

**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, 2020

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

(State or other jurisdiction of
incorporation or organization)

4281 Technology Drive, Fremont, California
(Address of principal executive offices)

94-3031310

(I.R.S. Employer
Identification No.)

94538

(Zip Code)

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

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

| <u>Title of each class:</u> | <u>Trading Symbol</u> | <u>Name of each exchange on which registered:</u> |
|---------------------------------|-----------------------|---------------------------------------------------|
| Common Stock, \$0.001 par value | AXTI | The NASDAQ Stock Market LLC |

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

Indicate by check mark whether the registrant has filed a report on and attestation to its management's assessment of the effectiveness of its internal control over financial reporting under Section 404(b) of the Sarbanes-Oxley Act (15 U.S.C. 7262(b)) by the registered public accounting firm that prepared or issued its audit report.

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

Large accelerated filer Accelerated filer Non-accelerated filer Smaller reporting company
Emerging growth company

If an emerging growth company, indicate by check mark if the registrant has elected not to use the extended transition period for complying with any new or revised financial accounting standards provided pursuant to Section 13(a) of the Exchange Act.

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 \$4.76 for the common stock on June 30, 2020 as reported on the Nasdaq Global Select Market, was approximately \$144,499,115. 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 March 1, 2021, 42,086,773 shares, \$0.001 par value, of the registrant's common stock were outstanding.

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PART I

This Annual Report on Form 10-K contains forward-looking statements within the meaning of Section 27A of the Securities Act of 1933, as amended, and Section 21E of the Securities Exchange Act of 1934, as amended. Statements relating to our expectations regarding results of operations, market and customer demand for our products, customer qualifications of our products, our ability to expand our markets or increase sales, emerging applications using chips or devices fabricated on our substrates, the development of new products, applications, enhancements or technologies, the life cycles of our products and applications, product yields and gross margins, expense levels, the impact of the adoption of certain accounting pronouncements, our investments in capital projects, ramping production at our new sites, potential severance costs with respect to the relocation of our gallium arsenide production line, our ability to have customers re-qualify substrates from our new manufacturing location in Dingxing, China, our ability to utilize or increase our manufacturing capacity, and our belief that we have adequate cash and investments to meet our needs over the next 12 months are forward-looking statements. Additionally, statements regarding completing steps in connection with the proposed listing of shares of our wafer manufacturing company, Beijing Tongmei Xtal Technology Co., Ltd. (“Tongmei”), on the Shanghai Stock Exchange’s Sci-Tech innovAtion boARd (the “STAR Market”), being accepted to list shares of Tongmei on the STAR Market, the timing and completion of such listing of shares of Tongmei on the STAR Market and the completion of entity reorganizations and the alignment of assets under Tongmei 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 and plans, industry trends and the impact of trends, tariffs and trade wars, the potential or expected impact of the COVID-19 pandemic on our business, results of operations and financial condition, mandatory factory shutdowns in China, changes in policies and regulations in China and economic cycles on our business are forward-looking statements.

Our forward-looking statements are based upon assumptions that are subject to uncertainties and factors relating to the company’s operations and business environment, which could cause actual results to differ materially from those expressed or implied in the forward-looking statements contained in this report. These uncertainties and factors include but are not limited to: the withdrawal, cancellations or requests for redemptions by private equity funds in China of their investments in Tongmei, the administrative challenges in satisfying the requirements of various government agencies in China in connection with the investments in Tongmei and the listing of shares of Tongmei on the STAR Market, continued open access to companies to list shares on the STAR Market, investor enthusiasm for new listings of shares on the STAR Market and geopolitical tensions between China and the United States. Additional uncertainties and factors include, but are not limited to: the timing and receipt of significant orders; the cancellation of orders and return of product; emerging applications using chips or devices fabricated on our substrates; end-user acceptance of products containing chips or devices fabricated on our substrates; our ability to bring new products to market; product announcements by our competitors; the ability to control costs and improve efficiency; the ability to utilize our manufacturing capacity; product yields and their impact on gross margins; the relocation of manufacturing lines and ramping of production; possible factory shutdowns as a result of air pollution in China; COVID-19 or other outbreaks of a contagious disease; the availability of COVID-19 vaccines; tariffs and other trade war issues; the financial performance of our partially owned supply chain companies; policies and regulations in China; and other factors as set forth in this Annual Report on Form 10-K, including those set forth under the section entitled “Risk Factors” in Item 1A below. 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.

Item 1. Business

AXT, Inc. (“AXT”, “the Company”, “we,” “us,” and “our” refer to AXT, Inc. and its consolidated subsidiaries) is a materials science company that develops and produces high-performance compound and single element semiconductor substrates, also known as wafers. Two of 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 performance requirements of a semiconductor or optoelectronic device. 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 do not design or manufacture the chips. We add value by researching, developing and producing the specialty material wafers. We have two product lines: specialty material substrates and raw materials integral to these substrates. 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).

InP is a high-performance semiconductor substrate used in broadband and fiber optic applications, 5G infrastructure and data center connectivity. InP substrates are also used in biometric wearables and other health monitoring applications. In recent years, InP demand has increased. Semi-insulating GaAs substrates are used to create various high-speed microwave components, including power amplifier chips used in cell phones, satellite communications and broadcast television applications. 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 new application for semi-conducting GaAs substrates is 3-D sensing chips using VCSELs (vertical cavity surface emitting lasers) as an array of lasers on a single chip that can be used in cell phones and other devices. GaAs wafers could also be used for making micro-LEDs. Ge substrates are used in applications such as solar cells for space and terrestrial photovoltaic applications.

Our supply chain strategy includes partial ownership of raw material companies. Two of these companies are consolidated. One of these consolidated companies produces 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, effusion rings when growing OLED (Organic Light Emitting Diode) tools, epitaxial layer growth in MOCVD (Metal-Organic Chemical Vapor Deposition) reactors and MBE (Molecular Beam Epitaxy) reactors. We use these pBN crucibles in our own ingot growth processes and they are also sold in the open market to other companies. The second consolidated company converts raw gallium to purified gallium. We use purified gallium in producing our GaAs substrates and it is also sold in the open market to other companies for use in producing magnetic materials, high temperature thermometers, single crystal ingots, including gallium arsenide, gallium nitride, gallium antimonite and gallium phosphide ingots, and other materials and alloys. In addition to purified gallium, the second consolidated company also produces InP base material which we then use to grow single crystal ingots. In prior years, a third company was consolidated, but, in the first quarter of 2019, we sold a portion of our ownership to our investment partner and, as of March 11, 2019, we ceased to consolidate this company. Our substrate product group generated 79%, 81% and 79% of our consolidated revenue and our raw materials product group generated 21%, 19% and 21% for 2020, 2019 and 2018, respectively.

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

Products

| Substrate Group and Wafer Diameter | Sample of Applications |
|-----------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <i>Indium Phosphide (InP)</i> 2", 3", 4" | <ul style="list-style-type: none"> • Data center connectivity using light/lasers • 5G communications • Fiber optic lasers and detectors • Passive Optical Networks (PONs) • Silicon photonics • Photonic Integrated circuits (PICs) • High efficiency terrestrial solar cells (CPV) • RF amplifier and switching (military wireless & 5G) • Infrared light-emitting diode (LEDs) motion control • Lidar for robotics and autonomous vehicles • Infrared thermal imaging |
| <i>Gallium Arsenide (GaAs - semi-insulating)</i> 1", 2", 3", 4", 5", 6" | <ul style="list-style-type: none"> • Wi-Fi devices • IoT devices • High-performance transistors • Direct broadcast television • Power amplifiers for wireless devices • Satellite communications • High efficiency solar cells for drones and automobiles • Solar cells |
| <i>Gallium Arsenide (GaAs - semi-conducting)</i> 1", 2", 3", 4", 5", 6" | <ul style="list-style-type: none"> • High brightness LEDs • Screen displays using micro-LEDs • Printer head lasers and LEDs • 3-D sensing using VCSELs • Data center communication using VCSELs • Sensors for industrial robotics/Near-infrared sensors • Laser machining, cutting and drilling • Optical couplers • High efficiency solar cells for drones and automobiles • Other lasers • Night vision goggles • Lidar for robotics and autonomous vehicles • Solar cells |
| <i>Germanium (Ge)</i> 2", 4", 6" | <ul style="list-style-type: none"> • Multi-junction solar cells for satellites • Optical sensors and detectors • Terrestrial concentrated photo voltaic (CPV) cells • Infrared detectors • Carrier wafer for LED |
| Raw Materials Group | |
| <i>6N+ and 7N+ purified gallium</i> | <ul style="list-style-type: none"> • Key material in single crystal ingots such as: <ul style="list-style-type: none"> - Gallium Arsenide (GaAs) - Gallium Nitride (GaN) - Gallium Antimonite (GaSb) - Gallium Phosphide (GaP) |
| <i>Boron trioxide (B2O3)</i> <i>Gallium-Magnesium alloy</i> | <ul style="list-style-type: none"> • Encapsulant in the ingot growth of III-V compound semiconductors • Used for the synthesis of organo-gallium compounds in epitaxial growth on semiconductor wafers |
| <i>pyrolytic boron nitride (pBN) crucibles</i> | <ul style="list-style-type: none"> • Used when growing single-crystal compound semiconductor ingots |
| <i>pBN insulating parts</i> | <ul style="list-style-type: none"> • Used as effusion rings growing OLED tools • Used in MOCVD reactors • Used when growing epitaxial layers in Molecular Beam Epitaxy (MBE) reactors |

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 raw material 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 raw material companies produce materials, including raw gallium (4N Ga), high purity gallium (6N and 7N Ga), starting material for InP, arsenic, germanium, germanium dioxide, pyrolytic boron nitride (pBN) crucibles and boron oxide (B₂O₃). We have board representation in all of these raw material 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 operations, or financial decisions, of such companies. 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 such companies. We purchase portions of the materials produced by these companies for our own use and they sell the remainder of their production to third parties.

The Beijing city government is moving its offices into the area where our original manufacturing facility is currently located and is in the process of moving thousands of government employees into this area. The government has constructed showcase tower buildings and overseen the establishment of new apartment complexes, retail stores and restaurants. An amusement park is being constructed within a few miles of our facility. To create room and upgrade the district, the city instructed virtually all existing manufacturing companies, including AXT, to relocate all or some of their manufacturing lines. We were instructed to relocate our gallium arsenide manufacturing lines. For reasons of manufacturing efficiency, we elected to also move our germanium manufacturing line. Our indium phosphide manufacturing line, as well as various administrative and sales functions, will remain primarily at our original site in Beijing.

Began in 2017, the relocation of our gallium arsenide production lines is now largely completed. We entered into volume production in 2020. To mitigate our risks and maintain our production schedule, we moved our gallium arsenide equipment in stages. By December 31, 2019, we had ceased all crystal growth for gallium arsenide in our original manufacturing facility in Beijing and transferred 100% of our ingot production to our new manufacturing facility in Kazuo, a city approximately 250 miles from Beijing. We transferred our wafer processing equipment for gallium arsenide to our new manufacturing facility in Dingxing, a city approximately 75 miles from Beijing. Some of our larger, more sophisticated customers qualified gallium arsenide wafers from the new sites in 2020. A few customers are still in that process. Our new facilities enabled us to expand capacity and upgrade some of our equipment. The new buildings are large enough that we can install additional equipment if market demand increases or if we gain market share. We also acquired sufficient land to enable us to add facilities, if needed in the future. We believe our ability to add capacity gives us a competitive advantage. In addition, a new level of technological sophistication in our manufacturing capabilities will enable us to support the major trends that we believe are likely to drive demand for our products in the years ahead.

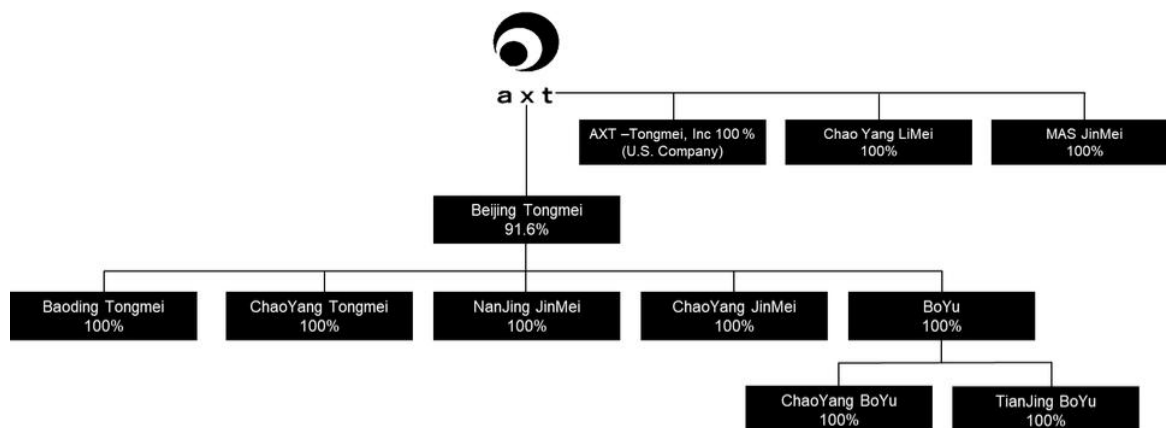
Customer qualifications and expanding capacity as needed require us to continue to diligently address the many details that arise at both of the new sites. A failure to properly accomplish this could result in disruption to our production and have a material adverse impact on our revenue, our results of operations and our financial condition. If we fail to meet the product qualification and volume requirements of a customer, we may lose sales to that customer. Our reputation may also be damaged. Any loss of sales could have a material adverse effect on our revenue, our results of operations and our financial condition.

On November 16, 2020 we announced a strategic initiative to access China's capital markets by beginning a process to list shares of Tongmei in an initial public offering (the "IPO") on the STAR Market, an exchange intended to support innovative companies in China. We formed and founded Tongmei in 1998 and believe Tongmei has grown into a company that will be an attractive offering on the STAR Market. To qualify for a STAR Market listing, the first major step in the process was to engage private equity firms in China ("Investors") to invest funds in Tongmei. By December 31, 2020, investors which consists of 10 private equity funds had engaged with Tongmei for a total investment of approximately \$48.1 million. (The currency used in the investment transactions was the Chinese renminbi, which has been converted to approximate U.S. dollars for this report.) The remaining investment of approximately \$1.5 million of new capital was funded in early January. Under China regulations these investments must be formally approved by the

appropriate government agency and are not deemed to be dilutive until such approval is granted. The government approved the entire approximately \$49 million investment on January 25, 2021. In exchange for an investment of approximately \$49 million, the Investors received a 7.28% noncontrolling interest in Tongmei. Pursuant to the investment agreements (“Capital Investment Agreements”) with the Investors, each Investor has the right to require AXT to redeem any or all Tongmei shares held by such Investor at the original purchase price paid by such Investor, without interest, in the event of a material adverse change or if Tongmei does not achieve its IPO on or before December 31, 2022. This right is suspended when Tongmei submits its formal application for IPO to the China Securities Regulatory Commission (“CSRC”). Tongmei currently plans to submit its formal application to the CSRC in the third quarter of 2021. However, if on December 31, 2022 the IPO application has been submitted and accepted by the CSRC or the stock exchange and such submission remains under review, then the date when such investor is entitled to exercise such redemption right shall be deferred to a date when such submission is rejected by the CSRC or stock exchange, or the date when Tongmei withdraws its IPO application. Tongmei would be required to sell a minimum of 10% of its equity in the IPO. The process of going public on the STAR Market includes several periods of review and is therefore a lengthy process. Tongmei does not expect to complete the IPO until mid-2022. The listing of Tongmei on China’s STAR Market will not change the status of AXT as a U.S. public company.

