2016	2015
ASSETS		
Current assets:		
Cash and cash equivalents	$ 36,152	$ 24,875
Short-term investments	11,415	11,437
Accounts receivable, net of allowances of $1,013 and $985 as of December 31, 2016 and December 31, 2015, respectively	14,453	18,468
Inventories	40,152	38,012
Prepaid expenses and other current assets	5,114	4,096
Total current assets	107,286	96,888
Long-term investments	6,156	7,691
Property, plant and equipment, net	27,805	31,422
Related party notes receivable – long-term	157	166
Other assets	12,842	15,729
Total assets	$ 154,246	$ 151,896
LIABILITIES AND STOCKHOLDERS' EQUITY		
Current liabilities:		
Accounts payable	$ 6,691	$ 6,460
Accrued liabilities	6,359	6,381
Total current liabilities	13,050	12,841
Long-term portion of royalty payments	575	1,150
Other long-term liabilities	330	344
Total liabilities	13,955	14,335
Commitments and contingencies (Note 17)		
Stockholders' equity:		
Preferred stock Series A, $0.001 par value; 2,000 shares authorized; 883 shares issued and outstanding as of December 31, 2016 and December 31, 2015 (Liquidation preference of $6.6 million and $6.5 million as of December 31, 2016 and December 31, 2015.)	3,532	3,532
Common stock, $0.001 par value; 70,000 shares authorized; 33,032 and 32,548 shares issued and outstanding as of December 31, 2016 and December 31, 2015.	33	32
Additional paid-in-capital	197,078	194,646
Accumulated deficit	(64,985)	(70,621)
Accumulated other comprehensive income	253	4,382
Total AXT, Inc. stockholders' equity	135,911	131,971
Noncontrolling interests	4,380	5,590
Total stockholders' equity	140,291	137,561
Total liabilities and stockholders' equity	$ 154,246	$ 151,896

See accompanying notes to consolidated financial statements.

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AXT, INC.

CONSOLIDATED STATEMENTS OF OPERATIONS

(In thousands, except per share data)

	Year Ended December 31,		
	2016	2015	2014
Revenue	$ 81,349	$ 77,502	$ 83,499
Cost of revenue	54,968	60,673	66,332
Gross profit	26,381	16,829	17,167
Operating expenses:			
Selling, general and administrative	13,880	16,064	14,970
Research and development	5,850	5,664	4,144
Restructuring charge	226	—	907
Total operating expenses	19,956	21,728	20,021
Income (loss) from operations	6,425	(4,899)	(2,854)
Interest income, net	409	412	483
Equity in earnings (loss) of unconsolidated joint ventures	(1,995)	462	1,528
Other income, net	860	2,023	361
Income (loss) before provision for income taxes	5,699	(2,002)	(482)
Provision for income taxes	733	531	215
Net income (loss)	4,966	(2,533)	(697)
Less: Net (income) loss attributable to noncontrolling interests	670	305	(691)
Net income (loss) attributable to AXT, Inc.	$ 5,636	$ (2,228)	$ (1,388)
Net income (loss) attributable to AXT, Inc. per common share:			
Basic	$ 0.17	$ (0.07)	$ (0.05)
Diluted	$ 0.17	$ (0.07)	$ (0.05)
Weighted average number of common shares outstanding:			
Basic	32,139	32,183	32,452
Diluted	32,894	32,183	32,452

See accompanying notes to consolidated financial statements.

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AXT, INC.

CONSOLIDATED STATEMENTS OF COMPREHENSIVE INCOME (LOSS)

(In thousands)

	Year Ended December 31,		
	2016	2015	2014
Net income (loss)	$ 4,966	$ (2,533)	$ (697)
Other comprehensive loss, net of tax:			
Change in foreign currency translation loss, net of tax	(4,305)	(3,425)	(377)
Change in unrealized loss on available-for-sale investments, net of tax	(312)	(313)	(964)
Total other comprehensive loss, net of tax	(4,617)	(3,738)	(1,341)
Comprehensive income (loss)	349	(6,271)	(2,038)
Less: Comprehensive (income) loss attributable to noncontrolling interests	1,158	752	(630)
Comprehensive income (loss) attributable to AXT, Inc.	$ 1,507	$ (5,519)	$ (2,668)

See accompanying notes to consolidated financial statements.

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AXT, INC.

CONSOLIDATED STATEMENTS OF STOCKHOLDERS' EQUITY

(In thousands)

	Preferred Stock Shares	$	Common Stock Shares	$	Additional Paid-In Capital	Accumulated Deficit	Other Comprehensive Income	AXT, Inc. Stockholders' Equity	Noncontrolling Interests	Total Stockh Equity
ry 1, 2014	883	3,532	32,605	32	194,156	(67,005)	8,953	139,668	5,878	145
non stock s exercised			111		134			134		134
-based ensation ce of on					1,129			1,129		1,12
n the form of ted stock			121							
come (loss) vidend ed by joint es						(1,388)		(1,388)	691	(69
									(83)	(83)
ehensive e							(1,280)	(1,280)	(61)	(1,3
ce as of mber 31, 2014	883	3,532	32,837	32	195,419	(68,393)	7,673	138,263	6,425	144
non stock s exercised			119		165			165		165
hased cted stock			(908)		(2,287)			(2,287)		(2,2
s canceled			(47)							
-based ensation ce of on					1,349			1,349		1,34
n the form of ted stock			547							
ss vidend ed by joint es						(2,228)		(2,228)	(305)	(2,5
									(83)	(83)
ehensive loss							(3,291)	(3,291)	(447)	(3,7
	883	3,532	32,548	32	194,646	(70,621)	4,382	131,971	5,590	137

ce as of nber 31, 2015 non stock s exercised			555	1	1,336			1,337		1,33
cted stock s canceled			(207)					—		—
-based ensation					1,096			1,096		1,09
ce of on n the form of ted stock			136					—		—
come (loss) vidend ed by joint es						5,636		5,636	(670)	4,96
								—	(52)	(52)
ehensive loss							(4,129)	(4,129)	(488)	(4,6
ce as of nber 31, 2016	883	$ 3,532	33,032	$ 33	$ 197,078	$ (64,985)	$ 253	$ 135,911	$ 4,380	$ 140

See accompanying notes to consolidated financial statements.

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AXT, INC.

CONSOLIDATED STATEMENTS OF CASH FLOWS

(In thousands)

	Year Ended December 31,		
	2016	2015	2014
Cash flows from operating activities:			
Net income (loss)	$ 4,966	$ (2,533)	$ (697)
Adjustments to reconcile net income (loss) to net cash provided by operating activities:			
Depreciation and amortization	4,865	5,494	5,639
Amortization of marketable securities premium	94	218	432
Stock-based compensation	1,096	1,349	1,129
Provision for doubtful accounts	313	211	9
Realized gain on sale of available for sale securities	(429)	(859)	(1,263)
Loss (gain) on disposal of equipment	5	17	(13)
Loss (gain) from equity method investments, net	1,995	(462)	(1,528)
Changes in operating assets and liabilities:			
Accounts receivable	3,465	(1,076)	(2,959)
Inventories	(2,959)	(45)	479
Prepaid expenses and other current assets	(1,223)	1,405	2,393
Other assets	458	542	946
Accounts payable	524	(485)	(979)
Accrued liabilities	* 205	(1,085)	742
Other long-term liabilities, including royalties	(871)	(813)	(833)
Net cash provided by operating activities	12,504	1,878	3,497
Cash flows from investing activities:			
Purchases of equipment	(2,728)	(4,150)	(1,971)
Proceeds from sale of equipment	35	2	13
Purchases of available for sale securities	(11,936)	(12,787)	(11,828)
Proceeds from sales and maturities of available for sale securities	13,516	14,309	13,928
Investments in non-marketable equity investments	—	(162)	—
Dividends received from equity method investments	—	305	327
Net cash provided by (used in) investing activities	(1,113)	(2,483)	469
Cash flows from financing activities:			
Proceeds from common stock options exercised	1,337	165	134
Repurchase of the Company’s common stock, including commission	—	(2,287)	—
Dividends paid by joint ventures to their minority shareholders	(39)	(112)	(166)
Net cash provided by (used in) financing activities	1,298	(2,234)	(32)
Effect of exchange rate changes on cash and cash equivalents	(1,412)	(1,100)	(81)
Net increase (decrease) in cash and cash equivalents	11,277	(3,939)	3,853
Cash and cash equivalents at the beginning of the period	24,875	28,814	24,961
Cash and cash equivalents at the end of the period	$ 36,152	$ 24,875	$ 28,814
Supplemental disclosures:			
Income taxes paid, net of refunds	$ 788	$ 284	$ 293

* Dividend accrued but not paid by joint ventures of $499, $534 and $563 was included in accrued liabilities as of December 31, 2016, 2015 and 2014, respectively

See accompanying notes to consolidated financial statements.

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AXT, INC.

NOTES TO CONSOLIDATED FINANCIAL STATEMENTS

Note 1. The Company and Summary of Significant Accounting Policies

The Company

AXT, Inc. (“AXT”, “we,” “us,” and “our” refer to AXT, Inc. and its consolidated subsidiaries) is a worldwide developer and producer of high-performance compound and single element semiconductor substrates, also known as wafers. Our consolidated subsidiaries produce and sell certain raw materials some of which are used in our substrate manufacturing process and some of which are sold to other companies.

Our substrate wafers are used when a typical silicon substrate wafer cannot meet the conductive requirements of a chip. The dominant substrates used in producing semiconductor chips and other electronic circuits are made from silicon. However, certain chips may become too hot or perform their function too slowly if silicon is used as the base material. In addition, optoelectronic applications, such as LED lighting and chip-based lasers, do not use silicon substrates because they require a wave form frequency that cannot be achieved using silicon. Alternative or specialty materials are used to replace silicon as the preferred base in these situations. Our wafers provide such alternative or specialty materials. We operate our business as one segment with two product lines: specialty material substrates and raw materials. In 2016, our substrate product group generated 81% of our revenue and raw materials product group generated 19%. Our compound substrates combine indium with phosphorous (indium phosphide: InP) or gallium with arsenic (gallium arsenide: GaAs). Our single element substrates are made from germanium (Ge).

Our raw materials include both raw gallium and purified gallium. We use purified gallium in producing our GaAs substrates and sell both raw gallium and purified gallium in the open market to other companies for use in magnetic materials, high temperature thermometers and growing single crystal ingots including gallium arsenide, gallium nitride, gallium antimonide, gallium phosphide and other materials and alloys. We also produce pyrolytic boron nitride (pBN) crucibles used in the high temperature (typically in the range 500 C to 1,500 C) growth process of single crystal ingots and epitaxial layer growth in MBE reactors. We use these pBN crucibles in our own ingot growth processes and also sell them in the open market to other companies.

Principles of Consolidation

The consolidated financial statements include the accounts of AXT, our wholly-owned subsidiary, Beijing Tongmei Xtal Technology Co., Ltd., and our majority-owned, or significantly controlled subsidiaries, Beijing JiYa Semiconductor Material Co., Ltd., Nanjing Jin Mei Gallium Co., Ltd. and Beijing BoYu Semiconductor Vessel Craftwork Technology Co., Ltd. All significant inter company accounts and transactions have been eliminated. Investments in business entities in which we do not have controlling interest, but have the ability to exercise significant influence over operating and financial policies (generally 20-50% ownership), are accounted for by the equity method. We have seven companies accounted for by the equity method. For subsidiaries that we consolidate, we reflect the noncontrolling interest of the portion we do not own on our consolidated balance sheets in stockholders’ equity and in our consolidated statements of operations.

Reclassifications

Certain reclassifications have been made to prior periods' financial statements to conform to the current period presentation. These reclassifications did not result in any change in previously reported net income (loss) or stockholders' equity.

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Use of Estimates

The preparation of financial statements in conformity with accounting principles generally accepted in the United States of America requires management to make estimates, judgments and assumptions. We believe that the estimates, judgments, and assumptions upon which management relies are reasonable based on information available at the time that these estimates, judgments, and assumptions are made. These estimates, judgments, and assumptions can affect the reported amounts of assets and liabilities as of the date of the consolidated financial statements as well as the reported amounts of revenues and expenses during the periods presented. To the extent there are material differences between these estimates and actual results, our consolidated financial statements would be affected.

Fair Value of Financial Instruments

The carrying amounts of certain of our financial instruments including cash and cash equivalents, accounts receivable, short-term investments and long-term investments, accounts payable and accrued liabilities approximate fair value due to their short maturities. Certain cash equivalents and investments are required to be adjusted to fair value on a recurring basis. See Note 2.

Fair Value of Investments

ASC topic 820, Fair value measurement (“ASC 820”) establishes three levels of inputs that may be used to measure fair value.

Level 1 instruments represent quoted prices in active markets. Therefore, determining fair value for Level 1 instruments does not require significant management judgment, and the estimation is not difficult.

Level 2 instruments include observable inputs other than Level 1 prices, such as quoted prices for similar instruments in markets with insufficient volume or infrequent transactions (less active markets), issuer bank statements, credit ratings, non-binding market consensus prices that can be corroborated with observable market data, model-derived valuations in which all significant inputs are observable or can be derived principally from or corroborated with observable market data for substantially the full term of the assets or liabilities, or quoted prices for similar assets or liabilities. These Level 2 instruments require more management judgment and subjectivity compared to Level 1 instruments, including:

- Determining which instruments are most comparable to the instrument being priced requires management to identify a sample of similar securities based on the coupon rates, maturity, issuer, credit rating, and instrument type, and subjectively select an individual security or multiple securities that are deemed most similar to the security being priced.
- Determining which model-derived valuations to use in determining fair value requires management judgment. When observable market prices for similar securities or comparable securities are not available, we price our marketable debt instruments using non-binding market consensus prices that are corroborated with observable market data or pricing models, such as discounted cash flow models, with all significant inputs derived from or corroborated with observable market data.

Level 3 instruments include unobservable inputs to the valuation methodology that are significant to the measurement of fair value of assets or liabilities. The determination of fair value for Level 3 instruments requires the most management judgment and subjectivity.

We place short-term foreign currency hedges that are intended to offset the potential cash exposure related to fluctuations in the exchange rate between the United States dollar and Japanese yen. We measure the fair value of these foreign currency hedges at each month end and quarter end using current exchange rates and in accordance with

generally accepted accounting principles. At quarter end any foreign currency hedges not settled are netted in “accrued liabilities” on the consolidated balance sheet and classified as Level 3 assets and liabilities. As of December 31, 2016

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and 2015, the net change in fair value from the placement of the hedge to settlement had a de minimis impact to the consolidated results.

Foreign Currency Translation

The functional currency of our Chinese subsidiaries is the Renminbi, the local currency of China. Transaction gains and losses resulting from transactions denominated in currencies other than the U.S. dollar or in the functional currencies of our subsidiaries are included in “other income (expense), net” for the years presented. The transaction gains for the year ended December 31, 2016 totaled $232,000. The transaction gain totaled $717,000 and a transaction loss totaled $1.0 million for the years ended December 31, 2015 and 2014, respectively.

The assets and liabilities of the subsidiaries are translated at the rates of exchange on the balance sheet date. Revenue and expense items are translated at the average rate of exchange for the period. Gains and losses from foreign currency translation are included in “other comprehensive income (loss)” in the consolidated statements of comprehensive income (loss).

Revenue Recognition

We manufacture and sell high-performance compound semiconductor substrates including indium phosphide and semi-conducting and semi-insulating gallium arsenide and germanium wafers, and our three consolidated subsidiaries sell certain raw materials including 99.99% pure gallium (4N Ga), high purity gallium (7N Ga), pyrolytic boron nitride (pBN) crucibles and boron oxide (B2O3). After we ship our products, there are no remaining obligations or customer acceptance requirements that would preclude revenue recognition. Our products are typically sold pursuant to a purchase order placed by our customers, and our terms and conditions of sale do not require customer acceptance. We recognize revenue upon shipment and transfer of title of products to our customers, which is either upon shipment from our dock, receipt at the customer’s dock, or removal from consignment inventory at the customer’s location, provided that we have received a valid purchase order, the price is fixed or determinable, title and risk of ownership have transferred, collection of resulting receivables is probable, and product returns are reasonably estimable. Revenue is net of any taxes assessed by any governmental authority.

We do not provide training, installation or commissioning services. We assess the probability of collection based on a number of factors including past history with the customer and credit worthiness. We provide for future returns based on historical experience, current economic trends and changes in customer demand at the time revenue is recognized.

Accounting for Sales Taxes in Net Revenues

We record sales taxes collected on sales of our products and for amounts not yet remitted to tax authorities as accrued liabilities on our consolidated balance sheets.

Risks and Concentration of Credit Risk

Our business is very dependent on the semiconductor, lasers and optical industries which can be highly cyclical and experience downturns as a result of economic changes, overcapacity, and technological advancements. Significant

technological changes in the industry or customer requirements, or the emergence of competitive products with new capabilities or technologies, could adversely affect our operating results. In addition, a significant portion of our revenues and net income is derived from international sales. Fluctuations of the United States dollar against foreign currencies and changes in local regulatory or economic conditions, particularly in an emerging market such as China, could adversely affect operating results.

We depend on a limited number of suppliers for certain raw materials, components and equipment used in manufacturing our products, including quartz tubing and polishing solutions. We generally purchase these materials through standard purchase orders and not pursuant to long-term supply contracts.

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Financial instruments that potentially subject us to concentration of credit risk consist primarily of cash and cash equivalents, short-term investments, and trade accounts receivable. We invest primarily in money market accounts, certificates of deposits, corporate bonds and notes, and government securities. The composition and maturities are regularly monitored by management. Such deposits are in excess of the amount of the insurance provided by the federal government on such deposits. We are exposed to credit risks in the event of default by the issuers to the extent of the amount recorded on the consolidated balance sheets.

We perform ongoing credit evaluations of our customers' financial condition, and limit the amount of credit extended when deemed necessary, but generally do not require collateral. The credit risk in our accounts receivable is mitigated by our credit evaluation process and the geographical dispersion of sales transactions. One customer accounted for 13% of our trade accounts receivable as of December 31, 2016 and one customer accounted for 22% of our trade accounts receivable as of December 31, 2015.

No customer represented more than 10% of our revenue for the year ended December 31, 2016. One customer, IQE Group, represented 12% of our revenue for the year ended December 31, 2015 while no customer represented more than 10% of our revenue for the year ended December 31, 2014. Our top five customers, although not the same five customers for each period, represented 35%, 40% and 34% of revenue for the years ended December 31, 2016, 2015 and 2014, respectively.

Cash and Cash Equivalents

We consider investments in highly liquid instruments purchased with an original maturity of three months or less to be cash equivalents. Cash equivalents consist primarily of certificate of deposits. Cash and cash equivalents are stated at cost, which approximates fair value.

Short-Term and Long-Term Investments

We classify our investments in marketable debt and equity securities as available-for-sale securities in accordance with ASC topic 320, Investments — Debt and Equity Securities ("ASC 320"). Short-term and long-term investments are comprised of available-for-sale marketable debt securities, which consist primarily of certificates of deposit, corporate bonds and notes, and government securities. These investments are reported at fair value as of the respective balance sheet dates with unrealized gains and losses included in accumulated other comprehensive income within stockholders' equity on the consolidated balance sheets. The amortized cost of securities is adjusted for amortization of premiums and accretion of discounts to maturity. Such amortization is included in "other income (expense), net" in the consolidated statements of operations. Realized gains and losses and declines in value judged to be other than temporary on available-for-sale securities are also included in "other income (expense), net" in the consolidated statements of operations. The cost of securities sold is based upon the specific identification method.

Accounts Receivable and Allowance for Doubtful Accounts and Sales Returns

Accounts receivable are recorded at the invoiced amount and are not interest bearing. We periodically review the likelihood of collection on our accounts receivable balances and provide an allowance for doubtful accounts receivable primarily based upon the age of these accounts. We evaluate receivables from U.S. customers with an emphasis on balances in excess of 90 days and for receivables from customers located outside the U.S. with an emphasis on balances in excess of 120 days and establish a reserve allowance on the receivable balances if needed. The reason for the difference in the evaluation of receivables between foreign and U.S. customers is that U.S. customers have historically made payments in a shorter period of time than foreign customers. Foreign business practices generally require us to allow customer payment terms that are longer than those accepted in the United States. We assess the probability of collection based on a number of factors, including the length of time a receivable

balance has been outstanding, our past history with the customer and their credit worthiness.

We exercise judgment when determining the adequacy of these reserves as we evaluate historical bad debt trends, general economic conditions in the United States and internationally, and changes in customer financial conditions. Uncollectible receivables are recorded as bad debt expense when all efforts to collect have been exhausted

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and recoveries are recognized when they are received. As of December 31, 2016 and 2015, our accounts receivable, net balance was $14.5 million and $18.5 million, respectively, which was net of an allowance for doubtful accounts of $653,000 and $561,000, respectively. During 2016, we increased this allowance for doubtful accounts by $92,000 due to the poor financial condition of a few customers partially offset by recoveries. During 2015, we increased this allowance for doubtful accounts by $151,000 primarily because of the poor financial condition of a few customers. No amounts have been written off. If actual uncollectible accounts differ substantially from our estimates, revisions to the estimated allowance for doubtful accounts would be required, which could have a material impact on our financial results for future periods.

The allowance for sales returns is also deducted from gross accounts receivable. During 2016, we utilized $360,000 and charged an additional $296,000 resulting in the ending balance of allowance for sales returns of $360,000 as of December 31, 2016. During 2015, we utilized $423,000 and charged an additional $434,000 resulting in the ending balance of allowance for sales returns of $424,000 as of December 31, 2015.

Warranty Reserve

We maintain a warranty reserve based upon our claims experience during the prior twelve months and any pending claims and returns of which we are aware. Warranty costs are accrued at the time revenue is recognized. As of December 31, 2016 and 2015, accrued product warranties totaled $251,000 and $497,000, respectively. The decrease in accrued product warranties is primarily attributable to decreased claims for quality issues experienced by some customers and reduction in estimated replacement costs. If actual warranty costs or pending new claims differ substantially from our estimates, revisions to the estimated warranty liability would be required, which could have a material impact on our financial condition and results of operations for future periods.

Inventories

Inventories are stated at the lower of cost (approximated by standard cost) or market. Cost is determined using the weighted average cost method. Our inventory consists of raw materials as well as finished goods and work-in-process that include material, labor and manufacturing overhead costs. We routinely evaluate the levels of our inventory in light of current market conditions in order to identify excess and obsolete inventory, and we provide a valuation allowance for certain inventories to their estimated net realizable value based upon the age and quality of the product and the projections for sale of the completed products.

Property, Plant and Equipment

Property, plant and equipment are stated at cost less accumulated depreciation computed using the straight-line method over the estimated economic lives of the assets, which vary from 1 to 27.5 years. Leasehold improvements are amortized using the straight-line method over the shorter of the estimated useful life or the term of the lease. We generally depreciate computer, software, office equipment, furniture and fixtures 3 to 5 years, machinery and equipment 1 to 5 years, automobiles 5 to 10 years, leasehold and building improvements over 10 years, or lease term if shorter, and buildings over 27.5 years. Repairs and maintenance costs are expensed as incurred.

Impairment of Long-Lived Assets

We evaluate the recoverability of property, equipment and intangible assets in accordance with ASC topic 360, Property, Plant and Equipment (“ASC 360”). When events and circumstance indicate that long-lived assets may be impaired, our management compares the carrying value of the long-lived assets to the projection of future undiscounted cash flows attributable to such assets. In the event that the carrying value exceeds the future undiscounted cash flows, we record an impairment charge against income equal to the excess of the carrying value

over the asset’s fair value. Fair values are determined based on quoted market values, discounted cash flows or internal and external appraisals, as applicable. We did not recognize any impairment charges of long-lived assets in 2016, 2015 and 2014.