An additional step in the STAR Market IPO process involves certain entity reorganizations and alignment of assets under Tongmei. In this regard our two consolidated raw material companies, Nanjing JinMei Gallium Co., Ltd. (“JinMei”) and Beijing BoYu Semiconductor Vessel Craftwork Technology Co., Ltd. (“BoYu”) and its subsidiaries were assigned to Tongmei in December 2020. This will increase the number of customers and employees attributable to Tongmei as well as increase Tongmei’s consolidated revenue.

The following organization chart depicts the consolidated structure as of December 31, 2020;



In September 2018, the Trump Administration announced a list of thousands of categories of goods that became subject to tariffs when imported into the United States. This pronouncement imposed tariffs on the wafer substrates we imported into the United States. The initial tariff rate was 10% and subsequently was increased to 25%. Approximately 10% of our revenue derives from importing our wafers into the United States. In 2020 and 2019, we paid approximately \$1.3 million and \$0.7 million, respectively, in tariffs. The future impact of tariffs and trade wars is uncertain.

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.

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 wafers (mixture of two materials) or single element wafer substrates. Examples of higher performance non-silicon based wafer substrates include GaAs, InP, gallium nitride (GaN), silicon carbide (SiC) and Ge. One of the earliest broadly used alternative wafer substrates was GaAs and GaAs wafer substrates were the earliest wafer substrates we produced.

Silicon substrates dominate the semiconductor substrate market. Silicon wafers are larger in diameter and significantly lower in cost. AXT and our competitors exist because the laws of physics prevent certain functions from performing properly, or at all, if silicon material is used as the wafer substrate. Our substrate wafers are used when a typical silicon substrate wafer cannot meet the performance requirements of a semiconductor or optoelectronic device. Demand for higher performance non-silicon-based wafer substrates, such as the substrates in which AXT specializes, is expected to increase as new applications are adopted. In contrast to the ever-more complex electronic circuit designs and the skill sets required to accomplish such designs, the knowledge base and skill sets required for AXT and our competitors are material science-based. We do not design or manufacture the semiconductor chips and other electronic circuits. Instead we apply our deep knowledge in material science to grow single crystal ingots that are then sliced into individual wafer substrates. We add value by researching, developing and producing the specialty material wafers. This places us at the beginning of the semiconductor “food chain”.

InP is a high-performance semiconductor substrate used in broadband and fiber optic applications and data center connectivity. InP substrates can also be used in 5G applications. In recent years, InP demand has increased. Semi-insulating GaAs substrates are used to create various high-speed microwave components, including power amplifier chips used in cell phones, satellite communications and broadcast television applications. 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 new application for semi-conducting GaAs substrates is 3-D sensing chips using VCSELs (vertical cavity surface emitting lasers) as an array of lasers on a single chip that can be used in cell phones and other devices. 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:

- *New facilities, equipment and added capacity.* We believe we are the only company in our industry to have recently added significant new facilities, equipment and capacity. Although current customers and prospective customers previously viewed our relocation process as a risk, we believe our progress and success in managing this process now position us as the “go to” supplier with a state of the art manufacturing line, a proven ability to add capacity and a commitment to continuous improvement.
- *Funds from the recent private equity investments in Tongmei and additional funds from the anticipated future IPO of Tongmei are viewed favorably by our customers and prospective customers.* New applications using InP and GaAs wafer substrates could require significant capital investments to add capacity, purchase and install advanced process and test equipment or construct additional facilities. We believe customers view the funds recently raised, and intended to be raised in the IPO, as a sign of our commitment to meet their needs and to deploy this capital to increase capacity as needed.
- *Key leadership in InP technology and revenue growth.* We believe our InP wafers have the lowest defect densities, stress and slip lines on the market, enabling our customers to achieve the highest wafer fab and device yields. We have developed a strong base of proprietary InP technology that we continue to expand. There are significant barriers to entry in the InP substrate market and currently, there are only three primary

suppliers, including AXT. We believe that this market will continue to expand and grow. We intend to promote our track record of successfully adding capacity as the market expands.

- *Key provider of low defect density GaAs wafer substrates.* In recent years customer demand for low etch pit density (“EPD”) GaAs wafer substrates has increased, particularly for LED lighting, the deployment of 3-D sensing for facial recognition in cell phones and world facing camera technology in cell phones. 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, including AXT. As we qualify low EPD wafers from our new location, we believe the quality of our low EPD wafers and our ability to expand manufacturing capacity quickly will enable us to support new applications and generate additional revenue.
- *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 we believe this gives us a competitive advantage, especially in InP. This also creates a barrier to entry.
- *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, 2020, 1,046 of our 1,074 employees (including employees at our Beijing, Kazuo and Dingxing facilities as well as our consolidated raw material companies) were 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 believe that we are the only compound semiconductor substrate supplier to have a position in raw materials.* We have partial ownership of raw material companies in China that form an integral part of our supply chain. We believe our subsidiaries and raw material companies in China provide us with a more reliable supply of, 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 and are able to provide custom-defined products that meet our customers’ specifications. We have a strong technical sales support team that engages with our customers and understands their product requirements. A significant percentage of the members of our team that engage with customers have PhDs in physics or materials science. This combination of technical sales strength and our willingness to accept our customers’ unique product specifications results in a broad range of customers and applications.
- *Enhanced revenue diversity through the sale of raw materials.* Our strategy allows our consolidated subsidiaries to also sell raw materials in the open market to third parties. Revenue from non-substrate products provides 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 wafer substrates. Our direct competitors are either privately owned companies or divisions within very large companies that are publicly listed in Japan. We believe the combination of access to U.S. and China capital markets, U.S.-based product quality standards, China-based manufacturing and a unique strategy for the supply of many of the raw materials we need is a competitive advantage as well as an attractive business model to our customers.

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:

Promote our strengths in InP. As cloud-based data centers continue to combine integrated circuits and InP-based lasers to transfer data through light, we believe there will be increased demand for InP substrates. More recently InP is being used in 5G infrastructure. Future applications could include driverless cars and 5G in cell phones.

Add InP capacity and continue InP R&D. We are continuing to add manufacturing capacity for InP to support the growth for this product line. End market applications using our wafer substrate products often have long product life cycles. We believe the end market applications using InP could have product life cycles that are similar to the long product life cycles of end market applications using GaAs. 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.

Qualify the new facilities for GaAs based 3-D and Time of Flight sensing array applications in mobile devices. Although 3-D sensing has not yet been widely adopted and embraced, we believe its use in world-facing cameras will accelerate adoption and generate a significant impact for high-quality GaAs suppliers. We believe 3-D sensing technology will also be used as sensors in driverless automobiles. The GaAs substrate requirements for 3-D sensing applications include very low defect densities or etch pitch densities. We intend to capture opportunities in these markets by promoting our strengths and capabilities.

Create customer awareness that the new facilities are designed to allow us to add equipment and capacity rapidly. The construction of new facilities and infrastructure takes much longer to complete in comparison to the installation of furnaces and other manufacturing equipment. We have proven our ability to do both and we believe this ability makes us an attractive supplier for customers.

Offer diverse products, including custom products. We believe AXT has a reputation in the market for providing a broad range of products, including custom products that are supported by a team of technical sales support professionals, the majority of whom hold advanced graduate degrees in physics or materials science. We plan to further promote this brand image as a way to differentiate ourselves in the market. We believe this strategy will lead to a more diverse customer base and higher volumes.

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. quality control systems and access to U.S. and China capital markets with our China-based manufacturing operations. We promote the concept and practice of continuous improvement within our company culture.

Increase productivity and seek profitability in our subsidiaries/consolidated raw material companies. The supply and demand equation for specialty materials can be complex and volatile. Over the years, we have established or invested in raw material companies in China 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 improve their financial performance as they continue to support our supply chain.

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

Wafer substrates on which integrated circuits and optical devices are fabricated serve as a foundation for semiconductor device fabrication. Wafers are derived from 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 can be single-crystalline (a single crystal) or multi-crystalline (polycrystalline). A single crystal is a continuous lattice of atoms with no boundaries within the structure. The ingot must be a single crystal in order for it to be useful in making wafers for device fabrication. A single crystal ingot can be made from a single element such as germanium or silicon, or it can be made from two or more elements such as gallium arsenide (with gallium and arsenic) or indium phosphide (with indium and phosphorous). 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) technology for growing single crystal Indium Phosphide (InP), Gallium Arsenide (GaAs) and Germanium (Ge) ingots. After growing the crystalline ingot, the ingot is then sliced 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 compounds are formed by combining elements from Groups III and V in the periodic table of elements, whereas Ge is a Group IV elemental material. 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 band-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.

After growing the crystalline ingot, the material is then sliced 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, particularly in cleaning the wafers.

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 or 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 believe 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 integral to these substrates. We design, develop, manufacture and distribute high-performance semiconductor substrates, also known as wafers. Through

the two consolidated 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), telecommunication, now expanding to include 5G, metro and 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, as well as high power industrial lasers for material processing (welding, cutting, drilling, soldering, marking and surface modification). 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 semi-conducting 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 two consolidated raw material 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. One of these consolidated companies produces pBN crucibles and the other consolidated company converts raw gallium to purified gallium and produces InP base material.

We promote our product diversity as a way to differentiate ourselves in the market. Some competitors provide only gallium arsenide substrates. We provide gallium arsenide and also indium phosphide and germanium substrates. Some competitors limit their wafer diameters to only a few sizes. 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, smoothness or flatness 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 two 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.

Customers

Before specialty material wafers can be processed in a typical wafer manufacturing facility that constructs the electronic circuit, laser or optical device 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 that use specialty materials for experimentation in various aspects of semi-conducting 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. One customer, Landmark, represented 11%, 15% and 13% of our revenue for the years ended December 31, 2020, 2019 and 2018, respectively. Our top five customers, although not the same five customers for each period, represented 32% of our revenue for the year 2020, 40% of our revenue for 2019 and 35% of our revenue for 2018.

For the year ended December 31, 2020, three customers of our consolidated subsidiaries, in aggregate, accounted for 31% of raw material sales. For the year ended December 31, 2019, three customers of our consolidated subsidiaries, in aggregate, accounted for 48% of raw material sales and in 2018, three customers accounted for 30% of

raw material sales. Our subsidiaries and consolidated raw material companies 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 products in 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 takes a number of 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, beveling the edges, and then polishing 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 also 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, particularly in cleaning the wafers. In 2015, we purchased wafer processing equipment from Hitachi Metals to help us 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 licensed proprietary wafer processing technology at any step and on any form of equipment in our 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.

Together with certain subsidiaries we have partial ownership of 10 raw material companies in China that form the backbone of our supply chain model. These companies generally 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 raw material companies 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, China and Europe. We also use independent sales representatives and distributors in Japan, Taiwan, Korea and other areas. 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 our wafer substrate manufacturing process, from developing the precise composition of the wafer substrate through manufacturing and processing the wafer 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. A significant percentage of the members of our technical sales support team who frequently engage with customers have PhDs in physics or materials 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% of our revenue during each of 2020, 2019 and

2018. The primary markets for sales of our substrate products outside of North America are to customers located in Asia and Western Europe. We occasionally receive small orders from customers located in Israel and Russia.

Our raw material 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, parts for MBE and parts used in manufacturing OLED rings. Each raw material company has its own separate sales force and sells directly to its 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, achieving new lows in EPD, 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.

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 proprietary wafer processing equipment 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 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 \$7.1 million in 2020, compared with \$5.8 million in 2019 and \$5.9 million in 2018. Development work focusing on yield, continuous improvement and other matters related to our research and development efforts also occurs within regular manufacturing processes. These costs are included in our cost of revenue because it is difficult to isolate them as research and development.

Competition

The semiconductor substrate industry is characterized by narrow technological boundaries, price erosion and generally intense competition. Certain wafer substrates, such as low-quality wafer substrates for consumer products using 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 advantages of greater name recognition and more established relationships in the industry. In some cases, our competitors have substantially greater financial, technical and marketing resources as they are divisions of much larger companies. 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. We believe a critical factor in our business is the level of technical support we provide to the customer or prospective customer and we attempt to counter possible advantages of name recognition or size with superior technical support through our team of technical sales support professionals, the majority of whom hold PhDs in physics or materials 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 processes;
- protection of our products and processes by effective use of intellectual property laws; and
- general economic conditions, which impact end markets using substrates.

A majority of our customers specialize in epitaxial growth, a complex series of chemical layers grown on top of our wafers. Typically, our customer or prospective customer has at least two qualified substrate suppliers. 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 Sumitomo Electric Industries ("Sumitomo"), Japan Energy ("JX"), Freiburger Compound Materials ("Freiberger"), Umicore, 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 process similar to our VGF technology. In addition, we also face competition from semiconductor device manufacturers that may use other specialty material substrates that are not GaAs, InP or Ge based materials and that are actively exploring 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 2012 to 2015, 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, we believe we are the only compound semiconductor substrate supplier to offer a broad suite of raw materials. We believe this gives us a unique competitive advantage because we have greater control and stability over many of our 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.

In addition to proprietary process trade secrets, we also file patents. To date, we have been issued 56 patents related to our VGF products and processes; 34 in China, nine in the United States, seven in Japan, two in Taiwan, two in the European Union, one in Canada and one in South Korea. Patents normally have a protected life of 20 years from their filing dates. Our patents have expiration dates ranging from 2021 to 2037. In some cases we may consider filing divisional, continuation or continuation-in-part of the existing patents for additional claims. We currently have five patent applications pending, including three in China, one in the United States and one in Europe. Furthermore, in aggregate, our consolidated raw material companies have been issued 61 patents in China, including 42 patents issued to BoYu and 19 patents issued to JinMei.

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 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 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 the real property. These laws and regulations govern the use, storage, discharge and disposal of hazardous materials 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 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. 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 set of regulations that could require changes in our equipment and processes and require us to obtain new permits. In 2017, China increased its focus on environmental concerns which increased pressure on manufacturing companies. During periods of severe air pollution in Beijing, manufacturing companies, including AXT, may be ordered by the local government to stop production for several days. For example, in the first quarter of 2018, over 300 manufacturing companies, including AXT, were intermittently shut down by the local government for a total of ten days from February 27 to March 31, due to severe air pollution.