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Impairment of Investments

All available-for-sale securities are periodically reviewed for impairment. An investment is considered to be impaired when its fair value is less than its amortized cost basis and it is more likely than not that we will be required to sell the impaired security before recovery of its amortized cost basis. Factors considered in determining whether a loss is temporary include the magnitude of the decline in market value, the length of time the market value has been below cost (or adjusted cost), credit quality, and our ability and intent to hold the securities for a period of time sufficient to allow for any anticipated recovery in market value.

We also invest in equity instruments of privately-held companies in China for business and strategic purposes. Investments in our non-consolidated joint venture companies are classified as other assets and accounted for under either the equity or cost method, depending on whether we have the ability to exercise significant influence over their operations or financial decisions. We monitor our investments for impairment and record reductions in carrying value when events or changes in circumstances indicate that the carrying value may not be recoverable. Determination of impairment is highly subjective and is based on a number of factors, including an assessment of the strength of the subsidiary's management, the length of time and extent to which the fair value has been less than our cost basis, the financial condition and near-term prospects of the subsidiary, fundamental changes to the business prospects of the subsidiary, share prices of subsequent offerings, and our intent and ability to hold the investment for a period of time sufficient to allow for any anticipated recovery in our carrying value. We estimate fair value of our cost method investments considering available information such as pricing in recent rounds of financing, current cash positions, earnings and cash flow forecasts, recent operational performance and any other readily available market data.

Segment Reporting

We operate in one segment for the design, development, manufacture and distribution of high-performance compound and single element semiconductor substrates and sale of materials. In accordance with ASC topic 280, Segment Reporting, our chief operating decision-maker has been identified as our Chief Executive Officer, who reviews operating results to make decisions about allocating resources and assessing our performance for the Company. We discuss revenue and capacity for both AXT and our joint ventures collectively, when determining capacity constraints and need for raw materials in our business, and consider their capacity when determining our strategic and product marketing and advertising strategies. While we consolidate our majority-owned or significantly controlled joint ventures, we do not allocate any portion of overhead, interest and other income, interest expense or taxes to them. We therefore have determined that our joint venture operations do not constitute an operating segment. Since we operate in one segment, all financial segment and product line information can be found in the consolidated financial statements.

Stock Based Compensation

We have employee stock option plans, which are described more fully in Note 11—Employee Benefit Plans and Stock-based Compensation. We account for stock based compensation in accordance with the provisions of ASC topic 718, Compensation-Stock Compensation ("ASC 718"). We utilize the Black Scholes option pricing model to estimate the grant date fair value of stock options, which requires the input of highly subjective assumptions, including estimating stock price volatility and expected term. Stock based compensation cost is measured at each grant date, based on the fair value of the award, and is recognized as expense and as an increase in additional paid-in-capital over the requisite service period of the award.

Research and Development

Research and development costs consist primarily of salaries, including stock-based compensation expense and related personnel costs, depreciation, materials and product testing and are expensed as incurred.

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Advertising Costs

Advertising costs, included in selling, general and administrative expenses, are expensed as incurred. Advertising costs for the years ended December 31, 2016, 2015 and 2014 were $10,000, $10,000 and $10,000, respectively.

Shipping and Handling costs

We include fees billed to customers and costs incurred for shipping and handling as a component of cost of revenues.

Income Taxes

We account for income taxes in accordance with ASC topic 740, Income Taxes (“ASC 740”), which requires that deferred tax assets and liabilities be recognized using enacted tax rates for the effect of temporary differences between the book and tax bases of recorded assets and liabilities. ASC 740 also requires that deferred tax assets be reduced by a valuation allowance if it is more likely than not that a portion of the deferred tax asset will not be realized. The impact of ASC 740 is more fully described in Note 13.

Comprehensive Income (loss)

We report comprehensive income (loss) in accordance with the provisions of ASC topic 220 Comprehensive Income (“ASC 220”) which establishes standards for reporting comprehensive income or loss and its components in the financial statements. The components of other comprehensive income include unrealized gains and losses on marketable securities and foreign currency translation adjustments. Comprehensive income (loss) is presented in the consolidated statements of comprehensive income (loss), net of tax.

Net Income (loss) Per Share

Basic net income (loss) per share is computed using the weighted average number of common shares outstanding during the periods less shares of common stock subject to repurchase and non-vested stock awards. Diluted net income (loss) per share is computed using the weighted average number of common shares outstanding and potentially dilutive common shares outstanding during the periods. The dilutive effect of outstanding stock options and restricted stock awards is reflected in diluted earnings per share by application of the treasury stock method. Potentially dilutive common shares consist of common shares issuable upon the exercise of stock options and vesting of restricted stock awards. Potentially dilutive common shares are excluded from the computation of weighted average number of common shares outstanding in net loss years, as their effect would be anti-dilutive to the computation.

Recent Accounting Pronouncements

In January 2016, the FASB issued ASU 2016-01, which made changes to the accounting for financial instruments that primarily affect equity investments, financial liabilities under the fair value option, and the presentation and disclosure requirements for financial instruments. The amendments in this update supersede the guidance to classify equity securities with readily determinable fair values into different categories (that is, trading or available-for-sale) and require equity securities to be measured at fair value with changes in the fair value recognized through net income. The standard amends financial reporting by providing relevant information about an entity’s equity investments and reducing the number of items that are recognized in other comprehensive income. This update will be effective for the annual periods beginning after December 15, 2017, and interim periods within those annual periods. We are currently assessing the impact of the future adoption of this standard on our consolidated financial statements.

In May 2014, the FASB issued ASU 2014-09, which applies to any entity that either enters into contracts with customers to transfer goods or services or enters into contracts for the transfer of non-financial assets, unless those contracts are within the scope of other standards, superseding the existing revenue recognition requirements in ASC Topic 605 “Revenue Recognition.” Pursuant to ASU 2014-09, an entity should recognize revenue to depict the transfer of promised goods or services to customers in an amount that reflects the consideration to which the entity expects to be

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entitled in exchange, as applied through a multi-step process to achieve that core principle. Subsequently, the FASB approved a deferral included in ASU 2015-14 that permits public entities to apply the amendments in ASU 2014-09 for annual reporting periods beginning after December 15, 2017, including interim reporting periods therein, and that would also permit public entities to elect to adopt the amendments as of the original effective date as applicable to reporting periods beginning after December 15, 2016.

The FASB has since issued additional updates of its new standard on revenue recognition issued in May 2014. In March 2016, an amendment was issued to clarify the implementation guidance on principal versus agent consideration. The guidance requires entities to determine whether the nature of its promise to provide goods or services to a customer is performed in a principal or agent capacity and to recognize revenue in a gross or net manner based on its principal/agent designation. In April 2016, amendments were issued to clarify the identification of performance obligations and the licensing implementation guidance in the initial standard. Amendments were issued in May 2016 related to its guidance on assessing collectability, presentation of sales tax, noncash consideration, and completed contracts and contract modification at transition, which reduce the potential for diversity in practice, and the cost and complexity of application at transition and on an ongoing basis. The new guidance allows for the amendment to be applied either retrospectively to each prior reporting period presented or retrospectively as a cumulative-effect adjustment as of the date of adoption. We are currently evaluating the impact that the adoption of ASU 2014-09 and ASU 2015-14 may have on our consolidated financial statements and have not elected a transition method as of the period ended December 31, 2016.

In February 2016, the FASB issued ASU 2016-02, which replaces the existing guidance for leases. The new standard establishes a right-of-use (ROU) model that requires a lessee to record a ROU asset and a lease liability on the balance sheet for all leases with terms longer than twelve months. Leases will be classified as either finance or operating, with classification affecting the pattern of expense recognition in the income statement. The guidance is effective for fiscal years beginning after December 15, 2018, including interim periods within those fiscal years and requires retrospective application. We will adopt in fiscal 2020 and is currently evaluating the impact of the guidance on its consolidated financial statements.

In March 2016, the FASB issued ASU No. 2016-07, which eliminates the requirement to retrospectively apply the equity method in previous periods when an investor initially obtains significant influence over an investee. Under the amended guidance, the investor should apply the equity method prospectively from the date the investment qualifies for the equity method. The guidance is effective for fiscal years beginning after December 15, 2016, including interim periods within those fiscal years with early application permitted. We are currently evaluating the impact of the future adoption of this standard on our consolidated financial statements.

In March 2016, the FASB issued ASU No. 2016-09, which simplifies several aspects of the accounting for share based payment award transactions, including the accounting for income taxes, forfeitures and statutory tax withholding requirements, as well as classification in the statement of cash flows. ASU 2016-09 is effective for fiscal years beginning after December 15, 2016, including interim periods. We are currently evaluating the impact of the future adoption of this standard on our consolidated financial statements.

In August 2016, the FASB issued ASU No. 2016-15, which reduces diversity in practice where the FASB was either unclear or did not provide specific guidance for classifying cash payments and receipts in the statement of cash flows for eight specific transactions. The guidance is effective for fiscal years beginning after December 15, 2017, including interim periods within those fiscal years and requires retrospective application with early application permitted. We are currently evaluating the impact of the future adoption of this standard on our consolidated financial statements.

In October 2016, the FASB issued ASU No. 2016-16, which clarifies the accounting for the current and deferred income taxes for an intra-entity transfer of an asset other than inventory. The guidance is effective for fiscal years

beginning after December 15, 2017, including periods within those fiscal years and requires retrospective application with early application permitted. We are currently evaluating the impact of the future adoption of this standard on our consolidated financial statements.

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In January 2017, the FASB issued ASU No. 2017-01, which clarifies the definition of a business with the objective of adding guidance to assist entities with evaluating whether transactions should be accounted for as acquisitions (or disposals) of assets or businesses. The definition of a business affects many areas of accounting including acquisitions, disposals, goodwill, and consolidation. The guidance is effective for fiscal years beginning after December 15, 2017, including periods within those fiscal years and requires retrospective application with early application permitted. We are currently evaluating the impact of the future adoption of this standard on our consolidated financial statements.

Note 2. Cash, Cash Equivalents and Investments

Our cash and cash equivalents consist of cash and instruments with original maturities of less than three months. Our investments consist of instruments with original maturities of more than three months. As of December 31, 2016 and 2015, our cash, cash equivalents and investments are classified as follows (in thousands):

	December 31, 2016				December 31, 2015			
	Amortized Cost	Gross Unrealized Gain	Gross Unrealized (Loss)	Fair Value	Amortized Cost	Gross Unrealized Gain	Gross Unrealized (Loss)	Fair Value
Classified as:								
Cash	$ 23,948	$ —	$ —	$ 23,948	$ 10,289	$ —	$ —	$ 10,289
Cash equivalents:								
Certificates of deposit 1	12,204	—	—	12,204	14,586	—	—	14,586
Total cash and cash equivalents	36,152	—	—	36,152	24,875	—	—	24,875
Investments (available for sale):								
Certificates of deposit 2	8,999	1	(20)	8,980	9,795	1	(13)	9,783
Corporate bonds	8,479	—	(47)	8,432	8,776	—	(63)	8,713
Corporate equity securities	48	111	—	159	200	432	—	632
Total investments	17,526	112	(67)	17,571	18,771	433	(76)	19,128
Total cash, cash equivalents and investments	$ 53,678	$ 112	$ (67)	$ 53,723	$ 43,646	$ 433	$ (76)	$ 44,003
Contractual maturities on investments:								
Due within 1 year	$ 11,325			$ 11,415	$ 11,022			$ 11,437
Due after 1 through 5 years	6,201			6,156	7,749			7,691
	$ 17,526			$ 17,571	$ 18,771			$ 19,128

1. Certificate of deposit with original maturities of less than three months.
2. Certificate of deposit with original maturities of more than three months.

We manage our investments as a single portfolio of highly marketable securities that is intended to be available to meet our current cash requirements. We have no investments in auction rate securities. Certificates of deposit and corporate bonds are typically held until maturity. Corporate equity securities have no maturity and may be sold at any time. Our holding of corporate equity securities consists of common stock of GCS Holdings, Inc. (“GHI”) (previously Global Communication Semiconductors, Inc), a Taiwan publicly-traded company. Previously, we also owned the common stock of Intelligent Epitaxy Technology, Inc. (“IntelliEpi”). We began classifying IntelliEpi stock as an available-for-sale security upon its initial public offering in 2013 and sold our remaining IntelliEpi stock in the second quarter of 2015 and we no longer hold any IntelliEpi stock as of December 31, 2016. In 2015, our cash proceeds from sales of IntelliEpi stock, an available-for-sale investment, were $902,000, our cost was $43,000 and our gross realized gain was $859,000. In 2014, our cash proceeds from sales of this available-for-sale investment were $1.3 million, our cost was $82,000 and our gross realized gain was $1.3 million.

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We began classifying GHI as an available-for-sale security in the second quarter of 2015 when we determined that there was sufficient trading volume in the exchange for the stock to be deemed readily marketable. An unrealized gain of $111,000 and $432,000, net of tax, was recorded as of December 31, 2016 and 2015, respectively. This security is valued at fair market value at December 31, 2016 and will be marked to market with changes through other comprehensive income until sold. There is no assurance that we will realize this value when the stock is sold in the future. In 2016, we sold some of our GHI stock and our cash proceeds from sales of this available-for-sale investment was $581,000. Our cost was $152,000 and our gross realized gain from sales of this available-for-sale investment was $429,000. There were no sales of GHI stock for the year ended December 31, 2015.

The gross unrealized losses related to our portfolio of available-for-sale securities were primarily due to changes in interest rates and market and credit conditions of the underlying securities. We have determined that the gross unrealized losses on some of our available-for-sale securities as of December 31, 2016 are temporary in nature. We periodically review our investment portfolio to identify and evaluate investments that have indications of possible impairment. Factors considered in determining whether a loss is temporary include the magnitude of the decline in market value, the length of time the market value has been below cost (or adjusted cost), credit quality, and our ability and intent to hold the securities for a period of time sufficient to allow for any anticipated recovery in market value.

A portion of our investments would generate a loss if we sold them on December 31, 2016. The following table summarizes the fair value and gross unrealized losses related to available-for-sale securities, aggregated by investment category and length of time that individual securities have been in a continuous unrealized loss position as of December 31, 2016 (in thousands):

	In Loss Position < 12 months		In Loss Position > 12 months		Total In Loss Position	
As of December 31, 2016	Fair Value	Gross Unrealized (Losses)	Fair Value	Gross Unrealized (Losses)	Fair Value	Gross Unrealized (Losses)
Investments:						
Certificates of deposit	$ 5,211	$ (20)	$ 1,200	$ —	$ 6,411	$ (20)
Corporate bonds	5,037	(35)	3,395	(12)	8,432	(47)
Total in loss position	$ 10,248	$ (55)	$ 4,595	$ (12)	$ 14,843	$ (67)

The following table summarizes the fair value and gross unrealized losses related to available-for-sale securities, aggregated by investment category and length of time that individual securities have been in a continuous unrealized loss position as of December 31, 2015 (in thousands):

	In Loss Position < 12 months		In Loss Position > 12 months		Total In Loss Position	
As of December 31, 2015	Fair Value	Gross Unrealized (Loss)	Fair Value	Gross Unrealized (Loss)	Fair Value	Gross Unrealized (Loss)
Investments:						
Certificates of deposit	$ 4,509	$ (11)	$ 3,543	$ (2)	$ 8,052	$ (13)
Corporate bonds	6,866	(56)	1,847	(7)	8,713	(63)
Total in loss position	$ 11,375	$ (67)	$ 5,390	$ (9)	$ 16,765	$ (76)

Investments in Privately-held Companies

We have made strategic investments in private companies located in China in order to gain access at a competitive cost to raw materials that are critical to our substrate business (see Note 6). The investment balances for all of these companies, including minority investments indirectly in privately-held companies made by our consolidated subsidiaries accounted for under the equity method, are included in “other assets” in the consolidated balance sheets and totaled $11.3 million and $13.7 million as of December 31, 2016 and December 31, 2015, respectively. As of December 31, 2016, there were seven companies accounted for under the equity method.

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As noted above, in the second quarter of 2015, we re-classified our minority investment in GHI, which was accounted for under the cost method, as an available-for- sale security and valued the security at fair market value. As of December 31, 2016 and 2015, we no longer maintain any investments under the cost method. As of December 31, 2014, our investments in this unconsolidated company had a carrying value of $200,000 and were also included in “other assets” in the consolidated balance sheets.

Fair Value Measurements

We invest primarily in money market accounts, certificates of deposits, corporate bonds and notes, and government securities. ASC topic 820, Fair value measurement (“ASC 820”) establishes three levels of inputs that may be used to measure fair value. Level 1 instrument valuations are obtained from real-time quotes for transactions in active exchange markets of the asset or identical assets. Level 2 instrument valuations are obtained from readily-available, observable pricing sources for comparable instruments. Level 3 instrument valuations are obtained from unobservable inputs in which there is little or no market data, which require us to develop our own assumptions. On a recurring basis, we measure certain financial assets and liabilities at fair value, primarily consisting of our short-term and long-term investments.

The type of instrument valued based on quoted market prices in active markets include our money market funds, which are generally classified within Level 1 of the fair value hierarchy. Other than corporate equity securities which are based on quoted market prices and classified as Level 1, we classify our available-for-sale securities including certificates of deposit and corporate bonds as having Level 2 inputs. The valuation techniques used to measure the fair value of these financial instruments having Level 2 inputs were derived from bank statements, quoted market prices, broker or dealer statements or quotations, or alternative pricing sources with reasonable levels of price transparency. There were no changes in valuation techniques or related inputs in the year ended December 31, 2016. There have been no transfers between fair value measurement levels during the year ended December 31, 2016.

We place short-term foreign currency hedges that are intended to offset the potential cash exposure related to fluctuations in the exchange rate between the United States dollar and Japanese yen. We measure the fair value of these foreign currency hedges at each month end and quarter end using current exchange rates and in accordance with generally accepted accounting principles. At quarter end any foreign currency hedges not settled are netted in “accrued liabilities” on the consolidated balance sheet and classified as Level 3 assets and liabilities. As of December 31, 2016, the net change in fair value from the placement of the hedge to settlement at each month end during the quarter had a de minimis impact to the consolidated results.

The following table summarizes our financial assets and liabilities measured at fair value on a recurring basis in accordance with ASC 820 as of December 31, 2016 (in thousands):

	Balance as of December 31, 2016	Quoted Prices in Active Markets of Identical Assets (Level 1)	Significant Other Observable Inputs (Level 2)	Significant Unobservable Inputs (Level 3)
Assets:				
Cash equivalents and investments:				
Certificates of deposit	$ 21,184	$ —	$ 21,184	$ —
Corporate bonds	8,432	—	8,432	—
Corporate equity securities	159	159	—	—
Total	$ 29,775	$ 159	$ 29,616	$ —

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The following table summarizes our financial assets and liabilities measured at fair value on a recurring basis in accordance with ASC 820 as of December 31, 2015 (in thousands):

	Balance as of December 31, 2015	Quoted Prices in Active Markets of Identical Assets (Level 1)	Significant Other Observable Inputs (Level 2)	Significant Unobservable Inputs (Level 3)
Assets:				
Cash equivalents and investments:				
Certificates of deposit	$ 24,369	$ —	$ 24,369	$ —
Corporate bonds	8,713	—	8,713	—
Corporate equity securities	632	632	—	—
Total	$ 33,714	$ 632	$ 33,082	$ —

Items Measured at Fair Value on a Nonrecurring Basis

Certain assets that are subject to nonrecurring fair value measurements are not included in the table above. These assets include investments in privately-held companies accounted for by equity and cost method (See Note 6). We did not record other-than-temporary impairment charges for these investments during 2016.

Note 3. Inventories

The components of inventory are summarized below (in thousands):

	December 31, 2016	December 31, 2015
Inventories:		
Raw materials	$ 17,485	$ 19,532
Work in process	20,410	16,007
Finished goods	2,257	2,473
	$ 40,152	$ 38,012

As of December 31, 2016 and 2015, carrying values of inventories were net of inventory reserve of $12.0 million and $12.0 million, respectively, for excess and obsolete inventory and $254,000 and $625,000, respectively, for lower of cost or market reserves.

Note 4. Related Party Transactions

In August 2011, our consolidated joint venture, Beijing JiYa Semiconductor Material Co., Ltd. (“JiYa”), entered into a non-interest bearing note agreement in the amount of $1.6 million for a loan to one of its equity investment entities. The original term of the loan was for two years and ten months with three periodic principal payments required. After various amendments to the terms of the note, in December 2013 the parties agreed to delay all principal repayment until December 2017. In December 2016, we determined that this receivable was in substance an investment and began re-classifying this long term loan from “Related party notes receivable – long-term” to “Other assets” in our

consolidated balance sheets. As of December 31, 2016 and 2015, we included $1.4 million and $1.6 million, respectively, in “Other assets” in our consolidated balance sheets.

JiYa also purchases raw materials from one of its equity investment entities for production in the ordinary course of business. As of December 31, 2016 and 2015, amounts payable of $1.8 million and $2.4 million, respectively, were included in “accounts payable” in our consolidated balance sheets.

JiYa also sells raw materials to one of its equity investment entities for production in the ordinary course of business. As of December 31, 2016 and 2015, amounts receivable of $313,000 and $473,000, respectively, were included in “accounts receivable” in our consolidated balance sheets. During the three months ended December 31, 2016, we deemed the collection of the outstanding amount to be improbable and established an allowance in full.

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Beginning in 2012, our consolidated joint venture, Nanjing Jin Mei Gallium Co., Ltd. (“Jin Mei”), is contractually obligated under an agency sales agreement to sell raw material on behalf of its equity investment entity. Jin Mei bills the customers and remits the receipts, net of its portions of sales commission, to this equity investment entity. For the year ended December 31, 2016 and 2015, Jin Mei has recorded $1,000 and $1,000 income from agency sales, respectively, which were included in “other income (expense), net” in the consolidated statements of operations.

In March 2012, our wholly-owned subsidiary, Beijing Tongmei Xtal Technology Co., Ltd. (“Tongmei”), entered into an operating lease for the land it owns with our consolidated joint venture, Beijing BoYu Semiconductor Vessel Craftwork Technology Co., Ltd. (“BoYu”). The lease agreement for the land of approximately 22,081 square feet commenced on January 1, 2012 for a term of 10 years with annual lease payments of $24,000 subject to a 5% increase at each third year anniversary. The annual lease payment is due by January 31 of each year.

Tongmei has paid certain amounts on behalf of Donghai County Dongfang High Purity Electronic Materials Co., Ltd. (“Dongfang”), its equity investment entity, to purchase materials. The original agreement was signed between Tongmei and Dongfang in 2014 and the date of repayment was set as December 31, 2015. In 2015, both parties agreed to delay the date of repayment to December 31, 2017. As of December 31, 2016 and 2015, the balance of $107,000 and $114,000, respectively, were included in “Related party notes receivable – long term” in our consolidated balance sheets.

In April 2014, Tongmei loaned an additional of $43,000 to Dongfang. The loan bears interest at 6.15% per annum and the principal and interest totaling $50,000 as of December 31, 2016 is due on December 31, 2017. As of December 31, 2016, this balance, including both principal and interest, was included in “Related party notes receivable – long term” in our consolidated balance sheets.

Tongmei purchases raw materials from one of our equity investment entities, Emei Shan Jiamei Materials Co. Ltd. (“Jiamei”), for production in the ordinary course of business. As of December 31, 2016 and 2015, amounts payable of $377,000 and $70,000, respectively, were included in “accounts payable” in our consolidated balance sheets.

Tongmei also purchases raw materials from one of our equity investment entities, Xilingol Tongli Germanium Refine Co. Ltd. (“Tongli”), for production in the ordinary course of business. As of December 31, 2016 and 2015, amounts payable of $246,000 and $0, respectively, were included in “accounts payable” in our consolidated balance sheets.

In April 2016, our consolidated joint venture, BoYu, provided a personal loan of $173,000 to one of its executive employees. This loan is secured by the officer’s shares in BoYu. The loan bears interest at 2.75% per annum. Principal and accrued interest are due on March 31, 2019. As of December 31, 2016, including both principal and accrued interest, was included in “prepaid expenses and other current assets” in our consolidated balance sheets.