Human Capital

As of December 31, 2020, AXT and Tongmei had 784 employees, which consisted of 27 employees in our headquarters in Fremont, California, one sales professional in France and 756 employees in our factories in China. In addition, our two consolidated raw material companies had, in total, 290 employees. In aggregate, we and our consolidated raw material companies had 1,074 employees, of whom 882 were principally engaged in manufacturing, 112 in sales and administration and 80 in research and development. Of these 1,074 employees, 27 were located in the United States, one in France and 1,046 in China.

We believe that our future success largely depends upon our continued ability to attract and retain highly skilled employees. We provide our employees with competitive salaries and bonuses, opportunities for equity ownership, development programs that enable continued learning and growth and a robust employment package that promotes well-being across all aspects of their lives, including health care and paid time off. Most of our employees in China are represented by unions. As of December 31, 2020, 881 employees in China, including employees of our two consolidated raw material companies, were represented by unions. We have never experienced a work stoppage and we consider our relations with our employees to be good.

Geographical Information

Please see Note 14 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 website 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.

Item 1A. Risk Factors

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

- I. Summary Risk Factors;
- II. General Risk Factors;
- III. Risks Related to International Aspects of Our Business;
- IV. Risks Related to Our Financial Results and Capital Structure;
- V. Risks Related to Our Intellectual Property; and
- VI. Risks Related to Compliance, Environmental Regulations and Other Legal Matters.

I. Summary Risk Factors

- Our NASDAQ stock price is volatile and our stock price could decline. Unpredictable fluctuations in our operating results, changes and events in our end markets and global trends cause volatility in our stock price.
- COVID-19 or other contagious diseases may affect our business operations and financial performance. Lack of supply of vaccines and resistance by some to be vaccinated could prolong COVID-19.
- Global economic and political conditions, including trade tariffs and restrictions from China, may have a negative impact on our business and financial results.
- Changes in China's political, social, regulatory or economic environments may affect our financial performance.
- Our gross margin has fluctuated historically and may decline due to several factors. Factors such as product mix, unit volume, yields and other manufacturing efficiencies can cause our gross margin to decrease or increase from quarter to quarter.
- The proposed Tongmei IPO on the STAR Market in China could fail to be completed. This could result in investor disappointment and in failure to secure sufficient capital needed to take advantage of market opportunities for our products. Our stock price could decline.
- The terms of the private equity raised by Tongmei in China grant each investor a right of redemption if Tongmei fails to achieve the IPO on or before December 31, 2022. This could result in disgorging the cash that we raised from the investors.
- Defects in our products could diminish demand for our products. Our ability to receive orders from tier one customers is contingent on producing wafer substrates of very high quality and deploying best practices in manufacturing. We may not always be able to meet these requirements and we could then lose revenue.
- Difficulties in accurately estimating market demand could result in over-investing in equipment and capacity expansion or losing market share if we do not invest sufficiently.
- Attracting and retaining tier one customers requires that we succeed in our research and development programs. Customers establish difficult to meet product specifications regarding defect densities, surface flatness diameter size and other specifications pushing the boundaries of material science. We may not achieve these specifications.
- We are subject to foreign exchange gains and losses that materially impact our income statement. Because we are a global company we are exposed to changes and swings in foreign exchange, particularly when currencies experience periods of volatility.

II. General Risk Factors

Silicon substrates (wafers) are significantly lower in cost compared to substrates made from specialty materials, such as those that we produce, and new silicon-based technologies could enable 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, wave lengths or other specifications. Beginning in 2011, certain applications that had previously used GaAs substrates, specifically the RF chip in mobile phones, 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 phones 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 new silicon-based 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.

COVID-19 or other contagious diseases may affect our business operations and financial performance.

The spread of COVID-19 has impacted our operations and financial performance. This outbreak has triggered references to the SARS outbreak, which occurred in 2003 and affected our business operations. Any severe occurrence of an outbreak of a contagious disease such as COVID-19, SARS, Avian Flu or Ebola may cause us or the government to temporarily close our manufacturing operations in China. In January 2020, virtually all companies in China were ordered to remain closed after the traditional Lunar New Year holiday ended, including our subsidiaries in China. If there is a renewed surge of the COVID-19 pandemic in China, the Chinese government may require companies to close again. If one or more of our key suppliers is required to close for an extended period, we might not have enough raw material inventories to continue manufacturing operations. In addition, travel restrictions between China and the U.S. have disrupted our normal movement to and from China and this has impacted our efficiency. If COVID-19 vaccines are not widely available, our business operations may be affected negatively. The outbreak has affected transportation and reduced the availability of air transport, caused port closures, and increased border controls and closures. If our manufacturing operations were closed for a significant period or we experience difficulty in shipping our products, we could lose revenue and market share, which would depress our financial performance and could be difficult to recapture. If one of our key customers is required to close for an extended period, this may delay the placement of new orders. As a result, our revenue would decline. Further, customers might default on their obligations to us. In the first quarter of 2020 we observed an increase in our accounts receivable and believe this was the result of businesses slowing down and a general cautiousness due to the COVID-19 pandemic. Such events would negatively impact our financial performance.

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

Our gross margin has fluctuated from period to period as a result of increases or decreases in total revenue, unit volume, shifts in product mix, shifts in the cost of raw materials, costs related to the relocation of our gallium arsenide and germanium production lines, including costs related to hiring additional manufacturing employees at our new locations, tariffs imposed by the U.S. government, the introduction of new products, decreases in average selling prices for products, utilization of our manufacturing capacity, fluctuations in manufacturing yields and our ability to reduce product costs. These factors and other variables change from period to period and these fluctuations are expected to continue in the future. A recent example is that in the second quarter of 2019 our gross margin was 34.3% but it dropped to 21.0% in the fourth quarter of 2019 as a result of several of these factors.

Further, we do not control the prices at which our raw material companies sell their raw material products to third parties and we do not control their production process. However, because we consolidate the results of two of these raw material 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, at some points in the last three years, 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 net realizable value accounting rules.

Shutdowns or 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, other natural disasters or calamities or government-ordered mandatory factory shutdowns, including as a result of the COVID-19 pandemic. Severe air pollution in Beijing can trigger mandatory factory shutdowns. For example, in the first quarter of 2018, over 300 manufacturing companies, including AXT, were intermittently shut down by the local government for a total of ten days from February 27 to March 31, due to severe air pollution. Further, we have increased capacity by adding two new sites and this could reduce our utilization rate and increase our depreciation charges. 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 and correctly manage capacity, the fixed expense

levels will have an adverse effect on our business, financial condition and results of operations. For example, in the three months ended December 31, 2019, our revenue dropped to \$18.4 million and our gross margin was only 21.0%.

If we are unable to utilize the available capacity in our manufacturing facilities, we may need to implement a restructuring plan, which could have a material adverse effect on our revenue, our results of operations and our financial condition. For example, 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 wafer manufacturing company, Tongmei, in order to better align manufacturing capacity with demand. Under the restructuring plan, we recorded 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 crystal growth and wafer processing technologies, and the number of usable wafer 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.

An 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, or EPD, 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 such 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, 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.

Risks exist in utilizing our new gallium arsenide manufacturing sites efficiently.

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 different location or temporarily cease or limit manufacturing. Such relocation, or other restrictions on manufacturing, could materially and adversely impact our results of operations and our financial condition.

The Beijing city government is moving its offices to the Tongzhou district where our original manufacturing facility is currently located. The city government is in the process of moving thousands of government employees into this area. To create room and upgrade the district, the city instructed virtually all existing manufacturing companies, including AXT, to relocate all or some of their manufacturing lines. We were instructed to move our gallium arsenide manufacturing line out of the area.

Although the relocation is largely completed and we are in volume production at the new sites, unforeseen manufacturing issues at the new sites could still occur. Problems could occur as we add capacity or comply with strict guidelines as customers perform their qualifications. All of this will require us to continue to diligently address the many details that arise at both of the new sites. A failure to properly accomplish this could result in disruption to our production and have a material adverse impact on our revenue, our results of operations and our financial condition. If we fail to meet the product qualification and volume requirements of a customer, we may lose sales to that customer. Our reputation may also be damaged. Any loss of sales could have a material adverse effect on our revenue, our results of operations and our financial condition.

Some of our key employees are relocating to our new manufacturing sites. Travel restrictions within China resulting from COVID-19 have impacted their relocation and hindered commuting. Certain employees may choose not to relocate. If we are unable to continue to employ those key employees in our original manufacturing facility, we may be required to terminate those employees and could incur severance costs. If the Chinese government does not assist us in this matter it could materially and adversely impact our results of operations and our financial condition. Further, a loss of key employees or our inability to hire qualified employees could disrupt our production, which could materially and adversely impact our results of operations and our financial condition.

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 shutdown 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 or required mandatory factory shutdowns. For example, in the first quarter of 2018, over 300 manufacturing companies, including AXT, were intermittently shut down by the local government for a total of ten days from February 27 to March 31 due to severe air pollution. If the government applies similar restrictions to us or requires mandatory factory shutdowns in the future, then such restrictions or shutdowns 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 required to seek additional permits.

Additional customers may require that they re-qualify our gallium arsenide wafer substrates or our new sites as a result of relocating our gallium arsenide manufacturing lines.

Although some of our largest customers have qualified our new sites there may still be some who will decide to go through the qualification process. If we fail to meet the product qualification requirements of a customer, we may lose sales to that customer. Our reputation may also be damaged. Any loss of sales could have a material adverse effect on our revenue, our results of operations and our financial condition.

Global economic and political conditions, including trade tariffs and restrictions, may have a negative impact on our business and financial results.

In September 2018, the Trump Administration announced a list of thousands of categories of goods that became subject to tariffs when imported into the United States. This pronouncement imposed tariffs on wafer substrates we imported into the United States. The initial tariff rate was 10% and subsequently was increased to 25%. Approximately 10% of our revenue derives from importing our wafers into the United States. In the years 2020 and 2019 we paid approximately \$1.3 million and \$0.7 million, respectively, in tariffs. The future impact of tariffs and trade wars is uncertain.

The economic and political conditions between China and the United States, in our view, create an unstable business environment. The United States has restricted access by certain Chinese technology companies to items produced domestically and abroad from U.S. technology and software, which may impact our ability to grow our revenue. Trade restrictions against China have resulted in a greater determination within China to be self-sufficient and produce more goods domestically. Government agencies in China may be encouraging and supporting the founding of new companies, the addition of new products in existing companies and more vertical integration within companies. In 2019 these factors resulted in lower revenue from sales of our wafer substrates in China.

Our operations and financial results depend on worldwide economic and political conditions and their impact on levels of business spending, which has deteriorated significantly in many countries and regions. Uncertainties in the political, financial and credit markets may cause our customers to postpone deliveries. The COVID-19 virus is an additional cause of uncertainty. Delays in the 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. 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.

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, high furnace temperatures or, in the case of InP, high pressure during our manufacturing processes could render some 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.

On the evening of March 15, 2017, an electrical short-circuit fire occurred at our Beijing manufacturing facility. The electrical power supply supporting 2-inch, 3-inch and 4-inch gallium arsenide and germanium crystal growth was damaged and production in that area was stopped. In addition, a waste water pipe was damaged resulting in a halt to wafer processing for four days until the pipe could be repaired. We were able to rotate key furnace hardware and use

some of the 6-inch capacity for smaller diameter crystal growth production to mitigate the impact of the fire and resume production. If we are unable to recover from a fire or natural disaster, our business and operating results could be materially and adversely affected.

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 to produce components for 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:

- worldwide economic and political conditions and their impact on levels of business spending;
- the competition such manufacturers face in their particular industries;
- end of life obsolescence of products containing devices built on our wafers;
- 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, during 2019 widespread political and economic instability and trade war concerns resulted in a general slowdown and our revenue decreased significantly. Additionally, 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. The slowdown persisted until late in 2017. This resulted in a slowdown of sales of our InP substrates used in the PON market. We expect similar cycles of strong demand followed by 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, when the average selling prices for the raw materials produced decline, this results in a negative impact on our revenue, gross margin and profitability. For example, the average selling prices for 4N gallium and for germanium were driven down by oversupply in recent years, and negatively impacted our financial results. In 2020, the companies accounted for under the equity method of accounting contributed a gain of \$0.1 million to our consolidated financial statements. In 2019 and 2018, the companies accounted for under the equity method of accounting contributed a loss of \$1.9 million and \$1.1 million, respectively, to our consolidated financial statements. Further, in several quarters over the past three years, one of our consolidated subsidiaries incurred a lower of cost or net realizable value inventory write down, which negatively impacted our consolidated gross margin. In the first quarter of 2019, we incurred an impairment charge of \$1.1 million for a germanium materials company in China in which we have a 25% ownership interest, writing down our investment to zero value. If the pricing environment remains stressed by oversupply and our raw material companies cannot reduce their production costs, then the reduced average selling prices of the raw materials will have a continuing adverse impact on our revenue, gross margins and net profit.

Problems incurred in our raw material companies or our investment partners could result in a material adverse impact on our financial condition or results of operations.

We have invested in raw material companies in China that produce materials, including 99.99% pure gallium (4N Ga), high purity gallium (6N and 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. 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 ownership interest. Several of these companies occupy space within larger facilities owned and/or operated by one of the other investment partners. Several of these 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 a partner in any of these ventures experiences problems with its operations, or deliberately withholds or disrupts services, disruptions in the operations of our companies could occur, having a material adverse effect on the financial condition and results of operation in these companies, and correspondingly on our financial condition or results of operations. For example, since gallium is a by-product of aluminum, our raw gallium company in China, which is housed in and receives services from an affiliated aluminum plant, could generate lower production and shipments 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 higher costs and reduced gross margin.

The China central government has become increasingly concerned about environmental hazards. Air pollution is a well-known problem in Beijing and other parts of China. In days of severe air pollution, the government has ordered manufacturing companies to stop all production. The central government is also tightening control over hazardous chemicals and other hazardous elements such as arsenic, which is produced by two of our raw material companies. Further, the central government encourages employees to report to the appropriate regulatory agencies possible safety or environmental violations, but there may not be actual violations. Regular use in the normal course of business of hazardous chemicals or hazardous elements or a company's failure to meet the ever-tightening standards for control of hazardous chemicals or hazardous elements could result in orders to shut down permanently, fines or other severe measures. Any such orders directed at one of our raw material companies could result in impairment charges if the company is forced to close its business, cease operations or incurs fines or operating losses, which would have a material adverse effect on our financial results. In the first quarter of 2019, we incurred an impairment charge of \$1.1 million for a germanium materials company in China in which we have a 25% ownership interest, writing down our investment to zero value.

Further, some of our raw material companies share facilities with our raw material investment partners. If either company is deemed to have violated applicable laws, rules or regulations governing the use, storage, discharge or disposal of hazardous chemicals, their operations could be adversely affected and we could be subject to substantial liability for clean-up efforts, personal injury, fines or suspension or termination of operations. Employees working for these companies could bring litigation against us even though we are not directly controlling those operations. 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 raw material companies or investment 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.

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

The markets for our products are intensely competitive. We face competition for our wafer substrate products from other manufacturers of substrates, such as Sumitomo, JX, Freiburger, Umicore, 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 process similar to our VGF process 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 decrease and we may not maintain 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 and profitability.