Tongmei also purchases raw materials from one of Jiya’s equity investment entities for production in the ordinary course of business. As of December 31, 2016 and 2015, amounts payable of $146,000 and $13,000, respectively, were included in “accounts payable” in our consolidated balance sheets.

Beijing Kaide Quartz Co. Ltd. (“Kaide”) has been a supplier of customized quartz tubes to the Company since 2004. Beijing XiangHeMing Trade Co. Ltd., (“XiangHeMing”) is a significant shareholder of Kaide. XiangHeMing was previously owned by, among others, certain immediate family members of Davis Zhang, our former President, China

Operations, until at least sometime in 2004, at which time the official Chinese government records indicate that Mr. Zhang's immediate family members transferred their ownership of XiangHeMing to a third party. However, we are currently unable to conclusively determine whether Mr. Zhang's immediate family members retained any economic interest in XiangHeMing after the transfer. As of December 31, 2016 and 2015, amounts payable to Kaide of $323,000 and $379,000, respectively, were included in "accounts payable" in our consolidated balance sheets.

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Our Related Party Transactions Policy seeks to prohibit all conflicts of interest in transactions between related parties and us, unless they have been approved by our Board of Directors. This policy applies to all of our employees, directors, and our consolidated subsidiaries. Our executive officers retain board seats on the board of directors of the companies in which we have invested in our China joint ventures. See Note 6 for further details.

Note 5. Property, Plant and Equipment, Net

The components of our property, plant and equipment are summarized below (in thousands):

	As of December 31,	
	2016	2015
Property, plant and equipment:		
Machinery and equipment, at cost	$ 41,254	$ 40,899
Less: accumulated depreciation and amortization	(37,311)	(36,044)
Building, at cost	29,600	30,388
Less: accumulated depreciation and amortization	(9,654)	(9,170)
Leasehold improvements, at cost	4,942	5,059
Less: accumulated depreciation and amortization	(3,608)	(3,306)
Construction in progress	2,582	3,596
	$ 27,805	$ 31,422

Depreciation and amortization expense was $4.9 million, $5.5 million and $5.6 million for the years ended 2016, 2015, and 2014 respectively.

Note 6. Investments in Privately-held Companies

We have made strategic investments in private companies located in China in order to gain access at a competitive cost to raw materials that are critical to our substrate business. We have six direct investments. Our consolidated subsidiaries have also made investments in private companies. We have four indirect investments. These companies form part of our overall supply chain.

Our direct investments are summarized below (in thousands):

	Investment Balance as of				
	December 31,	December 31,	Accounting	Ownership	
Company	2016	2015	Method	Percentage	
Beijing JiYa Semiconductor Material Co., Ltd.	$ 3,331	$ 3,331	Consolidated	46	%
Nanjing Jin Mei Gallium Co., Ltd.	592	592	Consolidated	83	%
Beijing BoYu Semiconductor Vessel Craftwork Technology Co., Ltd.	1,346	1,346	Consolidated	70	%
	$ 5,269	$ 5,269			
Donghai County Dongfang High Purity Electronic Materials Co., Ltd.	$ 1,498	$ 1,524	Equity	46	%
Xilingol Tongli Germanium Co. Ltd.	4,000	5,343	Equity	25	%
Emeishan Jia Mei High Purity Metals Co., Ltd.	1,101	1,081	Equity	25	%

$ 6,599	$ 7,948

Our ownership of Beijing JiYa Semiconductor Material Co., Ltd. (“JiYa”) is 46%. We continue to consolidate JiYa as we are the founding and largest shareholder, we appoint the general manager and controller and have the ability to exercise control in substance over the long-term strategic decisions made. Our Chief Executive Officer is chairman of the JiYa board and we have appointed one other representative, Davis Zhang, to serve on the board. Mr. Zhang was an executive officer of AXT for 27 years. Further, our Chief Financial Officer, Gary Fischer, is on the board of supervisors of JiYa.

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Our ownership of Nanjing Jin Mei Gallium Co., Ltd. ("Jin Mei") is 83%. We continue to consolidate Jin Mei as we have a controlling financial interest and have majority control of the board. Our Chief Executive Officer is chairman of the Jin Mei board and we have appointed two other representatives to serve on the board.

Our ownership of Beijing BoYu Semiconductor Vessel Craftwork Technology Co., Ltd ("BoYu") is 70%. We continue to consolidate BoYu as we have a controlling financial interest and have majority control of the board. Our Chief Executive Officer is chairman of the BoYu board and we have appointed two other representatives to serve on the board.

Although we have representation on the boards of directors of each of these companies, the daily operations of each of these companies are managed by local management and not by us. Decisions concerning their respective short- term strategy and operations, ordinary course of business capital expenditures, and decisions concerning sales of finished product, are made by local management with regular guidance and input from us.

During 2016, 2015, and 2014, the three consolidated joint ventures generated $0.1 million, $0.8 million and $3.0 million of income, respectively, of which a loss of $0.7 million, a loss of $0.3 million and a gain of $0.7 million, respectively were allocated to noncontrolling interests, resulting in $0.8 million, $1.2 million and $2.3 million of income, respectively, to our net income.

For AXT's three minority investment entities that are not consolidated, the investment balances are included in "other assets" in our consolidated balance sheets and totaled $6.6 million and $7.9 million as of December 31, 2016 and 2015, respectively. We own 46% of the ownership interests in one of these companies and 25% in each of the other two companies. These three companies are not considered variable interest entities because:

- all three companies have sustainable businesses of their own;
- our voting power is proportionate to our ownership interests;
- we only recognize our respective share of the losses and/or residual returns generated by the companies if they occur; and
- we do not have controlling financial interest in, do not maintain operational or management control of, do not control the board of directors of, and are not required to provide additional investment or financial support to any of these companies.

These three equity investment entities generated for AXT an equity loss of $1.2 million and $43,000 for the year ended December 31, 2016 and 2015, respectively, and an equity earnings of $569,000 for the years ended December 31, 2014, which was recorded as "equity in earnings (loss) of unconsolidated joint ventures" in the consolidated statements of operations.

Net loss recorded from all of the consolidated joint ventures and these three equity investment entities was $0.4 million for the year ended December 31, 2016. Net income recorded from all of the consolidated joint ventures and these three equity investment entities was $1.1 million and $2.9 million for the years ended December 31, 2015, and 2014, respectively.

We also maintain four minority investments indirectly in privately-held companies through our consolidated joint ventures. JiYa holds three investments and Jin Mei holds one investment. These minority investments are accounted for under the equity method in the books of our consolidated joint ventures. As of December 31, 2016 and 2015, our consolidated joint ventures included these minority investments in "other assets" in the consolidated balance sheets with a carrying value of $4.7 million and $5.8 million, respectively.

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AXT's three direct minority investment entities and the three minority investments of JiYa and the one minority investment of Jin Mei are not consolidated and are accounted for under the equity method and had the following summarized income information (in thousands) for the years ended December 31, 2016, 2015, and 2014, respectively:

	Year Ended December 31,			Our share for the Year Ended December 31,		
	2016	2015	2014	2016	2015	2014
Net revenue	$ 24,851	$ 36,259	$ 47,824	$ 6,441	$ 9,112	$ 11,887
Gross (loss) profit	(2,344)	8,327	21,436	(542)	1,954	5,340
Operating (loss) income	(7,388)	2,494	9,046	(1,828)	494	2,059
Net (loss) income	(7,947)	2,371	6,765	(1,995)	462	1,528

These seven minority investment entities that are not consolidated, but rather are accounted for under the equity method and had the following summarized balance sheet information (in thousands) for the years ended December 31, 2016 and 2015, respectively:

	As of December 31,	
	2016	2015
Current assets	$ 32,210	$ 32,097
Noncurrent assets	31,770	35,917
Current liabilities	24,449	18,185
Noncurrent liabilities	406	571

Our portion of the entity earnings from these seven minority investment entities that are not consolidated and are accounted for under the equity method were a loss of $2.0 million, a gain of $462,000 and a gain of $1.5 million for the years ended December 31, 2016, 2015, and 2014, respectively. Dividends received from these minority investment entities were $0, $305,000 and $327,000 for the years ended December 31, 2016, 2015, and 2014, respectively. Undistributed retained earnings relating to our investments in all these minority investment entities were $4.7 million and $6.6 million as of December 31, 2016 and 2015, respectively.

Note 7. Other Investments

During the second quarter of 2015, we re-classified our sole minority investment under the cost method as an available-for-sale security when we determined that there was sufficient trading volume in the exchange listing the company, GHI, for the stock to be deemed readily marketable. Since 2015 we no longer maintain any investments under the cost method.

Note 8. Accrued Liabilities

The components of accrued liabilities are summarized below (in thousands):

	As of December 31,

	2016	2015
Accrued compensation and related charges	$ 2,610	$ 2,129
Accrued professional services	583	709
Current portion of royalty payments	575	575
Dividends payable by consolidated joint ventures	499	534
Accrued product warranty	251	497
Accrued income taxes	203	225
Other accrued liabilities	1,638	1,712
	$ 6,359	$ 6,381

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Note 9. Debt

Prior to 2015, we had an unused credit facility with a bank that provided for a line of credit of $10.0 million. The line of credit was secured by marketable securities we had with the bank at that time. This line of credit was never used and there were no outstanding borrowings under this line of credit as of December 31, 2016, 2015 and 2014. This line of credit was terminated in January 2015 when we closed our investment account with this institution and moved all of our funds from this bank to a different bank. We did not apply for a new line of credit.

Note 10. Stockholders' Equity and Stock Repurchase Program

Stockholders' Equity

The 883,000 shares of $0.001 par value Series A preferred stock issued and outstanding as of December 31, 2016 and 2015, valued at $3,532,000 are non-voting and non-convertible preferred stock with a 5.0% cumulative annual dividend rate payable when declared by the board of directors and $4 per share liquidation preference over common stock, and must be paid before any distribution is made to common stockholders. These preferred shares were issued to Lyte Optronics, Inc. stockholders in connection with the completion of our acquisition of Lyte Optronics, Inc. on May 28, 1999.

Stock Repurchase Program

On February 21, 2013, our Board of Directors approved a stock repurchase program pursuant to which we may repurchase up to $6.0 million of our outstanding common stock through February 27, 2014. These purchases were to be made from time to time in the open market and were funded from our existing cash balances and cash generated from operations. During 2013, we repurchased approximately 285,000 shares at an average price of $2.51 per share for a total purchase price of $716,000 under the stock repurchase program. As of December 31, 2013, approximately $5.3 million remained available for future repurchases under this program. No shares were repurchased in 2014 under this program and the plan expired on February 27, 2014.

On October 27, 2014, our Board of Directors approved a stock repurchase program pursuant to which we may repurchase up to $5.0 million of our outstanding common stock. These repurchases can be made from time to time in the open market and are funded from our existing cash balances and cash generated from operations. During 2015, we repurchased approximately 908,000 shares at an average price of $2.52 per share for a total purchase price of approximately $2.3 million under the stock repurchase program. No shares were repurchased during 2016 under this program. As of December 31, 2016, approximately $2.7 million remained available for future repurchases under this program. See Item 5, Market for Registrant's Common Equity, Related Stockholder Matters and Issuer Purchases of Equity Securities in Part II.

Note 11. Employee Benefit Plans and Stock-based Compensation

Stock Option Plans and Equity Incentive Plans

In July 1997, our board of directors approved the 1997 Stock Option Plan ("1997 Plan"), which provides for the grant of incentive and non-qualified stock options to our employees, consultants and directors. Under the 1997 Plan, 5,423,583 shares of common stock have been authorized for issuance. Options granted under the 1997 Plan are generally for periods not to exceed ten years (five years if the option is granted to a 10% stockholder) and are granted at the fair market value of the stock at the date of grant as determined by the board of directors. Options granted under the 1997 Plan generally vest 25% at the end of one year and 2.1% each month thereafter, with full vesting after four years.

In May 2007, our shareholders approved our 2007 Equity Incentive Plan (the “2007 Plan”). The 2007 Plan is a restatement of the 1997 Plan which expired in 2007. The 1,928,994 share reserve of the 1997 Plan became the reserve of the 2007 Plan, together with 1,300,000 additional shares approved for issuance under the 2007 Plan. In May 2013, the shareholders approved an additional 2,000,000 shares to be issued under the 2007 plan. Awards may be made under the 2007 Plan are stock options, stock appreciation rights, restricted stock, restricted stock units, performance shares,

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performance units, deferred compensation awards and other stock based awards. Stock options and stock appreciation rights awarded under the 2007 Plan may not be repriced without stockholder approval. Stock options and stock appreciation rights may not be granted below fair market value. Stock options or stock appreciation rights generally shall not be fully vested over a period of less than three years from the date of grant and cannot be exercised more than 10 years from the date of grant. Restricted stock, restricted stock units, and performance awards generally shall not vest faster than over a three-year period (or a twelve month period if vesting is based on a performance measure). In December 2008, the 2007 Plan was amended to comply with the applicable requirements under Section 409A of the Internal Revenue Code.

In May 2015, our shareholders approved our 2015 Equity Incentive Plan (the "2015 Plan"). The 2015 Plan is a replacement of the 2007 Plan. The 1,804,869 share reserve of the 2007 Plan became the reserve of the 2015 Plan, together with 2,000,000 additional shares approved for issuance under the 2015 Plan. Awards that may be made under the 2015 Plan are stock options, stock appreciation rights, restricted stock, restricted stock units, performance shares, performance units, deferred compensation awards and other stock based awards. Stock options and stock appreciation rights awarded under the 2015 Plan may not be repriced without stockholder approval. Stock options and stock appreciation rights may not be granted below fair market value. Stock options or stock appreciation rights generally shall not be fully vested over a period of less than four years from the date of grant and cannot be exercised more than 10 years from the date of grant. Restricted stock, restricted stock units, and performance awards generally shall not vest faster than over a three-year period (or a twelve month period if vesting is based on a performance measure). However, options granted to consultants and restricted stock awards granted to independent board members typically vest in one year and the Plan does allow for similar vesting to employees. As of December 31, 2016, approximately 2,785,000 shares were available for grant under the 2015 Plan.

Stock Options

The following table summarizes the stock option transactions for each of the years ended December 31, 2014, 2015 and 2016 (in thousands, except per share data):

Stock Options	Number of Options Outstanding	Weighted-average Exercise Price	Weighted-average Remaining Contractual Life (in years)	Aggregate Intrinsic Value
Balance as of January 1, 2014	2,671	3.29	6.71	$ 893
Granted	712	2.40		
Exercised	(111)	1.21		
Canceled and expired	(74)	5.18		
Balance as of December 31, 2014	3,198	3.12	6.95	$ 1,247
Granted	866	2.19		
Exercised	(119)	1.38		
Canceled and expired	(166)	3.03		
Balance as of December 31, 2015	3,779	$ 2.97	6.26	$ 764
Granted	624	4.92		
Exercised	(555)	2.41		
Canceled and expired	(554)	3.26		
Balance as of December 31, 2016	3,294	$ 3.38	7.23	$ 5,301

Options vested as of December 31, 2016 and unvested options expected to vest, net of forfeitures	3,228	$ 3.37	7.18	$ 5,226
Options exercisable as of December 31, 2016	1,718	$ 3.45	5.70	$ 2,732

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The options outstanding and exercisable as of December 31, 2016 were in the following exercise price ranges (in thousands, except per share data):

	Options Outstanding as of December 31, 2016			Options Vested and Exercisable as of December 31, 2016	
Range of Exercise Price	Shares	Weighted average Exercise Price	Weighted average Remaining Contractual Life	Shares	Weighted Average Exercise Price
$ 1.59 - $ 2.14	192	$ 1.80	3.52	174	$ 1.76
$ 2.18 - $ 2.18	785	$ 2.18	8.84	190	$ 2.18
$ 2.29 - $ 2.36	484	$ 2.33	7.09	329	$ 2.33
$ 2.47 - $ 2.51	346	$ 2.47	7.87	162	$ 2.47
$ 2.56 - $ 2.91	340	$ 2.84	6.48	272	$ 2.91
$ 4.79 - $ 4.92	220	$ 4.80	4.61	220	$ 4.80
$ 5.21 - $ 5.21	556	$ 5.21	9.83	—	$ —
$ 5.61 - $ 5.83	321	$ 5.78	3.98	321	$ 5.78
$ 6.31 - $ 6.31	39	$ 6.31	0.81	39	$ 6.31
$ 7.82 - $ 7.82	11	$ 7.82	3.84	11	$ 7.82
	3,294	$ 3.38	7.23	1,718	$ 3.45

There were 555,000, 119,000 and 111,000 options exercised in the years ended December 31, 2016, 2015, and 2014, respectively. The total intrinsic value of options exercised for the years ended December 31, 2016, 2015, and 2014, was $1,302,000, $118,000 and $105,000, respectively.

As of December 31, 2016, the unamortized compensation costs related to unvested stock options granted to employees under our stock option plan was approximately $1.9 million, net of estimated forfeitures of $120,000. These costs will be amortized on a straight-line basis over a weighted-average period of approximately 2.9 years and will be adjusted for subsequent changes in estimated forfeitures. We did not capitalize any stock based compensation to inventory as of December 31, 2016 and 2015, due to the immateriality of the amount.

Restricted Stock Awards

A summary of activity related to restricted stock awards for the years ended December 31, 2014, 2015 and 2016 is presented below (in thousands, except per share data):

Stock Awards	Shares	Weighted-Average Grant Date Fair Value
Non-vested as of January 1, 2014	241	$ 3.44
Granted	121	$ 2.34
Vested	(101)	$ 4.01
Forfeited	—	$ —
Non-vested as of December 31, 2014	261	$ 2.71
Granted	547	$ 2.42

Vested	(215)	$	2.81
Forfeited	(47)		2.47
Non-vested as of December 31, 2015	546	$	2.39
Granted	136	$	4.66
Vested	(150)	$	2.34
Forfeited	(207)	$	2.55
Non-vested as of December 31, 2016	325	$	3.27

Total grant date fair value of stock awards vested during the years ended December 31, 2016, 2015, and 2014 was $351,000, $605,000 and $405,000, respectively. As of December 31, 2016, we had $876,000 of unrecognized

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compensation expense related to restricted stock awards, which will be recognized over the weighted average period of 1.6 years.

Common Stock

The following number of shares of common stock were reserved and available for future issuance at December 31, 2016 (in thousands, except per share data):

Options outstanding	3,294
Restricted stock awards outstanding	325
Stock available for future grant: 2015 Equity Incentive Plan	2,785
Total	6,404

Stock-based Compensation

We recorded $1.1 million, $1.3 million and $1.1 million of stock based compensation in our consolidated statements of operations for the years ended December 31, 2016, 2015, and 2014, respectively. The following table summarizes compensation costs related to our stock based compensation awards (in thousands, except per share data):

	Year Ended December 31,		
	2016	2015	2014
Stock based compensation in the form of employee stock options and restricted stock, included in:			
Cost of revenue	$ 23	$ 20	$ 18
Selling, general and administrative	908	1,148	938
Research and development	165	181	173
Total stock-based compensation	1,096	1,349	1,129
Tax effect on stock-based compensation	—	—	—
Net effect on net income (loss)	$ 1,096	$ 1,349	$ 1,129
Shares used in computing basic net income per share	32,139	32,183	32,452
Shares used in computing diluted net income per share	32,894	32,183	32,452
Effect on basic net income per share	$ (0.03)	$ (0.04)	$ (0.03)
Effect on diluted net income per share	$ (0.03)	$ (0.04)	$ (0.03)

We estimate the fair value of stock options using a Black Scholes valuation model, consistent with the provisions of ASC 718. There were 624,000, 866,000 and 712,000 stock options granted with weighted average grant date fair value of $1.85, $0.88 and $1.17 per share during 2016, 2015, and 2014, respectively. The fair value of options granted was estimated at the date of grant using the following weighted average assumptions:

	Year Ended December 31,		
	2016	2015	2014
Expected term (in years)	4.0	3.9	4.1

Volatility	46.5	%	51.1	%	63.2	%
Expected dividend	—	%	—	%	—	%
Risk-free interest rate	1.47	%	1.75	%	1.85	%

The expected term for stock options is based on the observed historical option exercise behavior and post-vesting forfeitures of options by our employees, and the contractual term, the vesting period and the expected term of the outstanding options. Expected volatility is based on the historical volatility of our Company's common stock. The dividend yield of zero is based on the fact that we have never paid cash dividends and have no present intention to pay cash dividends. The risk-free interest rates are taken from the Daily Federal Yield Curve Rates as of the grant dates as

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published by the Federal Reserve and represent the yields on actively traded Treasury securities for terms equal to the expected term of the options.

Retirement Savings Plan

We have a 401(k) Savings Plan ("Savings Plan") which qualifies as a thrift plan under Section 401(k) of the Internal Revenue Code. All full-time U.S. employees are eligible to participate in the Savings Plan after 90 days from the date of hire. Employees may elect to reduce their current compensation by up to the statutory prescribed annual limit and have the amount of such reduction contributed to the 401(k) Plan. We provide matching to employee contributions up to 4% of the employees' base pay if employees contribute at least 6% of their base pay. If the contribution rate is less than 6% of the base pay, the matching percentage is prorated. Our contributions to the 401(k) retirement savings plans were $133,000, $125,000 and $115,000 for the years ended December 31, 2016, 2015, and 2014, respectively.

Note 12. Guarantees

Indemnification Agreements

We have entered into indemnification agreements with our directors and officers that require us to indemnify our directors and officers against liabilities that may arise by reason of their status or service as directors or officers, other than liabilities arising from willful misconduct of a culpable nature; to advance their expenses incurred as a result of any proceeding against them as to which they could be indemnified; and to obtain directors' and officers' insurance if available on reasonable terms, which we currently have in place.

Product Warranty

We provide warranties for our products for a specific period of time, generally twelve months, against material defects. We provide for the estimated future costs of warranty obligations in cost of sales when the related revenue is recognized. The accrued warranty costs represent the best estimate at the time of sale of the total costs that we expect to incur to repair or replace product parts that fail while still under warranty. The amount of accrued estimated warranty costs are primarily based on historical experience as to product failures as well as current information on repair costs. On a quarterly basis, we review the accrued balances and update the historical warranty cost trends. The following table reflects the change in our warranty accrual which is included in "accrued liabilities" on the consolidated balance sheets, during 2016 and 2015 (in thousands):

	Year Ended December 31,	
	2016	2015
Beginning accrued warranty and related costs	$ 497	$ 802
Accruals for warranties issued	92	662
Adjustments related to pre-existing warranties including expirations and changes in estimates	(223)	(238)
Cost of warranty repair	(115)	(729)
Ending accrued warranty and related costs	$ 251	$ 497

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Note 13. Income Taxes

Consolidated income before provision for income taxes includes non-U.S. income of approximately $15.0 million, $15.2 million and $12.8 million for the years ended December 31, 2016, 2015, and 2014, respectively. We recorded a current tax provision of $733,000, $531,000 and $215,000 for the years ended December 31, 2016, 2015, and 2014, respectively. The components of the provision for income taxes are summarized below (in thousands):

	Year Ended December 31,		
	2016	2015	2014
Current:			
Federal	$ —	$ —	$ —
State	4	2	2
Foreign	729	529	213
Total current	733	531	215
Deferred:			
Federal	—	—	—
State	—	—	—
Total deferred	—	—	—
Total net provision for income taxes	$ 733	$ 531	$ 215

A reconciliation of the effective income tax rates and the U.S. statutory federal income tax rate is summarized below:

	Year Ended December 31,		
	2016	2015	2014
Statutory federal income tax rate	35.0 %	35.0 %	35.0 %
State income taxes, net of federal tax benefits	—	—	(0.2)
Valuation allowance	(7.0)	(46.1)	(106.3)
Stock-based compensation	1.2	(9.4)	(26.1)
Foreign tax rate differential	(12.1)	29.3	104.2
Foreign tax incentives	(13.5)	24.1	64.7
Dividend from unconsolidated affiliates	1.5	(57.8)	(169.8)
Tax effect in equity method loss or gain from unconsolidated affiliates	8.2	1.1	45.6
Other	(0.2)	(0.1)	14.4
Effective tax rate	13.1 %	(23.9)%	(38.5) %

Deferred tax assets and liabilities are summarized below (in thousands):

	As of December 31,	
	2016	2015
Deferred tax assets:		
Net operating loss	$ 62,459	$ 60,538

Accruals and reserves not yet deductible	4,520	3,723
Credits	1,488	1,488
	68,467	65,749
Deferred tax liabilities:		
Valuation of investment portfolio	—	—
	—	—
Net deferred tax assets	68,467	65,749
Valuation allowance	(68,467)	(65,749)
Net deferred tax assets	$ —	$ —

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As of December 31, 2016, we have federal and state net operating loss carryforwards of approximately $178.4 million and $1.0 million, respectively, which will expire beginning in 2022 and 2017, respectively. In addition, we have federal tax credit carryforwards of approximately $1.5 million, which will expire beginning in 2019.