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. Further, recent trade tensions between China and the United States have resulted in a greater determination within China to be self-sufficient and produce more goods domestically. This could result in the formation of new competitors that would compete against our company and adversely affect our financial results.

Cyber-attacks, system security risks and data protection issues could disrupt our internal operations and cause a reduction in revenue, increase in expenses, negatively impact our results of operation or result in other adverse consequences.

Like most technology companies, we could be targeted in cyber-attacks. We face a risk that experienced computer programmers and hackers may be able to penetrate our network security and misappropriate or compromise our confidential and proprietary information, potentially without being detected. Computer programmers and hackers also may be able to develop and deploy viruses, worms, and other malicious software programs that attack our information technology infrastructure and demand a ransom payment. The costs to us to eliminate or alleviate cyber or other security problems, bugs, viruses, worms, malicious software programs and security vulnerabilities could be significant, and our efforts to address these problems may not be successful and could result in interruptions and delays that may impede our sales, manufacturing, distribution, accounting or other critical functions.

Breaches of our security measures could create system disruptions or cause shutdowns or result in the accidental loss, inadvertent disclosure or unapproved dissemination of proprietary information or sensitive or confidential data about us. Cyber-attacks could use fraud, trickery or other forms of deception. A cyber-attack could expose us to a risk of loss or misuse of information, result in litigation and potential liability, damage our reputation or otherwise harm our business. In addition, the cost and operational consequences of implementing further data protection measures could be significant.

Portions of our information technology infrastructure might also experience interruptions, delays or cessations of service or produce errors in connection with systems integration or migration work that takes place from time to time, which may have a material impact on our business. We may not be successful in implementing new systems and transitioning data, which could cause business disruptions and be more expensive, time consuming, disruptive and resource-intensive than originally anticipated. Such disruptions could adversely impact our ability to fulfill orders and interrupt other processes. Delayed sales, lower margins or lost customers could adversely affect our financial results and reputation.

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. In certain years, we have 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, price reductions by competitors, 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 also 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.

In order to remain competitive, we must continually work to reduce the cost of manufacturing our products and improve our yields and manufacturing efficiencies. Our efforts may not allow us to keep pace with competitive pricing pressures which could adversely affect our margins. 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 wafer 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 other manufacturing problems, customers may return product for credit, cancel or reduce orders or purchase products from our competitors. 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 revenue from new customers or for new products sold to existing customers.

New customers typically place orders with us for our substrate products three months to a year or more after our initial contact with them. 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 selling, 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.

From time to time, sales to one or more of our customers individually represent more than 10% of our revenue and if we were to lose a major customer the loss would negatively impact our revenue. 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. 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, 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 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 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. 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 for our products. 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.

A significant portion of our operating expense and manufacturing costs are relatively fixed. If revenue for a particular quarter is lower than we expect, we likely will be unable to proportionately reduce our operating expenses or fixed manufacturing costs for that quarter, which would harm our operating results.

If we do not successfully develop new product features and improvements and new products that respond to 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 product features, improved performance characteristics and new products, such as larger diameter substrates, low defect density substrates, thicker or thinner substrates, substrates with extreme surface flatness specifications, substrates that are manufactured with a doped crystal growth process or substrates that incorporate leading technology and other technological advances. 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. Over time, 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 product features, improved performance characteristics and new products can be a highly complex process, and we may experience delays in developing and introducing them. 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.

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 direct investments or investments through our subsidiaries in 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 significant influence over every one 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 which would have a negative impact on our results of operations. In the first quarter of 2017, we incurred an impairment charge of \$313,000 against one of our partially-owned suppliers, writing down our investment to zero value. Most recently, in the first quarter of 2019, we incurred an impairment charge of \$1.1 million for a germanium materials company in China in which we have a 25% ownership interest, writing down our investment to zero value. The significant decline in the selling prices of raw materials which began in 2015 has weakened some of these companies and their losses have negatively impacted our financial results. Further, the increasing concern and restrictions in China of hazardous chemicals and other hazardous elements could result in orders to shut down permanently, fines or other severe measures. Any such orders directed at one of our joint venture companies could result in impairment charges if the company is forced to close its business, cease operations or incurs fines, or operating losses, which would have a material adverse effect on our financial results.

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. 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. Delays in receiving equipment or materials could result in higher 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 or form additional complementary raw material joint ventures.

We might invest in additional joint venture companies 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 business venture with the other investment partners. Further, geopolitical tensions and trade wars could result in government agencies blocking such new joint ventures. New joint ventures could require cash investments or cause us to

incur additional liabilities or other expenses, any of which could adversely affect our financial condition and operating results.

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

Some of our customers may be undercapitalized and cope with cash flow issues. Because of competitive market conditions, we may grant our customers extended payment terms when selling products to them. Subsequent to our fulfilling an order, 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. We observed an increase in our accounts receivable in the first quarter of 2020 and believe this has resulted from work stoppages, shelter-in-place orders and general cautiousness due to the COVID-19 pandemic. In the past we, have had some customers file for bankruptcy. If our customers do not pay amounts owed to us then we will 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, 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 would need to take a charge for a reduction in inventory values in accordance with the lower of cost or net realizable value 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, would adversely affect our results of operations.

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

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.

III. Risks Related to International Aspects of Our Business

The Chinese central government is increasingly aware of air pollution and other forms of environmental pollution and their reform efforts can impact our manufacturing, including intermittent mandatory shutdowns.

The Chinese central government is demonstrating strong leadership to improve air quality and reduce environmental pollution. These efforts have impacted manufacturing companies through mandatory shutdowns, increased inspections and regulatory reforms. In the fourth quarter of 2017, many manufacturing companies in the greater Beijing area, including AXT, were instructed by the local government to cease most manufacturing for several days until the air quality improved. In the first quarter of 2018, from February 27 to March 31 over 300 manufacturing companies, including AXT, were again intermittently shut down by the local government for a total of ten days, or 30 percent of the remaining calendar days, due to severe air pollution. Our shipments were delayed and our revenue for the quarter was negatively impacted. We expect that mandatory factory shutdowns will occur in the future. If the frequency of such shutdowns increases, especially at the end of a quarter, or if the total number of days of shutdowns prevents us from producing enough wafers to ship, then these shutdowns will have a material adverse effect on our manufacturing output, revenue and factory utilization. Each of our raw material supply chain companies could also be impacted by environmental related orders from the central government.

Enhanced trade tariffs, import restrictions, export restrictions, Chinese regulations or other trade barriers may materially harm our business.

All of our wafer substrates are manufactured in China and in the years 2020 and 2019, approximately 10% of our revenue was generated by sales to customers in North America, primarily in the U.S. In September 2018, the Trump Administration announced a list of thousands of categories of goods that became subject to tariffs when imported into the United States. This pronouncement imposed tariffs on wafer substrates we imported into the United States. The initial tariff rate was 10% and subsequently was increased to 25%. In the years 2020 and 2019 we paid approximately \$1.3 million and \$0.7 million, respectively, in tariffs. The future impact of tariffs and trade wars is uncertain. We may be required to raise prices, which may result in the loss of customers and our business, financial condition and results of operations may be materially harmed. Additionally, it is possible that our business could be adversely impacted by retaliatory trade measures taken by China or other countries in response to existing or future tariffs, which could cause us to raise prices or make changes to our operations, which could materially harm our business, financial condition and results of operations.

The economic and political conditions between China and the United States, in our view, create an unstable business environment. The United States government has restricted access by certain Chinese technology companies to items produced domestically and abroad from U.S. technology and software, which may impact our ability to grow our revenue. Trade restrictions against China have resulted in a greater determination within China to be self-sufficient and produce more goods domestically. Government agencies in China may be encouraging and supporting the founding of new companies, the addition of new products in existing companies and more vertical integration within companies. These factors have resulted in lower revenue from sales of our wafer substrates in China. Further, the continued threats of tariffs and other trade restrictions could have a generally disruptive impact on the global economy and, therefore, negatively impact our sales.

In addition, we may incur increases in costs and other adverse business consequences, including loss of revenue or decreased gross margins, due to changes in tariffs, import or export restrictions, further trade barriers, or unexpected changes in regulatory requirements. 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 and the United States, 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.

The spread of COVID-19 has affected our business operations and financial performance.

The spread of COVID-19 has impacted our operations and financial performance. This outbreak has triggered references to the SARS outbreak, which occurred in 2003 and affected our business operations. Any severe occurrence of an outbreak of a contagious disease such as COVID-19, SARS, Avian Flu or Ebola may cause us or the government to temporarily close our manufacturing operations in China. In January 2020, virtually all companies in China were ordered to remain closed after the traditional Lunar New Year holiday ended, including our subsidiaries in China. If there is a renewed surge of the COVID-19 pandemic in China, the Chinese government may require companies to close again. If one or more of our key suppliers is required to close for an extended period, we might not have enough raw material inventories to continue manufacturing operations. In addition, travel restrictions between China and the U.S. have disrupted our normal movement to and from China and this has impacted our efficiency. The outbreak has affected transportation and reduced the availability of air transport, caused port closures, and increased border controls and closures. If our manufacturing operations were closed for a significant period or we experience difficulty in shipping our products, we could lose revenue and market share, which would depress our financial performance and could be difficult to recapture. If one of our key customers is required to close for an extended period this may delay the placement of new orders. As a result, our revenue would decline. Further, customers might default on their obligations to us. In the first quarter of 2020 we observed an increase in our accounts receivable and believe this is the result of businesses slowing down and a general cautiousness due to the COVID-19 pandemic. Such events would negatively impact our financial performance.

Financial market volatility and adverse changes in the domestic, global, political and 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 or low or negative growth in China, Europe or the United States, along with volatility in the financial markets, increasing national debt and fiscal concerns in various regions and the adoption and availability of fiscal and monetary stimulus measures to counteract the impact of the COVID-19 pandemic, pose challenges to our industry. Currently China's economy is slowing and this could impact our financial performance. In addition, tariffs, trade restrictions, trade wars and Brexit are creating an unstable environment and can disrupt or restrict commerce. Although we remain well-capitalized, the cost and availability of funds may be adversely affected by illiquid credit markets. Volatility 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;
- 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 tangible or intangible assets.

In the past, most recently in the fourth quarter of 2018 and continuing in 2019, we experienced delays in customer purchasing decisions and disruptions in a normal volume of customer orders that we believe were in part due to the uncertainties in the global economy, resulting in 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.

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

Approximately 90% of our revenue is from international sales. We expect that sales to customers outside the United States, particularly sales to customers in Japan, Taiwan, Europe and China, will continue to represent a significant portion of our revenue. Therefore, our revenue growth depends significantly on the expansion of our international sales and operations.

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, threats of trade wars, 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, natural disasters and epidemics or pandemics, such as COVID-19, 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 electronic products; (iii) capital spending by semiconductor manufacturers; (iv) price weakness for certain semiconductor devices; (v) changing and tightening environmental regulations; (vi) political instability in regions where we have operations and (vii) trade wars 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;
- foreign exchange rate fluctuations;
- changes in export license requirements;
- political and economic instability; and
- unexpected changes in diplomatic and trade relationships.

Most of 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. We also have some small sales denominated in Euro. 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.

We are subject to foreign exchange gains and losses that materially impact our income statement.

We are subject to foreign exchange gains and losses that materially impact our statement of operations. For example, in 2020 we incurred a loss of \$411,000.

The functional currency of our companies in China is the Chinese renminbi, the local currency. We can incur foreign exchange gains or losses when we pay dollars to one of our China-based companies or a third-party supplier in China. Similarly, if a company in China pays renminbi into one of our bank accounts transacting in dollars the renminbi will be converted to dollars and we can incur a foreign exchange gain or loss. Hedging renminbi will be considered in

the future but it is complicated by the number of companies involved, the diversity of transactions and restrictions imposed by the banking system in China.

Sales to Japanese customers are denominated in Japanese yen. This subjects us to fluctuations in the exchange rates between the U.S. dollar and the Japanese yen and can result in foreign exchange gains and losses. This has been problematic in the past and, therefore, we instituted a foreign currency hedging program dealing with yen which has mitigated the problem.

Joint venture raw material companies in China bring certain risks.

Since our consolidated subsidiaries and all of our joint venture raw material companies reside in China, their activities could subject us to a number of risks associated with conducting operations internationally, including:

- unexpected changes in regulatory requirements that may limit our ability to manufacture, export the products of these companies or sell into particular jurisdictions or impose multiple conflicting tax laws and regulations;
- the imposition of tariffs, trade barriers and duties;
- difficulties in managing geographically disparate operations;
- difficulties in enforcing agreements through non-U.S. legal systems;
- 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.

Uncertainty regarding the United States' foreign policy, particularly with regards to China, could disrupt our business.

We manufacture our substrates in China and, in 2020, approximately 90% of our sales were to customers located outside the United States. Further, we have partial ownership of raw material companies in China as part of our supply chain. The United States' current foreign policy has created uncertainty and caution in the international business community, resulting in disruptions in manufacturing, import/export, trade tariffs, sales, investments and other business activity. Such disruptions have had an adverse impact on our financial performance and could continue in the future.

If China places restrictions on freight and transportation routes and on ports 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 manufacturing delays or 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 items) 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.

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 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 facilities 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. The Beijing municipal government's decision to move to the Tongzhou district, the original location of our manufacturing company, resulted in the city instructing virtually all existing manufacturing companies, including AXT, to relocate all or some of their manufacturing lines. We were instructed to move our gallium arsenide manufacturing line out of the area. Chinese policies toward hazardous materials, including arsenic, environmental controls, air pollution, economic liberalization, 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. We have observed a growing fluidity and tightening of regulations concerning hazardous materials, other environmental controls and air pollution. The Chinese government could revoke, terminate or suspend our operating licenses for reasons related to environmental control over the use of hazardous materials, air pollution, labor complaints, national security and similar reasons without compensation to us. Further, the central government encourages employees to report to the appropriate regulatory agencies possible safety or environmental violations, but there may not be actual violations. In days of severe air pollution the government has ordered manufacturing companies to stop all production. For example, in the first quarter of 2018, from February 27 to March 31, over 300 manufacturing companies, including us, were again intermittently shut down by the local government for a total of ten days due to severe air pollution. Our shipments were delayed and our revenue for the quarter was negatively impacted. We expect that mandatory factory shutdowns will occur in the future. Any failure on our part to comply with governmental regulations could result in the loss of our ability to manufacture our products. Further, any imposition of surcharges or any increase in Chinese tax rates or reduction or elimination of Chinese tax benefits could hurt our financial results.

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 raw material companies. We may be unable to manufacture our products and would then be unable to meet customer orders except from finished goods 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.

VI. Risks Related to Our Financial Results and Capital Structure

We may utilize our cash balances for relocating manufacturing lines, adding capacity, acquiring state-of-the-art equipment or offsetting a business downturn resulting in the decline of our existing cash and if we need additional capital, funds may not be available on acceptable terms, or at all.

Our liquidity is affected by many factors including among others, the relocation of our gallium arsenide manufacturing lines, the expansion of our capacity to meet market demand, the acquisition of state-of-the-art equipment, other capital expenditures, operating activities, the effect of exchange rate changes and other factors related to the uncertainties of the industry and global economies. Such matters could draw down our cash reserves, which could adversely affect our financial condition, require us to incur debt, 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.

The terms of the private equity raised in China as a first step toward an IPO on the STAR Market grant each Investor a right of redemption if Tongmei fails to achieve its IPO.

Pursuant to the Capital Investment Agreements with the Investors, each Investor has the right to require AXT to redeem any or all Tongmei shares held by such Investor at the original purchase price paid by such Investor, without interest, in the event of a material adverse change or if Tongmei does not achieve its IPO on or before December 31, 2022. This right is suspended when Tongmei submits its formal application to the CSRC. Tongmei currently plans to submit its formal application to the CSRC in the third quarter of 2021. However, if on December 31, 2022 the IPO application has been submitted and accepted by the CSRC or the stock exchange and such submission remains under review, then the date when such investor is entitled to exercise such redemption right shall be deferred to a date when such submission is rejected by the CSRC or stock exchange, or the date when Tongmei withdraws its IPO application. The process of going public on the STAR Market includes several periods of review and is therefore a lengthy process. Tongmei does not expect to complete the IPO until mid-2022. The listing of Tongmei on China's STAR Market will not change the status of AXT as a U.S. public company. There can be no assurances that Tongmei will complete its IPO by December 31, 2022 or at all. In the event that investors exercise their redemption rights, we may be required to seek additional capital in order to redeem their Tongmei shares and there would be no assurances that such capital would be available on terms acceptable to us, if at all. Any redemptions could have a material adverse effect on our business, financial condition and results of operations.

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;
- unforeseen disruptions at our new sites;
- disruptions in manufacturing if air pollution, or other environmental hazards, or outbreaks of contagious diseases causes the Chinese government to order work stoppages;
- 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
- 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 $\frac{2}{3}$ % 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.

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, 2020, we had U.S. federal net operating loss carryforwards of approximately \$57.0 million. We have utilized all state net operating losses, primarily in the state of California, as of December 31, 2020. 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 might 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.

V. 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 may incur expenses to defend ourselves against such claims or enter into cross license agreements that require us to pay royalty payments to resolve such claims. For example, in 2020, we and a competitor entered into the Cross License Agreement, which has a term that began on January 1, 2020 and expires on December 31, 2029. We have in the past been involved in lawsuits alleging patent infringement, and could in the future be involved in similar litigation.

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 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.

VI. Risks Related to Compliance, Environmental Regulations and Other Legal Matters

If we, or any of our partially-owned supply chain companies, fail to comply with environmental and safety regulations, we may be subject to significant fines or forced to cease our operations.

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 materials during manufacturing, research and development, and sales demonstrations. If we, or any of our partially-owned supply chain companies, 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 close or temporarily 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.

The Chinese central government is demonstrating strong leadership to improve air quality and reduce environmental pollution. The central government encourages employees to report to the appropriate regulatory agencies possible safety or environmental violations but there may not be actual violations. These efforts have impacted manufacturing companies through mandatory shutdowns, increased inspections and regulatory reforms. In the first quarter of 2018, from February 27 to March 31 over 300 manufacturing companies were again intermittently shut down by the local government for a total of ten days, or 30 percent of the remaining calendar days, due to severe air pollution. Our shipments were delayed and our revenue for the quarter was negatively impacted. We expect that mandatory factory shutdowns will occur in the future. If the frequency of such shutdowns increases, especially at the end of a quarter, or if the total number of days of shutdowns prevents us from producing enough wafers to ship, then the shutdowns will have a material adverse effect on our manufacturing output, revenue and factory utilization. We believe the relocation of our gallium arsenide and germanium manufacturing lines mitigates our exposure to factory shutdowns. Each of our raw material supply chain companies could also be impacted by environmental related orders from the central government.

In addition, from time to time, the Chinese government issues new regulations, which may require additional actions on our part to comply. For example 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 required to seek additional permits.

We could be subject to suits for personal injuries caused by hazardous materials.

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 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.

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 and it extends to our companies in China. 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 raw material 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 March 12, 2021 are as follows:

| Location | Square Feet | Principal Use | Ownership |
|-----------------|-------------|-------------------------------|---------------------------------------------------------------------------------------------------------------------------------|
| Fremont, CA | 19,467 | Administration | Operating lease, expires November 2023 |
| Beijing, China | 256,000 | Production and Administration | Owned by AXT / Tongmei |
| DingXing, China | 236,000 | Production | Owned by AXT / Tongmei |
| Kazuo, China | 350,000 | Production | Owned by AXT / Tongmei |
| Nanjing, China | 1,250 | Administration | Operating lease by Nanjing JinMei Gallium Co. Ltd., expires May 2021.* |
| Kazuo, China | 71,000 | Production and Administration | Owned by Beijing BoYu Semiconductor Vessel Craftwork Technology Co., Ltd.* |
| Beijing, China | 5,000 | Production and Administration | Operating leases by Beijing BoYu Semiconductor Vessel Craftwork Technology Co., Ltd., expire on various dates until June 2021.* |
| Tianjin, China | 145,000 | Production and Administration | Owned by Beijing BoYu Semiconductor Vessel Craftwork Technology Co., Ltd., * |
| Kazuo, China | 191,000 | Production | Owned by ChaoYang JinMei Gallium Ltd.,* |

* Raw material companies consolidated in our consolidated financial statements.

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 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.

| | <u>High</u> | <u>Low</u> |
|----------------|-------------|------------|
| 2020 | | |
| First Quarter | \$ 4.92 | \$ 1.85 |
| Second Quarter | \$ 5.99 | \$ 2.76 |
| Third Quarter | \$ 6.42 | \$ 4.42 |
| Fourth Quarter | \$ 11.65 | \$ 5.44 |
| 2019 | | |
| First Quarter | \$ 4.68 | \$ 3.70 |
| Second Quarter | \$ 6.14 | \$ 3.55 |
| Third Quarter | \$ 4.47 | \$ 3.24 |
| Fourth Quarter | \$ 4.20 | \$ 2.72 |

As of March 4, 2021, there were 170 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. The 883,000 shares of Series A preferred stock issued and outstanding as of December 31, 2020 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. 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 \$2.9 million and we include such cumulative dividends in "Accrued liabilities" in our consolidated balance sheets. No shares were repurchased during 2020, 2019 and 2018 under this program. 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 year to date dividends on the Series A preferred stock when calculating our earnings per share.

Issuer Purchases of Equity Securities

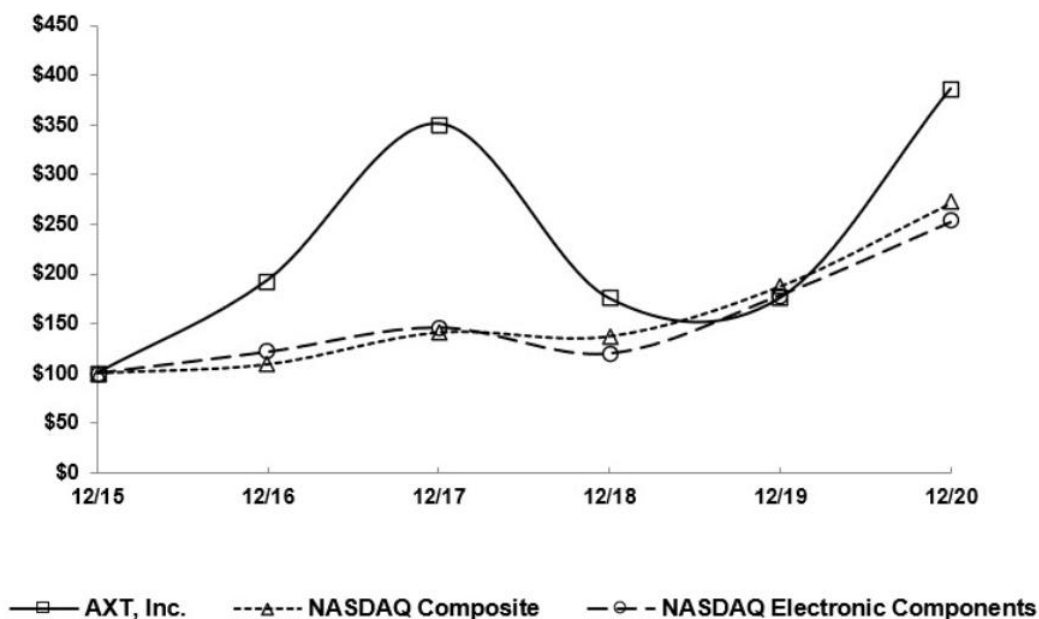
On October 27, 2014, our Board of Directors approved a stock repurchase program pursuant to which we may repurchase up to \$5.0 million of our outstanding common stock. These repurchases can be made from time to time in the open market and are funded from our existing cash balances and cash generated 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 2020 or 2019 under this program. As of December 31, 2020 and 2019, approximately \$2.7 million remained available for future repurchases under this program, respectively.

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, 2015 and ending December 31, 2020.

COMPARISON OF 5 YEAR CUMULATIVE TOTAL RETURN*

Among AXT, Inc., the NASDAQ Composite Index and the NASDAQ Electronic Components Index



*\$100 invested on 12/31/15 in stock or index, including reinvestment of dividends. Fiscal year ending December 31.

| | 12/15 | 12/16 | 12/17 | 12/18 | 12/19 | 12/20 |
|-------------------------------------|------------|--------|--------|--------|--------|--------|
| AXT, Inc. | 100 | 193.55 | 350.81 | 175.40 | 175.40 | 385.89 |
| NASDAQ Composite | 100 | 108.87 | 141.13 | 137.12 | 187.44 | 271.64 |
| NASDAQ Electronic Components | 100 | 121.48 | 146.21 | 119.92 | 178.71 | 252.83 |

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, | | | | |
|------------------------------------------------------------------|-------------------------|------------|------------|-----------|-----------|
| | 2020 | 2019 | 2018 | 2017 | 2016 |
| (in thousands, except per share data) | | | | | |
| Statements of Operations Data: | | | | | |
| Revenue | \$ 95,361 | \$ 83,256 | \$ 102,397 | \$ 98,673 | \$ 81,349 |
| Cost of revenue | 65,086 | 58,431 | 65,350 | 64,198 | 54,968 |
| Gross profit | 30,275 | 24,825 | 37,047 | 34,475 | 26,381 |
| Operating expenses: | | | | | |
| Selling, general and administrative | 19,200 | 19,305 | 19,003 | 17,009 | 13,880 |
| Research and development | 7,135 | 5,834 | 5,897 | 4,827 | 5,850 |
| Restructuring charge | — | — | — | — | 226 |
| Total operating expenses | 26,335 | 25,139 | 24,900 | 21,836 | 19,956 |
| Income (loss) from operations | 3,940 | (314) | 12,147 | 12,639 | 6,425 |
| Interest income (expense), net | (179) | 217 | 528 | 461 | 409 |
| Equity in income (loss) of unconsolidated joint ventures | 111 | (1,876) | (1,080) | (1,694) | (1,995) |
| Other income (expense), net | 3,200 | 947 | 352 | (553) | 860 |
| Income (loss) before provision for income taxes | 7,072 | (1,026) | 11,947 | 10,853 | 5,699 |
| Provision for income taxes | 2,031 | 562 | 938 | 792 | 733 |
| Net income (loss) | 5,041 | (1,588) | 11,009 | 10,061 | 4,966 |
| Less: Net (income) loss attributable to noncontrolling interests | (1,803) | (1,012) | (1,355) | 87 | 670 |
| Net income (loss) attributable to AXT, Inc. | \$ 3,238 | \$ (2,600) | \$ 9,654 | \$ 10,148 | \$ 5,636 |
| Net income (loss) attributable to AXT, Inc. per common share: | | | | | |
| Basic | \$ 0.08 | \$ (0.07) | \$ 0.24 | \$ 0.27 | \$ 0.17 |
| Diluted | \$ 0.07 | \$ (0.07) | \$ 0.24 | \$ 0.26 | \$ 0.17 |
| Shares used in per share calculations: | | | | | |
| Basic | 40,152 | 39,487 | 39,049 | 37,444 | 32,139 |
| Diluted | 41,025 | 39,487 | 40,265 | 38,966 | 32,894 |

| | December 31, | | | | |
|----------------------------|--------------|-----------|-----------|-----------|-----------|
| | 2020 | 2019 | 2018 | 2017 | 2016 |
| (in thousands) | | | | | |
| Balance Sheet Data: | | | | | |
| Cash and cash equivalents | \$ 72,602 | \$ 26,892 | \$ 16,526 | \$ 44,352 | \$ 36,152 |
| Investments | 5,966 | 9,427 | 22,846 | 32,608 | 17,571 |
| Working capital | 125,443 | 85,679 | 99,831 | 117,927 | 91,335 |
| Total assets | 298,862 | 223,349 | 223,524 | 211,200 | 154,246 |
| Current liabilities | 39,075 | 27,526 | 28,709 | 22,594 | 15,951 |
| Stockholders’ equity | 207,969 | 192,762 | 194,532 | 188,317 | 137,390 |

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 on Form 10-K. 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.

Critical Accounting Policies and Estimates

We prepare our consolidated financial statements in accordance with accounting principles generally accepted in the United States of America ("U.S. GAAP"). 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 and Sales Returns

We manufacture and sell high-performance compound semiconductor substrates including indium phosphide, gallium arsenide and germanium wafers, and our consolidated subsidiaries sell certain raw materials, including high purity gallium (6N and 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 purchase orders placed by our customers, and our terms and conditions of sale do not require customer acceptance. We account for a contract with a customer when there is a legally enforceable contract, which could be the customer's purchase order, the rights of the parties are identified, the contract has commercial terms, and collectibility of the contract consideration is probable. The majority of our contracts have a single performance obligation to transfer products and are short term in nature, usually less than six months. Our revenue is measured based on the consideration specified in the contract with each customer in exchange for transferring products that are generally based upon a negotiated, formula, list or fixed price. Revenue is recognized when control of the promised goods is transferred to our customer, which is either upon shipment from our dock, receipt at the customer's dock, or removal from consignment inventory at the customer's location, in an amount that reflects the consideration we expect to be entitled to receive in exchange for those goods.

We have elected to account for shipping and handling as activities to fulfill the promise to transfer the goods. As such, shipping and handling fees billed to customers in a sales transaction are recorded in revenue. Shipping and handling costs incurred are recorded in cost of revenue. Sales taxes and value added taxes in foreign jurisdictions that are collected from customers and remitted to governmental authorities are accounted for on a net basis and, therefore, are excluded from revenue.

We do not provide training, installation or commissioning services. We accrue for future returns based on historical data, prior experience, current economic trends and changes in customer demand at the time revenue is recognized. We do not recognize any asset associated with the incremental cost of obtaining revenue generating customer contracts. As such, sales commissions and other related expenses are expensed as incurred, given that the expected period of benefit is less than one year.