The deferred tax assets valuation allowance as of December 31, 2016 is attributed to U.S. federal, and state deferred tax assets, which result primarily from future deductible accruals, reserves, net operating loss carryforwards, and tax credit carryforwards. We believe that, based on a number of factors, the available objective evidence creates sufficient uncertainty regarding the realizability of the deferred tax assets such that a full valuation allowance has been recorded. These factors include our history of losses related to domestic operations, and the lack of carryback capacity to realize deferred tax assets. The valuation allowance increased by $2.7 million and increased by $4.1 million for the years ended December 31, 2016 and 2015, respectively.

The China Enterprise Income Tax Law “EIT” imposes a single uniform income tax rate of 25% on all Chinese enterprises. Our subsidiaries in China have qualified for a preferential 15% tax rate that is available for High and New Technology Enterprises “HTE”. In order to retain the preferential tax rate, we must meet certain operating conditions, satisfy certain product requirements, meet certain headcount requirements and maintain certain levels of research expenditures. We realized benefits from this 10% reduction in tax rate of $489 thousand, $354 thousand and $143 thousand for 2016, 2015 and 2014, respectively. The favorable tax rate is renewed every three years and our subsidiaries are due for renewal between late 2016 and into the end of 2017. The preferential tax rate that we enjoy could be modified or discontinued altogether at any time, which could materially and adversely affect our financial condition and results of operations.

Our subsidiaries in China also qualify for reduction in their taxable income in China for R&D expenditures. Government pre-approval is required to claim R&D tax benefits. Any R&D claim is then submitted with the annual corporate income tax for the taxing authorities approval. We realized a reduction in tax in China of $0.2 million for 2016, 2015, and 2014. Our consolidated subsidiaries in China have enjoyed various tax holidays since 2000. Benefits under the tax holidays vary by jurisdiction.

Utilization of the NOL and research and development credit carryforwards may be subject to a substantial annual limitation due to ownership changes that have occurred previously or that could occur in the future, as provided by Section 382 of the Internal Revenue Code of 1986, as well as similar state provisions. Ownership changes may limit the amount of NOL and tax credit carryforwards that can be utilized to offset future taxable income and tax, respectively. In general, an ownership change, as defined by Section 382, results from transactions increasing the ownership of certain shareholders or public groups in the stock of a corporation by more than 50 percentage points over a three-year period. If the Company has experienced a change of control, utilization of its NOL or tax credits carryforwards would be subject to an annual limitation under Section 382. Any limitation may result in expiration of a portion of the NOL or research and development credit carryforwards before utilization. Subsequent ownership changes could further impact the limitation in future years. Until a Section 382 study is completed and any limitation known, no amounts are being presented as an uncertain tax position. A full valuation allowance has been provided against the Company’s NOL carryforwards and research and development credit carryforwards and, if an adjustment is required, this adjustment would be offset by an adjustment to the valuation allowance. Thus, there would be no net impact to the balance sheet or statement of operations if an adjustment were required.

During fiscal year 2016, the amount of gross unrecognized tax benefits remain unchanged. During fiscal year 2015, the amount of gross unrecognized tax benefits decreased by $1.8 million. The total amount of unrecognized tax benefits was $14.6 million as of December 31, 2016 and December 31, 2015. The Company recognizes interest and penalties related to uncertain tax positions as part of the income tax provision. To date, such interest and penalties have not been material.

We recognize interest and penalties related to uncertain tax positions in income tax expense. Income tax expense for the year ended December 31, 2016 includes no interest and penalties. As of December 31, 2016, we have no accrued interest and penalties related to uncertain tax positions.

We file income tax returns in the U.S. federal, various states and foreign jurisdictions. We have substantially concluded all U.S. federal and state income tax matters through 2003 and 2002, respectively.

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Deferred tax liabilities have not been recognized for $95.3 million of undistributed earnings of our foreign subsidiaries at December 31, 2016. We have made no provision for U.S. income taxes on undistributed earnings of certain foreign subsidiaries because it is our intention to permanently reinvest such earnings in its foreign subsidiaries. If such earnings were distributed, we would be subject to additional U.S. income tax expense. Determination of the amount of unrecognized deferred income tax liability related to these earnings is not practicable. As of December 31, 2016, we and our consolidated joint ventures held approximately $22.6 million in cash and investments in foreign bank accounts. This consists of $14.5 million held by our wholly owned subsidiary in China and $8.1 million held by our three partially-owned consolidated subsidiaries in China. Of this $22.6 million, approximately $16.6 million would not be available for use in the United States without paying United States income taxes. We believe that the current value of our net operating loss carry forward would offset the taxes due.

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

	Year Ended December 31,		
	2016	2015	2014
	$	$	$
Gross unrecognized tax benefits balance at beginning of the year	14,557	16,403	16,403
Add:			
Additions based on tax positions related to the current year	—	—	—
Additions for tax positions of prior years	—	—	—
Less:			
Decrease related to lapse of statute of limitations	—	(1,846)	—
	$	$	$
Gross unrecognized tax benefits balance at end of the year	14,557	14,557	16,403

Excluding the effects of recorded valuation allowances for deferred tax assets, $14.6 million of the unrecognized tax benefit would favorably impact the effective tax rate in future periods if recognized.

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Note 14. Net Income (Loss) per Share

Basic net income (loss) per share is computed using the weighted-average number of common shares outstanding during the periods less shares of common stock subject to repurchase and non-vested stock awards. Diluted net income (loss) per share is computed using the weighted-average number of common shares outstanding and potentially dilutive common shares outstanding during the periods. The dilutive effect of outstanding stock options and restricted stock awards is reflected in diluted earnings per share by application of the treasury stock method. Potentially dilutive common shares consist of common shares issuable upon the exercise of stock options. Potentially dilutive common shares are excluded in net loss periods, as their effect would be anti-dilutive.

A reconciliation of the numerators and denominators of the basic and diluted net income (loss) per share calculations is as follows (in thousands, except per share data):

	Year ended December 31,		
	2016	2015	2014
Numerator:			
Net income (loss) attributable to AXT, Inc	$ 5,636	$ (2,228)	$ (1,388)
Less: Preferred stock dividends	(177)	(177)	(177)
Net income (loss) available to common stockholders	$ 5,459	$ (2,405)	$ (1,565)
Denominator:			
Denominator for basic net income (loss) per share - weighted average common shares	32,139	32,183	32,452
Effect of dilutive securities:			
Common stock options	596	—	—
Restricted stock awards	159	—	—
Denominator for dilutive net income (loss) per common shares	32,894	32,183	32,452
Basic net income (loss) per share:			
Net income (loss) attributable to AXT, Inc	$ 0.17	$ (0.07)	$ (0.05)
Net income (loss) to common stockholders	$ 0.17	$ (0.07)	$ (0.05)
Diluted net income (loss) per share:			
Net income (loss) attributable to AXT, Inc	$ 0.17	$ (0.07)	$ (0.05)
Net income (loss) to common stockholders	$ 0.17	$ (0.07)	$ (0.05)
Options excluded from diluted net income (loss) per share as the impact is anti-dilutive	779	3,779	2,772
Restricted stock excluded from diluted net income (loss) per share as the impact is anti-dilutive	15	546	252

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Note 15. Segment Information and Foreign Operations

Segment Information

We operate in one segment for the design, development, manufacture and distribution of high-performance compound and single element semiconductor substrates and sale of raw materials. In accordance with ASC topic 280, Segment Reporting, our chief operating decision maker has been identified as the Chief Executive Officer, who reviews operating results to make decisions about allocating resources and assessing performance for the Company. Since we operate in one segment, all financial segment and product line information can be found in the consolidated financial statements.

Product Information

The following table represents revenue amounts (in thousands) by product type:

	Year Ended December 31,		
	2016	2015	2014
Product Type:			
Substrates	$ 65,633	$ 58,220	$ 60,178
Raw Materials and Others	15,716	19,282	23,321
Total	$ 81,349	$ 77,502	$ 83,499

Geographical Information

The following table represents revenue amounts (in thousands) reported for products shipped to customers in the corresponding geographic region:

	Year Ended December 31,		
	2016	2015	2014
Europe (primarily Germany)	$ 18,637	$ 19,518	$ 21,535
China	17,448	13,728	17,451
Taiwan	15,369	13,799	11,464
Japan	11,015	9,138	11,550
Asia Pacific (excluding China, Taiwan and Japan)	10,796	11,482	11,207
North America (primarily the United States)	8,084	9,837	10,292
Total	$ 81,349	$ 77,502	$ 83,499

Long-lived assets consist primarily of property, plant and equipment, and are attributed to the geographic location in which they are located. Long-lived assets, net of depreciation, by geographic region were as follows (in thousands):

	As of December 31,	
	2016	2015

Long-lived assets by geographic region, net of depreciation:		
North America	$ 318	$ 542
China	27,487	30,880
	$ 27,805	$ 31,422

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Note 16. Other Income (expense)

The components of other income (expense) are summarized below (in thousands):

	Year Ended December 31,		
	2016	2015	2014
Foreign exchange gain (loss)	$ 232	$ 717	$ (999)
Gain on available-for-sales securities	429	859	1,263
Other income (expense)	199	447	97
	$ 860	$ 2,023	$ 361

Foreign Exchange Contracts and Transaction Gains/Losses

Transaction gains and losses resulting from transactions denominated in currencies other than the U.S. dollar or in the functional currencies of our subsidiaries are included in “other income (expense), net” for the periods presented. The transaction gains for the year ended December 31, 2016 totaled $232,000. The transaction gain totaled $717,000 and a transaction loss totaled $1.0 million for the years ended December 31, 2015 and 2014, respectively.

To partially protect us against fluctuations in foreign currency resulting from accounts receivable in Japanese yen, starting in 2015, we instituted a foreign currency hedging program. We place short-term hedges that are intended to offset the potential cash exposure related to fluctuations in the exchange rate between the United States dollar and Japanese yen. We measure the fair value of these hedges at each month end and quarter end using current exchange rates and in accordance with generally accepted accounting principles. At year end any foreign currency hedges not settled are netted on the consolidated balance sheet and classified as Level 3 assets and liabilities. As of December 31, 2016 the net change in fair value from the placement of the hedge to settlement at year end had a de minimis impact to the consolidated results. As of December 31, 2016 and December 31, 2015, we had no outstanding commitments with respect to foreign exchange contracts.

Gain on Sales of Investments

Gain on sales investments were derived from the realized gain from the sales of our IntelliEpi and GSI common stock, both of these investments are categorized as available-for-sales investment, in the Taiwan stock exchange market in year ended December 31, 2016 and 2015. As of December 31, 2016, we no longer hold any IntelliEpi stock.

Note 17. Commitments and Contingencies

Legal Proceedings

From time to time we may be involved in judicial or administrative proceedings concerning matters arising in the ordinary course of business. We do not expect that any of these matters, individually or in the aggregate, will have a material adverse effect on our business, financial condition, cash flows or results of operations.

Leases

We lease certain office space, warehouse facilities and equipment under long-term operating leases expiring at various dates through December 2025. The majority of our lease obligations relates to our lease agreement for the facility in Fremont, California with approximately 19,467 square feet which expires in 2017. Total rent expenses under these operating leases were $331,000, $313,000 and $260,000 for the years ended December 31, 2016, 2015 and 2014,

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respectively. Total minimum lease payments under these leases as of December 31, 2016 are summarized below (in thousands):

	Lease Payments
2017	$ 174
2018	37
2019	28
2020	25
2021	25
Thereafter	66
	$ 355

Royalty Agreement

We entered into a royalty agreement with a competitor effective December 3, 2010 with a term of eight years, terminating December 31, 2018. We and our related companies are granted a worldwide, nonexclusive, royalty bearing, irrevocable license to certain patents for the term on the agreement. We shall pay up to $7.0 million royalty payment over eight years that began in 2011 based on future royalty bearing sales. This agreement contains a clause that allows us to claim a credit, starting in 2013, in the event that the royalty bearing sales for the year is lower than a pre-determined amount set forth in this agreement. Royalty expense under this agreement was $447,000 which was net of claim for credit of $128,000 for the year ended December 31, 2016. Royalty expense for years ended December 31, 2015 and 2014 were $583,000, which was net of claim for credit of $217,000 and $577,000 which was net of claim for credit of $233,000, respectively. These expenses were included in cost of revenue. Total maximum, remaining royalty payments under this agreement as of December 31, 2016 are summarized below (in thousands):

	Royalty Payments
2017	$ 575
2018	575
	$ 1,150

Note 18. Unaudited Quarterly Consolidated Financial Data

	Quarter			
	First	Second	Third	Fourth
	(in thousands, except per share data)			
2016:				
Revenue	$ 18,713	$ 20,495	$ 21,872	$ 20,269
Gross profit	5,253	6,027	7,578	7,523
Net income attributable to AXT, Inc	42	1,151	2,229	2,214
Net (loss) attributable to AXT, Inc per share, basic	$ (0.00) *	$ 0.03	$ 0.07	$ 0.07

Net (loss) attributable to AXT, Inc per share, diluted	$ (0.00) *	$ 0.03	$ 0.07	$ 0.06
2015:				
Revenue	$ 20,064	$ 21,010	$ 18,371	$ 18,057
Gross profit	4,749	4,385	4,605	3,090
Net (loss) attributable to AXT, Inc	(1,024)	(3)	42	(1,243)
Net (loss) attributable to AXT, Inc per share, basic	$ (0.03)	$ (0.00)	$ (0.00) *	$ (0.04)
Net (loss) attributable to AXT, Inc per share, diluted	$ (0.03)	$ (0.00)	$ (0.00) *	$ (0.04)

* Net loss to AXT, Inc. per common share resulted due to the accrual of preferred dividend liquidation preference during the three months ended September 30, 2015 and March 31, 2016.

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Note 19. Restructuring Charges

On February 25, 2014, we announced a restructuring plan with respect to our wholly-owned subsidiary, Beijing Tongmei Xtal Technology Co, Ltd. (“Tongmei”) in order to better align manufacturing capacity with demand. Under the restructuring plan, Tongmei implemented certain workforce reductions with respect to its manufacturing facility in China. We also announced that the restructuring plan would be completed by March 31, 2014, depending on local legal requirements. In the first quarter of 2014, we reduced the workforce at Tongmei by approximately 93 positions that were no longer required to support production and operations, or approximately 11 percent of the workforce. Accordingly, we recorded a restructuring charge of approximately $907,000 related to the reduction in force for severance-related expenses. As of March 31, 2014, we had completed this restructuring plan and the reduction in force. We had no restructuring charges in 2015.

In the second quarter of 2016, we restructured the operations of Beijing JiYa Semiconductor Material Co., Ltd., which resulted in a reduction in force of 28 positions that were no longer required to support production and operations. Accordingly, we recorded a restructuring charge of approximately $226,000 related to the reduction in force for severance-related expenses. As of June 30, 2016, we had completed this restructuring plan and the reduction in force. During the three month period ended September 30, 2016 and December 31, 2016, we incurred no additional restructuring charges.

Note 20. Whistleblower Complaint and Investigation

On February 23, 2015, the Board of Directors announced that, pursuant to an anonymous whistleblower complaint, our Audit Committee conducted an investigation of certain potential related-party transactions involving Davis Zhang, our former President, China Operations. The investigation did not conclude that there was any intentional misconduct by Mr. Zhang, or that he received any improper benefit from these transactions. Further, the investigation did not reveal any inaccuracies in our financial statements resulting from these transactions. However, the investigation identified certain historical related-party transactions that were not previously disclosed in our filings with the Securities and Exchange Commission (“SEC”). We have filed a Current Report on Form 8-K with the SEC on February 23, 2015 to disclose such historical related-party transactions.

On February 20, 2015, the Board waived any potential inconsistencies with our Code of Conduct and Ethics arising from the transactions identified in the investigation. Also, the Audit Committee approved the related-party nature of such transactions to the extent it had not previously approved such transactions. The Board and Audit Committee specified that such waiver and approval would have retroactive effect to the date of commencement of the transactions covered by such waiver and approval. We have incurred approximately $1.8 million of professional service fees during the course of this investigation.

Item 16. Form 10-K Summary

Not applicable.

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SIGNATURES

Pursuant to the requirements of Section 13 or 15(d) of the Securities Exchange Act of 1934, the registrant has duly caused this report to be signed on its behalf by the undersigned, thereto duly authorized.

AXT, Inc.

By: /s/ GARY L. FISCHER
Chief Financial Officer and Corporate Secretary
(Principal Financial Officer)

Date: February 27, 2017

POWER OF ATTORNEY

KNOW ALL PERSONS BY THESE PRESENTS, that each person whose signature appears below hereby constitutes and appoints Morris S. Young and Gary L. Fischer, and each of them, his true and lawful attorney-in-fact and agent, with full power of substitution, each with power to act alone, to sign and execute on behalf of the undersigned any and all amendments to this Report on Form 10-K, and to perform any acts necessary in order to file the same, with all exhibits thereto and other documents in connection therewith with the Securities and Exchange Commission, granting unto said attorney-in-fact and agent full power and authority to do and perform each and every act and thing requested and necessary to be done in connection therewith, as fully to all intents and purposes as he might or could do in person, hereby ratifying and confirming all that said attorney-in-fact and agent, or their or his or her substitutes, shall do or cause to be done by virtue hereof.

Pursuant to the requirements of the Securities Exchange Act of 1934, this report has been signed below by the following persons on behalf of the registrant and in the capacities and on the dates indicated.

Signature	Title	Date
/s/ MORRIS S. YOUNG Morris S. Young	Chief Executive Officer and Director (Principal Executive Officer)	February 27, 2017
/s/ GARY L. FISCHER Gary L. Fischer	Chief Financial Officer and Corporate Secretary (Principal Financial Officer and Principal Accounting Officer)	February 27, 2017
/s/ JESSE CHEN Jesse Chen	Chairman of the Board of Directors	February 27, 2017
/s/ DAVID C. CHANG David C. Chang	Director	February 27, 2017
/s/ LEONARD LEBLANC Leonard LeBlanc	Director	February 27, 2017

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AXT, Inc.

EXHIBITS

TO

FORM 10-K ANNUAL REPORT

For the Year Ended December 31, 2016

Exhibit Number	Description
3.1(1)	Restated Certificate of Incorporation
3.2(2)	Certificate of Amendment of Certificate of Incorporation
3.3(3)	Certificate of Amendment to the Restated Certificate of Incorporation
3.4(4)	Certificate of Designation, Preferences and Rights of Series A Preferred Stock (which is incorporated herein by reference to Exhibit 2.1 to the registrant's form 8-K dated May 28, 1999).
3.5(5)	Second Amended and Restated By Laws
3.6(6)	Amended and Restated Section 5.1 of Article V of the Second Amended and Restated Bylaws of AXT, Inc.
3.7(7)	Certificate of Amendment to By Laws
10.1(8)*	Form of Indemnification Agreement for directors and officers
10.2(9)*	1997 Stock Option Plan and forms of agreements thereunder
10.3(10)**	6-inch Supply Agreement dated December 31, 2008 between AXT, Inc. and IQE plc
10.4(11)**	4-inch Supply Agreement dated December 31, 2008 between AXT, Inc. and IQE plc
10.5(12)*	2007 Equity Incentive Plan (amended December 8, 2008)
10.6(13)*	Forms of agreements under the 2007 Equity Incentive Plan
10.7(14)*	Employment Letter Agreement between the Company and Mr. Robert G. Ochrym
10.8(15)*	Amended and Restated Employment Offer Letter between the Company and Dr. Morris S. Young dated December 4, 2012
10.9(16)*	Employment Letter Agreement between the Company and Mr. Gary L. Fischer
10.10(17)*	2015 Equity Incentive Plan
10.11(18)*	Executive Incentive Plan
12.1	Computation of Ratio of Earnings to Fixed Charges
21.1	List of Subsidiaries
23.1	Consent of Independent Registered Public Accounting Firm, BPM LLP
24.1	Power of Attorney (see signature page)
31.1	Certification by principal executive officer pursuant to Section 302 of the Sarbanes Oxley Act of 2002
31.2	Certification by principal financial officer pursuant to Section 302 of the Sarbanes Oxley Act of 2002
32.1	Certification by Chief Executive Officer Pursuant to 18 U.S.C. Section 1350, as adopted Pursuant to Section 906 of the Sarbanes Oxley Act of 2002
32.2	Certification by Chief Financial Officer Pursuant to 18 U.S.C. Section 1350, as adopted Pursuant to Section 906 of the Sarbanes Oxley Act of 2002
101.INS	XBRL Instance.
101.SCH	XBRL Taxonomy Extension Schema.
101.CAL	XBRL Taxonomy Extension Calculation Linkbase.
101.DEF	XBRL Taxonomy Extension Definition Linkbase.
101.LAB	XBRL Taxonomy Extension Label Linkbase.

101.PRE XBRL Taxonomy Extension Presentation Linkbase.

(1) Incorporated by reference to exhibit 3.1 to registrant's Form 10-K filed with the SEC on March 31, 1999.
(2) Incorporated by reference to exhibit 3.1 to registrant's Form 10-Q filed with the SEC on August 14, 2000.

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(3) Incorporated by reference to exhibit 3.4 to registrant's Form 10-Q filed with SEC on August 5, 2004.
(4) Incorporated by reference to exhibit 3.1 to registrant's Form 8-K filed with the SEC on June 14, 1999.
(5) Incorporated by reference to exhibit 3.4 to registrant's Form 8-K filed with the SEC on May 30, 2001.
(6) Incorporated by reference to exhibit 99.2 to registrant's Form 8-K filed with the SEC on August 1, 2007.
(7) Incorporated by reference to exhibit 3.1 to registrant's Form 8-K filed with the SEC on October 26, 2010.
(8) Incorporated by reference to exhibit 10.1 to registrant's Form 8-K filed with the SEC on October 31, 2014.
(9) Incorporated by reference to exhibit 10.3 to registrant's Registration Statement on Form S-1 filed with the SEC on March 17, 1998.
(10) Incorporated by reference to exhibit 10.29 to registrant's Form 8-K filed with the SEC on January 5, 2009.
(11) Incorporated by reference to exhibit 10.30 to registrant's Form 8-K filed with the SEC on January 5, 2009.
(12) Incorporated by reference to exhibit 10.31 to registrant's Form 10-K filed with the SEC on March 31, 2009.
(13) Incorporated by reference to exhibit 10.20 to registrant's Form 10-K filed with the SEC on March 22, 2010.
(14) Incorporated by reference to exhibit 10.24 to registrant's Form 10-K filed with the SEC on March 22, 2010.
(15) Incorporated by reference to exhibit 10.1 to registrant's Form 8-K filed with the SEC on December 4, 2012.
(16) Incorporated by reference to exhibit 10.1 to registrant's Form 8-K filed with the SEC on August 12, 2014.
(17) Incorporated by reference to appendix A to the registrant's Definitive Proxy Statement on Schedule 14A filed with the SEC on April 8, 2015.
(18) Incorporated by reference to exhibit 10.1 to registrant's Form 8-K filed with the SEC on February 26, 2016.

*Management contract or compensatory plan.

**Confidential treatment has been requested of the SEC for portions of the exhibit.