Accounts Receivable and Allowance for Doubtful Accounts

Accounts receivable are recorded at the invoiced amount and are not interest bearing. We review at least quarterly, or when there are changes in credit risks, the likelihood of collection on our accounts receivable balances and provide an allowance for doubtful accounts receivable for any expected credit losses 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 our 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 a credit loss is expected through the establishment of an allowance, which would then be written off when all efforts to collect have been exhausted and recoveries are recognized when they are received. As of December 31, 2020 and 2019, our accounts receivable, net balance was \$24.6 million and \$19.0 million, respectively, which was net of an allowance for doubtful accounts of \$217,000 and \$34,000 as of December 31, 2020 and 2019, respectively. During 2020, we increased the allowance for doubtful accounts by \$183,000 due to the poor financial condition of a few customers. During 2019, the allowance for doubtful accounts decreased by \$324,000 primarily due to the deconsolidation of Beijing JiYa Semiconductor Material Co., Ltd. (“JiYa”) as of March 11, 2019. 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 the future periods.

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, 2020 and 2019, accrued product warranties totaled \$609,000 and \$387,000, respectively. The increase in accrued product warranties is primarily attributable to four customers who claimed certain wafers did not meet their specifications. 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 net realizable value. 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 reserve 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, 2020 and 2019, we had an inventory reserve of \$17.7 million and \$16.4 million, respectively, for excess and obsolete inventory and \$162,000 and \$91,000, respectively, for lower of cost or net realizable value 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.

Impairment of Investments

We classify marketable investments in debt securities as available-for-sale debt securities in accordance with ASC Topic 320, *Investments—Debt Securities*. All available-for-sale debt 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 debt securities for a period of time sufficient to allow for any anticipated recovery in market value. We also review our debt investment portfolio at least quarterly, or when there are changes in credit risks or other potential valuation concerns to identify and evaluate whether an allowance for expected credit losses or impairment would be necessary.

We also invest in equity instruments of privately-held raw material companies in China for business and strategic purposes. Investments in our unconsolidated joint venture raw material 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.

For the years ended December 31, 2020 and 2018, we had no impairment charges. For the year ended December 31, 2019, we recorded an impairment charge of \$1.1 million for a germanium materials company in China in which we have a 25% ownership interest. After receiving such company's preliminary first quarter 2019 financial results in early April 2019 and its projections for significant losses going forward, we determined that this asset was fully impaired and wrote the asset balance down to zero.

Fair Value of Investments

ASC Topic 820, *Fair Value Measurement* 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 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, 2020 and 2019, 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*. 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” or any impairment of long-lived assets on the consolidated balance sheets as of December 31, 2020 and 2019.

Stock-Based Compensation

We account for stock-based compensation in accordance with ASC Topic 718, *Stock-based Compensation*. 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. Our deferred tax assets have been reduced to zero by valuation allowance.

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 12—“Income Taxes” in the consolidated financial statements for additional information.

Change in Accounting Estimate – Useful Life of Equipment and Facilities

From time to time we review our estimates of the useful lives of our property, plant and equipment. As a result of the review, we determined a portion of our manufacturing equipment was lasting longer than the estimate previously established for the respective useful lives. Where appropriate, we extended the useful life of the manufacturing equipment in our accounting records. In addition, the useful life of our buildings located in China was extended to better align with industry standards. The changes in our estimate of the useful life, effective January 1, 2020, were made in order to remain consistent with U.S. GAAP regarding management estimates. The effect of the change in the useful lives decreased our manufacturing costs for the year ended December 31, 2020 by approximately \$1.4 million and increased our basic and diluted net income per share by approximately \$0.03, respectively, as a result of lower depreciation expense.

Results of Operations

Overview

We were founded in 1986 to commercialize and enhance our proprietary VGF technology for producing high-performance compound semiconductor substrates or wafers. We have one operating 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 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 raw material 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 increased in 2020 from \$83.3 million in 2019 to \$95.4 million in 2020. This was an increase of 14.5%. Our revenue decreased in 2019 by 18.7% to \$83.3 million. For the years ended in 2018, 2017 and 2016 our revenue grew each year. Our revenue increased in 2018 by 4% to \$102.4 million, in 2017 by 21% to \$98.7 million and in 2016 by 5% to \$81.3 million. In 2020, our gross margin increased from 29.8% in 2019 to 31.7% in 2020. Our gross margin declined in 2019 to 29.8% of total revenue from 36.2% of total revenue in 2018. For the years ended December 31, 2018, 2017 and 2016 our gross margin grew each year. Gross margins improved to 36.2% of total revenue in 2018 from 34.9% of total revenue in 2017 and from 32.4% of total revenue in 2016. During the four years from 2012 to 2015 our revenue declined, primarily as a result of the adoption of an alternative technology, Silicon on Insulator ("SOI"), which entered the market in 2011. SOI enabled the RF switching chip in cell phones to function satisfactorily at a reduced cost. Before 2011, silicon did not perform adequately in this function due to power consumption, heat and speed issues.

In 2014, our revenue from InP began to grow and, in 2014 and 2015, the InP annual growth rate exceeded 50% year on year. This mitigated the reduction in revenue from gallium arsenide and enabled us to return to annual growth in 2016. During this period, we believe our GaAs wafer business stabilized and our manufacturing yields improved. Our outlook for GaAs wafer substrates today is positive, as it is for InP and Ge substrates. The underlying end markets needing our wafer substrates are growing. For example, InP wafer substrates are used for silicon photonics/data centers, passive optical networks and, more recently, 5G. GaAs wafer substrates are used in LED lighting, industrial lasers and cell phones. We are continuing to improve our six-inch low defect density or low EPD GaAs substrates that are required for 3D-sensing using VCSELs. We believe the relocation of our GaAs manufacturing line enables us to add capacity quickly for GaAs and InP in the future if market demands so require.

Revenue

| | Years Ended Dec. 31 | | | 2019 to 2020 | | 2018 to 2019 | |
|-------------------------|---------------------|------------------|-------------------|------------------------|----------|------------------------|----------|
| | 2020 | 2019 | 2018 | Increase (Decrease) | % Change | Increase (Decrease) | % Change |
| Product Type: | | | | | | | |
| Substrates | \$ 75,587 | \$ 67,849 | \$ 81,008 | \$ 7,738 | 11.4 % | \$ (13,159) | (16.2)% |
| Raw materials and other | 19,774 | 15,407 | 21,389 | 4,367 | 28.3 % | (5,982) | (28.0)% |
| Total revenue | <u>\$ 95,361</u> | <u>\$ 83,256</u> | <u>\$ 102,397</u> | <u>\$ 12,105</u> | 14.5 % | <u>\$ (19,141)</u> | (18.7)% |

Revenue increased \$12.1 million, or 14.5% in 2020 from \$83.3 million in 2019. The \$7.7 million increase in wafer substrate sales was the result of stronger GaAs demand in LED sensors used in the automobile industry and the industrial sensor market. In addition, GaAs sales into wireless applications increased. Revenue from InP sales also increased. The InP revenue increase was driven by 5G infrastructure and data center upgrades (silicon photonics). Revenue from Ge wafer substrates increased, primarily as a result of higher demand from our customers in China. The \$4.4 million raw materials revenue increase as compared to the same period in 2019 was primarily the result of increased shipments of purified gallium due to stronger market demand and higher demand for pBN crucibles and OLED manufacturing tools using pBN sold by our consolidated subsidiaries.

Revenue decreased \$19.1 million, or 18.7% in 2019 from \$102.4 million in 2018. The \$13.2 million decrease in wafer substrate sales was the result of weaker GaAs demand in LED sensors used in the automobile industry and the industrial sensor market. In addition, GaAs sales into wireless applications decreased. Revenue from Ge wafer substrates also decreased, primarily as a result of lower demand from our customers in China. These decreases were partially offset by an increase in InP revenue. The \$6.0 million raw materials revenue decrease as compared to the same period in 2018 was primarily the result of the absence of revenue from raw gallium sales due to the deconsolidation of JiYa as of March 11, 2019. In addition there was a reduction in shipments of purified gallium due to lower market demand.

Revenue by Geographic Region

| | Year Ended Dec. 31, | | | 2019 to 2020 | | 2018 to 2019 | |
|--------------------------------------------------|---------------------|------------------|-------------------|------------------------|----------|------------------------|----------|
| | 2020 | 2019 | 2018 | Increase (Decrease) | % Change | Increase (Decrease) | % Change |
| | (\$ in thousands) | | | | | | |
| China | \$ 35,150 | \$ 26,796 | \$ 31,492 | \$ 8,354 | 31.2 % | \$ (4,696) | (14.9)% |
| % of total revenue | 37 % | 32 % | 31 % | | | | |
| Taiwan | 16,485 | 16,204 | 20,078 | 281 | 1.7 % | (3,874) | (19.3)% |
| % of total revenue | 17 % | 19 % | 20 % | | | | |
| Japan | 7,624 | 6,258 | 10,305 | 1,366 | 21.8 % | (4,047) | (39.3)% |
| % of total revenue | 8 % | 8 % | 10 % | | | | |
| Asia Pacific (excluding China, Taiwan and Japan) | 5,458 | 7,592 | 8,488 | (2,134) | (28.1)% | (896) | (10.6)% |
| % of total revenue | 6 % | 9 % | 8 % | | | | |
| Europe (primarily Germany) | 19,673 | 18,178 | 22,013 | 1,495 | 8.2 % | (3,835) | (17.4)% |
| % of total revenue | 21 % | 22 % | 21 % | | | | |
| North America (primarily the United States) | 10,971 | 8,228 | 10,021 | 2,743 | 33.3 % | (1,793) | (17.9)% |
| % of total revenue | 11 % | 10 % | 10 % | | | | |
| Total revenue | <u>\$ 95,361</u> | <u>\$ 83,256</u> | <u>\$ 102,397</u> | <u>\$ 12,105</u> | 14.5 % | <u>\$ (19,141)</u> | (18.7)% |

Sales to customers located outside of North America represented approximately 90% of our revenue during 2020, 2019 and 2018, respectively.

Revenue from customers in China increased in 2020 by 31.2%, primarily due to higher demand for refined gallium and pBN crucibles sold by our consolidated subsidiaries. In addition, revenue from GaAs wafer substrates increased. Revenue from customers in Taiwan increased in 2020 by 1.7%, primarily due to an increase in demand for wireless applications using GaAs wafer substrates, partially offset by a decline in InP revenue in Taiwan that was transferred to North America. Revenue from customers in Japan increased in 2020 by 21.8% as a result of increased demand for InP wafer substrates and GaAs used in wireless applications, partially offset by lower demand for pBN crucibles sold by our consolidated subsidiary. Revenue from customers in Asia Pacific decreased by 28.1% as a result of lower demand for pBN crucibles sold by our consolidated subsidiaries. Revenue from customers in Europe increased in 2020 by 8.2%, primarily due to pBN crucibles sold by our consolidated subsidiary and Ge wafer substrates. Revenue from customers in North America increased by 33.3% primarily due to increased demand for our InP wafer substrates partially offset by lower demand for wireless applications using our GaAs wafer substrates.

Revenue from customers in China decreased in 2019 by 14.9%, primarily due to lower demand for our Ge wafer substrates. Revenue from customers in Europe decreased by 17.4%, primarily due to weaker demand for GaAs wafer substrates used in LED sensors for the automobile industry. In addition, GaAs sales into wireless applications decreased. Revenue from customers in Taiwan decreased in 2019 by 19.3%, primarily due to a softening of demand from InP customers and a slow-down in both LED and wireless applications using GaAs substrate wafers. Revenue from customers in North America decreased by 17.9% as a result of lower demand for GaAs. In addition revenue from one customer in Canada decreased as a result of weak demand from its primary optical device customer. Revenue from customers in Asia Pacific decreased by 10.6% as a result of lower demand for GaAs wafers used to produce industrial sensors. Revenue from customers in Japan decreased in 2019 by 39.3% as a result of lower demand for raw materials. In addition, there was lower demand for GaAs used in wireless applications and there was an aggressive inventory reduction program at one of our customers.

Gross Margin

| | Year Ended Dec. 31, | | | 2019 to 2020 | | 2018 to 2019 | |
|----------------|---------------------|-----------|-----------|------------------------|----------|------------------------|----------|
| | 2020 | 2019 | 2018 | Increase (Decrease) | % Change | Increase (Decrease) | % Change |
| | (\$ in thousands) | | | | | | |
| Gross profit | \$ 30,275 | \$ 24,825 | \$ 37,047 | \$ 5,450 | 22.0 % | \$ (12,222) | (33.0)% |
| Gross Margin % | 31.7 % | 29.8 % | 36.2 % | | | | |

Gross profit increased \$5.5 million in 2020 as compared to 2019. Gross margin in 2020 was 31.7% as compared to 29.8% in 2019. The increase in gross profit is attributed to higher revenue resulting in fixed costs being spread over more units and a favorable change in product mix.

Gross profit decreased \$12.2 million in 2019 as compared to 2018. Gross margin in 2019 was 29.8% as compared to 36.2% in 2018. The decrease in gross profit is attributed to the lower sales volume in 2019 as compared to 2018. In addition our manufacturing costs did not drop commensurately, particularly in GaAs.

Selling, General and Administrative Expenses

| | Years Ended Dec. 31 | | | 2019 to 2020 | | 2018 to 2019 | |
|----------------------------------------------|---------------------|-----------|-----------|------------------------|----------|------------------------|----------|
| | 2020 | 2019 | 2018 | Increase (Decrease) | % Change | Increase (Decrease) | % Change |
| | (\$ in thousands) | | | | | | |
| Selling, general and administrative expenses | \$ 19,200 | \$ 19,305 | \$ 19,003 | \$ (105) | (0.5)% | \$ 302 | 1.6 % |
| % of total revenue | 20.1 % | 23.2 % | 18.6 % | | | | |

Selling, general and administrative expenses decreased \$0.1 million, or 0.5%, to \$19.2 million for 2020 compared to \$19.3 million for 2019. The lower selling, general and administrative expenses were primarily from lower travel-related expenses driven by the COVID-19 pandemic, reimbursement of certain expenses from the local government in China for relocating our manufacturing line to its province, lower license, tax and registration related expenses and lower professional service-related expenses partially offset by higher personnel-related expenses and increase in our bad debt expenses due to the poor financial condition of a few customers as a result of the COVID-19 pandemic.

Selling, general and administrative expenses increased \$0.3 million, or 1.6%, to \$19.3 million for 2019 compared to \$19.0 million for 2018. The higher selling, general and administrative expenses were primarily from higher stock compensation expenses, VAT tax, legal expenses and consulting expenses related to our building construction in China which were partially offset by lower office supplies, facility and freight related expenses.

Research and Development Expenses

| | Years Ended Dec. 31 | | | 2019 to 2020 | | 2018 to 2019 | |
|--------------------------|---------------------|----------|----------|------------------------|----------|------------------------|----------|
| | 2020 | 2019 | 2018 | Increase (Decrease) | % Change | Increase (Decrease) | % Change |
| | (\$ in thousands) | | | | | | |
| Research and development | \$ 7,135 | \$ 5,834 | \$ 5,897 | \$ 1,301 | 22.3 | % \$ (63) | (1.1)% |
| % of total revenue | 7.5 % | 7.0 % | 5.8 % | | | | |

Research and development expenses increased \$1.3 million, or 22.3%, to \$7.1 million in 2020 from \$5.8 million in 2019. The increase in research and development expenses in 2020 was primarily due to higher development expenses of new features for certain of our GaAs and InP wafer substrates, product testing and personnel-related expenses.

Research and development expenses decreased \$0.1 million, or 1.1%, to \$5.8 million in 2019 from \$5.9 million in 2018. The decrease in research and development expenses in 2019 was primarily due to lower personnel-related expenses in one of our consolidated subsidiaries which was partially offset by higher personnel-related expenses in North America.

Interest Income (Expense), Net

| | Years Ended Dec. 31 | | | 2019 to 2020 | | 2018 to 2019 | |
|--------------------------------|---------------------|--------|--------|------------------------|----------|------------------------|----------|
| | 2020 | 2019 | 2018 | Increase (Decrease) | % Change | Increase (Decrease) | % Change |
| | (\$ in thousands) | | | | | | |
| Interest income (expense), net | \$ (179) | \$ 217 | \$ 528 | \$ (396) | (182.5)% | \$ (311) | (58.9)% |
| % of total revenue | (0.2)% | 0.3 % | 0.5 % | | | | |

Interest income (expense), net decreased in 2020 as compared to the same period in 2019, primarily due to lower investment balances in 2020 and increased borrowings in 2020. Interest income, net decreased in 2019 as compared to the same period in 2018, primarily due to lower investment balances in 2019.

Equity in Income (Loss) of Unconsolidated Joint Venture Companies

| | Years Ended Dec. 31 | | | 2019 to 2020 | | 2018 to 2019 | |
|----------------------------------------------------------|---------------------|------------|------------|------------------------|----------|------------------------|----------|
| | 2020 | 2019 | 2018 | Increase (Decrease) | % Change | Increase (Decrease) | % Change |
| | (\$ in thousands) | | | | | | |
| Equity in income (loss) of unconsolidated joint ventures | \$ 111 | \$ (1,876) | \$ (1,080) | \$ 1,987 | 105.9 % | \$ (796) | (73.7)% |
| % of total revenue | 0.1 % | (2.3)% | (1.1)% | | | | |

Equity in income (loss) of unconsolidated joint ventures is the aggregate net income (loss) from our minority-owned supply chain joint venture companies that are not consolidated. Equity in income (loss) of unconsolidated joint ventures increased \$2.0 million to an income of \$0.1 million in 2020 from a loss of \$1.9 million in 2019 as our unconsolidated joint ventures reported better performance in 2020 as compared to 2019. The loss in 2019 includes an impairment charge of \$1.1 million from the germanium mining company in our raw material supply chain.

Equity in income (loss) of unconsolidated joint ventures decreased \$0.8 million to a loss of \$1.9 million in 2019 from a loss of \$1.1 million in 2018 as our unconsolidated joint ventures reported worse performance in 2019 as compared to 2018. The loss in 2019 includes an impairment charge of \$1.1 million from the germanium mining company in our raw material supply chain. Further, there were no impairment charges in 2018.

Other Income, Net

| | Years Ended Dec. 31 | | | 2019 to 2020 | | 2018 to 2019 | |
|--------------------|---------------------|--------|--------|------------------------|----------|------------------------|----------|
| | 2020 | 2019 | 2018 | Increase (Decrease) | % Change | Increase (Decrease) | % Change |
| | (\$ in thousands) | | | | | | |
| Other income, net | \$ 3,200 | \$ 947 | \$ 352 | \$ 2,253 | 237.9 % | \$ 595 | 169.0 % |
| % of total revenue | 3.4 % | 1.1 % | 0.3 % | | | | |

Other income, net increased \$2.3 million to an income of \$3.2 million for 2020 as compared to an income of \$0.9 million in 2019, primarily due to compensation received from the China government by three of our consolidated subsidiaries for relocating their facilities outside of Nanjing.

Other income, net increased \$0.6 million to an income of \$0.9 million for 2019 as compared to an income of \$0.4 million in 2018, primarily due to compensation received from the China government by one of our consolidated subsidiaries for relocating their facility outside of Nanjing. In addition, our Beijing facility received an economic stimulus grant.

Provision for Income Taxes

| | Years Ended Dec. 31 | | | 2019 to 2020 | | 2018 to 2019 | |
|----------------------------|---------------------|--------|--------|------------------------|----------|------------------------|----------|
| | 2020 | 2019 | 2018 | Increase (Decrease) | % Change | Increase (Decrease) | % Change |
| | (\$ in thousands) | | | | | | |
| Provision for income taxes | \$ 2,031 | \$ 562 | \$ 938 | \$ 1,469 | 261.4 % | \$ (376) | (40.1)% |
| % of total revenue | 2.1 % | 0.7 % | 0.9 % | | | | |

Provision for income taxes for 2020 and 2019 were \$2.0 million and \$0.6 million, respectively, which were mostly related to our consolidated wafer substrate subsidiaries in China and our two partially owned consolidated raw material companies. No income taxes or benefits have been provided for U.S. operations as the income in the U.S. had been fully offset by utilization of federal and state net operating loss carryforwards. Additionally, there is uncertainty of generating future profit in the U.S., which 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 \$19.8 million for the years 2020, 2019 and 2018.

Net Income Attributable to Noncontrolling Interests

| | Years Ended Dec. 31 | | | 2019 to 2020 | | 2018 to 2019 | |
|-----------------------------------------------------|---------------------|----------|----------|------------------------|----------|------------------------|----------|
| | 2020 | 2019 | 2018 | Increase (Decrease) | % Change | Increase (Decrease) | % Change |
| | (\$ in thousands) | | | | | | |
| Net income attributable to noncontrolling interests | \$ 1,803 | \$ 1,012 | \$ 1,355 | \$ 791 | 78.2 % | \$ (343) | (25.3)% |
| % of total revenue | 1.9 % | 1.2 % | 1.3 % | | | | |

The increase in noncontrolling interests' share of income for 2020 as compared to 2019 was due to higher profitability from one of our consolidated subsidiaries in China.

The decrease in noncontrolling interests' share of income for 2019 as compared to 2018 was due to lower profitability from one of our consolidated subsidiaries in China.

Liquidity and Capital Resources

| | Year Ended December 31, | | |
|-----------------------------------------------------------------------|-------------------------|-----------|-----------|
| | 2020 | 2019 | 2018 |
| | (\$ in thousands) | | |
| Net cash provided by (used in): | | | |
| Operating activities | \$ 5,865 | \$ 12,658 | \$ 3,218 |
| Investing activities | (16,422) | (8,328) | (30,827) |
| Financing activities | 52,662 | 6,186 | 213 |
| Effect of exchange rate changes | 3,605 | (150) | (430) |
| Net change in cash and cash equivalents | 45,710 | 10,366 | (27,826) |
| Cash and cash equivalents—beginning year | 26,892 | 16,526 | 44,352 |
| Cash and cash equivalents—end of year | 72,602 | 26,892 | 16,526 |
| Short and long-term investments—end of year | 5,966 | 9,427 | 22,846 |
| Total cash, cash equivalents and short-term and long-term investments | \$ 78,568 | \$ 36,319 | \$ 39,372 |

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 money market accounts, certificates of deposit, corporate bonds and notes, and government securities. As of December 31, 2020, we and our consolidated joint ventures held approximately \$60.5 million in cash and investments in foreign bank accounts. This consists of \$55.5 million held by our consolidated wafer substrate subsidiaries in China and \$5.0 million held by our two consolidated raw material subsidiaries in China.

Total cash and cash equivalents, short-term and long-term investments increased by \$42.2 million in 2020. As of December 31, 2020, our principal source of liquidity was \$78.6 million, which consisted of cash and cash equivalents of \$72.6 million and short-term and long-term investments of \$6.0 million. In 2020, cash and cash equivalents increased by \$45.7 million and short-term and long-term investments decreased by \$3.5 million. The increase in cash and cash equivalents of \$45.7 million in 2020 was primarily due to net cash provided by financing activities of \$52.7 million, operating activities of \$5.9 million and the effect of exchange rate changes of \$3.6 million and partially offset by net cash used in investing activities of \$16.4 million.

Total cash and cash equivalents, short-term and long-term investments decreased by \$3.1 million in 2019. As of December 31, 2019, our principal source of liquidity was \$36.3 million, which consisted of cash and cash equivalents of \$26.9 million and short-term investments of \$9.4 million. In 2019, cash and cash equivalents increased by \$10.4 million and short-term and long-term investments decreased by \$13.4 million. The increase in cash and cash equivalents of \$10.4 million in 2019 was primarily due to net cash provided by operating activities of \$12.7 million and financing

activities of \$6.2 million and partially offset by net cash used in investing activities of \$8.3 million and the effect of exchange rate changes of \$0.2 million.

Net cash provided by operating activities of \$5.9 million for 2020 was primarily comprised of our net income of \$5.0 million, an adjustment of non-cash items of depreciation and amortization of \$4.3 million, stock-based compensation of \$2.6 million, provision for doubtful accounts of \$0.2 million, loss on disposal of equipment of \$0.1 million, offset in part by our net change in operating assets and liabilities of \$6.3 million and gain on equity method investments of \$0.1 million. The \$6.3 million net change in operating assets and liabilities primarily resulted from a \$6.7 million increase in prepaid expenses and other current assets, a \$5.3 million increase in accounts receivable a \$0.9 million increase in inventories and a \$0.1 million increase in other assets offset in part by a \$2.3 million decrease in accounts payable, a \$1.9 million decrease in other long-term liabilities, including royalties and a \$2.6 million decrease in accrued liabilities.

Net cash provided by operating activities of \$12.7 million for 2019 was primarily comprised of an adjustment of non-cash items of depreciation and amortization of \$5.5 million, stock-based compensation of \$2.3 million, impairment charge on equity investee of \$1.1 million, loss on equity method investments of \$1.0 million, return on equity method investments of \$0.4 million, loss on disposal of equipment of \$0.1 million, net change in operating assets and liabilities of \$4.0 million offset in part by our net loss of \$1.6 million and gain from deconsolidation of a subsidiary of \$0.2 million. The \$4.0 million net change in operating assets and liabilities primarily resulted from a \$8.9 million decrease in inventories, a \$2.9 million decrease in prepaid expenses and other current assets, a \$0.4 million decrease in accounts receivable, a \$0.1 million increase in other long-term liabilities, including royalties, offset in part by a \$4.0 million decrease in accrued liabilities, a \$3.1 million decrease in accounts payable and a \$1.2 million increase in other assets.

Net cash provided by operating activities of \$3.2 million for 2018 was primarily comprised of our net income of \$11.0 million, adjusted for non-cash items of depreciation and amortization of \$4.9 million, stock-based compensation of \$1.9 million, loss on equity method investments of \$1.1 million, amortization of marketable securities premium of \$0.2 million offset in part by gain on disposal of property, plant and equipment of \$0.1 million, which were partially offset by a net change of \$15.7 million in operating assets and liabilities. The \$15.7 million net change in operating assets and liabilities primarily resulted from a \$14.6 million increase in inventories, a \$4.6 million increase in prepaid expenses and other current assets, a \$1.9 million increase in other assets, a \$0.3 million decrease in other long-term liabilities offset in part by a \$0.5 million increase in accrued liabilities, a \$2.8 million decrease in accounts receivable, and a \$2.3 million increase in accounts payable.

Net cash used in investing activities of \$16.4 million for 2020 was primarily due to property, plant and equipment of \$19.9 million in preparation for our new manufacturing sites, additional equipment for our Beijing site and equipment and facility costs incurred by our consolidated subsidiaries and the purchases of marketable investment securities of \$6.0 million, which were partially offset by proceeds from maturities and sales of available-for-sale debt securities of \$9.4 million.

Net cash used in investing activities of \$8.3 million for 2019 was primarily due to property, plant and equipment of \$21.8 million in preparation for our new manufacturing sites, additional equipment for our Beijing site and equipment and facility costs incurred by our consolidated subsidiaries and the purchases of marketable investment securities of \$8.7 million, which were partially offset by proceeds from maturities and sales of available-for-sale debt securities of \$22.2 million.

Net cash used in investing activities of \$30.8 million for 2018 was primarily due to property, plant and equipment of \$40.6 million in preparation for our new manufacturing sites, additional equipment for our Beijing site and equipment and facility costs incurred by our consolidated subsidiaries and the purchases of marketable investment securities of \$9.9 million, which were partially offset by proceeds from maturities and sales of available-for-sale debt securities of \$19.6 million and proceeds from sale of property, plant and equipment of \$0.1 million.

Net cash provided by financing activities was \$52.7 million for 2020 which mainly consisted of the proceeds of \$47.6 million from issuance of common stock to noncontrolling interests net of issuance cost, \$10.4 million from short-

term loan in China, \$2.5 million from the exercise of common stock options, \$0.4 million from sale of Tongmei shares to noncontrolling interests partially offset by payments on short-term loans of \$6.0 million and dividends paid by joint ventures to their minority shareholders of \$2.2 million.

Net cash provided by financing activities was \$6.2 million for 2019, which mainly consisted of the proceeds of \$5.8 million from short-term loan in China, \$0.3 million from the exercise of common stock options, \$0.4 million from sale of previously consolidated subsidiary shares partially offset by the considerations paid in cash to repurchase subsidiary shares from noncontrolling interests of \$0.3 million.

Net cash provided by financing activities was \$0.2 million for 2018, which mainly consisted of the proceeds of \$0.6 million from the exercise of common stock options, partially offset by the considerations paid in cash to repurchase subsidiary shares from noncontrolling interests of \$0.4 million.

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 2020, 2019 and 2018 under this program. As of December 31, 2020, approximately \$2.7 million remained available for future repurchases under this program. Currently, we do not plan to repurchase additional shares.

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 \$2.9 million and we included this amount in “Accrued liabilities” in our consolidated balance sheets. At the time we pay this accrued liability, our cash and cash equivalents would be reduced. We account for the cumulative year to date dividends on the Series A preferred stock when calculating our earnings per share. See Item 5, Market for Registrant’s Common Equity, Related Stockholder Matters and Issuer Purchases of Equity Securities in Part II.

As one of the first steps in the process of listing Tongmei on the STAR Market and going public, we sold approximately 7.28% of Tongmei to private equity investors for approximately \$49 million in the aggregate. Pursuant to the Capital Investment Agreements with the Investors, each Investor has the right to require AXT to redeem any or all Tongmei shares held by such Investor at the original purchase price paid by such Investor, without interest, in the event of a material adverse change or if Tongmei does not achieve its IPO on or before December 31, 2022. This right is suspended when Tongmei submits its formal application to the CSRC. Tongmei currently plans to submit its formal application to the CSRC in the third quarter of 2021. However, if on December 31, 2022 the IPO application has been submitted and accepted by the CSRC or the stock exchange and such submission remains under review, then the date when such investor is entitled to exercise such redemption right shall be deferred to a date when such submission is rejected by the CSRC or stock exchange, or the date when Tongmei withdraws its IPO application. The process of going public on the STAR Market includes several periods of review and is therefore a lengthy process. Tongmei does not expect to complete the IPO until mid-2022. There can be no assurances that Tongmei will complete its IPO by December 31, 2022 or at all. In the event that investors exercise their redemption rights, we may be required to seek additional capital in order to redeem their Tongmei shares and there would be no assurances that such capital would be available on terms acceptable to us, if at all. Any redemptions could have a material adverse effect on our business, financial condition and results of operations.

We believe that we have adequate cash and investments to meet our operating needs and capital expenditures 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.

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 million of common stock, preferred stock, depository shares, warrants, debt securities and/or units in one or more offerings and in any combination. On November 4, 2016, the SEC declared the registration statement effective. On November 4, 2019, the registration statement expired.

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.

Bank Loans and Line of Credit

On November 6, 2018, the Company entered into a Credit Agreement (the “Credit Agreement”), by and between the Company and Wells Fargo Bank, National Association (“Wells Fargo Bank”), which established a \$10 million secured revolving line of credit with a \$1.0 million letter of credit sublimit facility. The revolving credit facility is collateralized by substantially all of the assets of the Company located within the United States, subject to certain exceptions. The commitments under the Credit Agreement expire on November 30, 2020 and any loans thereunder will bear interest at a rate based on the daily one-month London Inter-bank Offered Rate (“LIBOR”) for the applicable interest period plus a margin of 2.00%. As of December 31, 2019, no loans or letters of credit were outstanding under the Credit Agreement. On February 5, 2020, the Company entered into the First Amendment to Credit Agreement (the “First Amendment”), by and between the Company and Wells Fargo Bank, which reduced the \$10 million secured revolving line of credit under the Credit Agreement to \$7 million. The commitments under the Credit Agreement, as amended by the First Amendment, expired on November 30, 2020. As of the date of this Annual Report on Form 10-K, no loans or letters of credit were outstanding under the Credit Agreement, as amended by the First Amendment.

On August 9, 2019, Tongmei entered into a credit facility (the “Credit Facility”) with the Bank of China with a \$5.8 million line of credit at an annual interest rate of approximately 0.4% over the average interest rate quoted by the National Interbank Funding Center. Accrued interest is calculated monthly and paid quarterly. The annual interest rate was approximately 4.7% as of December 31, 2019. The Credit Facility is collateralized by Baoding Tongmei Xtal Technology Co., Ltd.’s land use rights and all of its buildings located at its facility in Dingxing. The primary intended use of the Credit Facility is for general purposes, which may include working capital and other corporate expenses.

On August 9, 2019, we borrowed \$2.8 million against the Credit Facility. The repayment of the full amount was due on August 9, 2020. On September 12, 2019 we borrowed an additional \$2.8 million against the Credit Facility. The repayment of the full amount was due on September 12, 2020. In August 2020, Tongmei repaid the full amount of the credit facility including all outstanding accrued interest of approximately \$5.9 million and simultaneously applied to renew the credit facility. The process of repaying a loan and then renewing the loan is customary in China.

In September 2020, the August 2019 borrowing was renewed and funded against the credit facility with an interest rate of 3.85%. The interest owed during the term of the loan was deducted prior to funding. The repayment of the loan is due on March 22, 2021, however the credit facility contains an option to renew for an additional six months.

In October 2020, the September 2019 borrowing was renewed and funded against the credit facility and an additional \$2.7 million was approved and funded against the credit facility with the annual interest rate of 4.7%. Accrued interest is calculated monthly and paid quarterly. The combined loan totals \$5.6 million. The repayment of the \$5.6 million is due on April 8, 2021, however, the credit facility contains an option to renew for an additional six months. As of December 31, 2020, \$8.9 million was included in “Bank loan” in our consolidated balance sheets.

In February 2020, our consolidated subsidiary, BoYu, entered into a credit facility with the ICBC with a \$1.4 million line of credit at an annual interest rate of approximately 0.15% over the loan prime rate. Accrued interest is calculated monthly and paid quarterly. The annual interest rate was approximately 4.3% as of December 31, 2020. The credit facility is collateralized by BoYu’s land use rights and its building located at its facility in Tianjin, China and

BoYu's accounts receivable. The primary intended use of the credit facility is for general purposes, which may include working capital and other corporate expenses.

In March 2020, BoYu borrowed \$0.4 million against the credit facility. The repayment of the full amount is due in March 2021. In December 2020, BoYu borrowed an additional \$1.1 million against the credit facility. As of December 31, 2020, \$1.5 million was included in "Bank loan" in our consolidated balance sheets.

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 July 2029. The majority of our lease obligations relate to our lease agreement for a nitrogen system to be used during the manufacturing process for our facility in Dingxing, China. The equipment lease became effective in August 2019 and will expire in July 2029. There are no variable lease payments, residual value guarantees or any restrictions or covenants imposed by the equipment lease. The remainder relate to our lease agreement for our facility in Fremont, California with approximately 19,467 square feet, which expires in 2023. There are no variable lease payments, residual value guarantees or any restrictions or covenants imposed by the facility lease. All other operating leases have a term of 12 months or less. Total rent expenses under these operating leases charged to selling, general and administrative were approximately \$322,000, \$306,000 and \$319,000 for the years ended December 31, 2020, 2019 and 2018, respectively, primarily related to our Fremont facility. Total rent expenses under these operating leases charged to cost of revenue were approximately \$266,000, \$112,000 and \$0 for the years ended December 31, 2020, 2019 and 2018, respectively, primarily related to the nitrogen system at our facility in Dingxing.

In 2010, we and a competitor entered into a royalty agreement with a term of eight years, terminating December 31, 2018. We and our related companies were granted a worldwide, nonexclusive, royalty bearing, irrevocable license to certain patents for the term on the agreement. Under this agreement we could have paid up to \$7.0 million in royalty payments over eight years beginning in 2011 based on future royalty bearing sales. This agreement contained a clause that allowed us to claim a credit, starting in 2013, in the event that the royalty bearing sales for the year was lower than a pre-determined amount set forth in this agreement. For the year ended December 31, 2018, royalty expense under this agreement was \$565,000, which was net of a claim for credit of \$10,000.

In 2020, we and a competitor entered into a cross license and covenant agreement (the "Cross License Agreement"), which has a term that begins on January 1, 2020 and expires on December 31, 2029. The Cross License Agreement is a fixed-cost cross license and not a variable-cost cross license that is based on revenue or units. Under the Cross License Agreement, we are obligated to make annual payments over a 10-year period. For the year ended December 31, 2020, royalty expense was \$174,000.

The following table summarizes our contractual obligations as of December 31, 2020 (in thousands):

| Contractual Obligations | Payments due by period | | | | |
|--------------------------------|-------------------------------|-------------------------|------------------|------------------|--------------------------|
| | Total | Less than 1 year | 1-3 years | 4-5 years | More than 5 years |
| Operating leases | \$ 3,350 | \$ 599 | \$ 1,447 | \$ 569 | \$ 735 |
| Royalty agreement | 1,700 | 300 | 900 | 200 | 300 |
| Total | \$ 5,050 | \$ 899 | \$ 2,347 | \$ 769 | \$ 1,035 |

Land Purchase and Investment Agreement

We have established a wafer processing production line in Dingxing, China. In addition to a land rights and building purchase agreement that we entered into with a private real estate development company to acquire our new manufacturing facility, we also entered into a cooperation agreement with the Dingxing local government. In addition to pledging its full support and cooperation, the Dingxing local government will issue certain tax credits to us as we achieve certain milestones. We, in turn, agreed to hire local workers over time, pay taxes when due and eventually demonstrate a total investment of approximately \$90 million in value, assets and capital. The investment will include cash paid for the land and buildings, cash on deposit in our name at local banks, the gross value of new and used equipment (including future equipment that might be used for indium phosphide and germanium substrates production), the deemed value for our customer list or the end user of our substrates (for example, the end users of the 3-D sensing VCSELs), a deemed value for employment of local citizens, a deemed value for our proprietary process technology, other intellectual property, other intangibles and additional items of value. There is no timeline or deadline by which this must be accomplished, rather it is a good faith covenant entered into between AXT and the Dingxing local government. Further, there is no specific penalty contemplated if either party breaches the agreement, however the agreement does state that each party has a right to seek from the other party compensation for losses. Under certain conditions, the Dingxing local government may purchase the land and building at the appraised value. We believe that such cooperation agreements are normal, customary and usual in China and that the future valuation is flexible. We have a similar agreement with the city of Kazuo, China, although on a smaller scale. The total investment targeted by AXT in Kazuo is approximately \$15 million in value, assets and capital.

Purchase Obligations with Penalties for Cancellation

In the normal course of business, we issue purchase orders to various suppliers. In certain cases, we may incur a penalty if we cancel the purchase order. As of December 31, 2020, we do not have any outstanding purchase orders that will incur a penalty if cancelled by the Company.

Selected Quarterly Results of Operations

The following table sets forth unaudited quarterly results for the eight quarters ended December 31, 2020. 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.

| (in thousands, except for per share amounts) | Quarters Ended | | | | | | | |
|----------------------------------------------------------------|----------------|----------------|---------------|---------------|---------------|----------------|---------------|---------------|
| | Dec. 31, 2020 | Sept. 30, 2020 | June 30, 2020 | Mar. 31, 2020 | Dec. 31, 2019 | Sept. 30, 2019 | June 30, 2019 | Mar. 31, 2019 |
| Revenue | \$ 27,035 | \$ 25,469 | \$ 22,134 | \$ 20,723 | \$ 18,410 | \$ 19,841 | \$ 24,797 | \$ 20,208 |
| Cost of revenue | 17,873 | 16,646 | 15,366 | 15,201 | 14,545 | 14,082 | 16,291 | 13,513 |
| Gross profit | 9,162 | 8,823 | 6,768 | 5,522 | 3,865 | 5,759 | 8,506 | 6,695 |
| Operating expenses: | | | | | | | | |
| Selling, general and administrative | 5,081 | 4,623 | 4,747 | 4,749 | 5,058 | 4,755 | 4,769 | 4,723 |
| Research and development | 2,162 | 2,023 | 1,543 | 1,407 | 1,607 | 1,482 | 1,399 | 1,346 |
| Total operating expenses | 7,243 | 6,646 | 6,290 | 6,156 | 6,665 | 6,237 | 6,168 | 6,069 |
| Income (loss) from operations | 1,919 | 2,177 | 478 | (634) | (2,800) | (478) | 2,338 | 626 |
| Interest income (expense), net | (41) | (70) | (39) | (29) | 2 | 41 | 79 | 95 |
| Equity in income (loss) of unconsolidated joint ventures | 354 | 45 | (168) | (120) | (226) | (204) | 8 | (1,454) |
| Other (expense) income, net | 260 | (34) | 1,608 | 1,366 | 1,002 | 169 | (90) | (134) |
| Income (loss) before provision for (benefit from) income taxes | 2,492 | 2,118 | 1,879 | 583 | (2,022) | (472) | 2,335 | (867) |
| Provision for (benefit from) income taxes | 108 | 637 | 920 | 366 | (214) | 23 | 597 | 156 |
| Net income (loss) | 2,384 | 1,481 | 959 | 217 | (1,808) | (495) | 1,738 | (1,023) |
| Less: Net income attributable to noncontrolling interests | (320) | (490) | (598) | (395) | (241) | (403) | (287) | (81) |
| Net income (loss) attributable to AXT, Inc | \$ 2,064 | \$ 991 | \$ 361 | \$ (178) | \$ (2,049) | \$ (898) | \$ 1,451 | \$ (1,104) |
| Net income (loss) attributable to AXT, Inc. per common share: | | | | | | | | |
| Basic | \$ 0.05 | \$ 0.02 | \$ 0.01 | \$ (0.01) | \$ (0.05) | \$ (0.02) | \$ 0.04 | \$ (0.03) |
| Diluted | \$ 0.05 | \$ 0.02 | \$ 0.01 | \$ (0.01) | \$ (0.05) | \$ (0.02) | \$ 0.04 | \$ (0.03) |
| Weighted average number of common shares outstanding: | | | | | | | | |
| Basic | 40,678 | 40,152 | 39,973 | 39,812 | 39,636 | 39,514 | 39,447 | 39,352 |
| Diluted | 42,042 | 40,979 | 40,750 | 39,812 | 39,636 | 39,514 | 40,123 | 39,352 |

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.

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. Although during 2019 and 2018, we recorded a foreign exchange gain of \$321,000 and \$165,000, respectively, during 2020 we recorded net foreign exchange loss of \$411,000, included as part of other income, net in our consolidated statements of operation. 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. 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 consolidated balance sheet and consolidated balance sheet, respectively, and classified as Level 3 assets and liabilities. As of December 31, 2020 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.

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, 2020 | Current Interest Rate | Projected Annual Interest Income | Proforma 10% Interest Rate Decline Income | Proforma 10% Interest Rate Increase Income |
|--------------------------------|------------------------------------------------|--------------------------------------|-------------------------------------------------|--------------------------------------------------------------|---------------------------------------------------------------|
| Cash and cash equivalents | \$ 72,602 | 0.24 % | \$ 174 | \$ 157 | \$ 191 |
| Investments in marketable debt | 5,966 | 1.25 % | 75 | 68 | 83 |
| | | | <u>\$ 249</u> | <u>\$ 225</u> | <u>\$ 274</u> |

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 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 (loss), net of estimated tax, further reduced by a valuation allowance for expected credit losses, if any. Our cash, cash equivalents and short-term investments and long-term investments are in high-quality instruments 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. Two customers accounted for 11% and 10% of our accounts receivable as of December 31, 2020 and three customers accounted for 14%, 13% and 12% of our accounts receivable as of December 31, 2019.

Equity Risk

As part of our supply chain strategy, we maintain minority investments in privately-held raw material companies located in China either invested directly by us and our subsidiaries or through our 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. We own 25% of a germanium mining company. In 2019, we wrote down our investment in this company to zero resulting in an impairment charge of \$1.1 million. 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, 2020 and 2019, we did not maintain any direct investments under the cost method. Our minority investments under the equity method as of December 31, 2020 and 2019 totaled \$6.4 million and \$6.0 million, respectively.

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 68, 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 U.S. GAAP. 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 U.S. 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 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, 2020 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, 2020.

Changes in Internal Control over Financial Reporting

There was no change in our internal control over financial reporting during our fourth quarter of fiscal 2020 that has materially affected, or is reasonably likely to materially affect, AXT's internal control over financial reporting.

Item 9B. *Other Information*

None.

PART III

The United States Securities and Exchange Commission (“SEC”) allows us to include information required in this report by referring to other documents or reports we have already or will soon be filing. This is called “Incorporation by Reference.” We intend to file our definitive proxy statement for our annual meeting of stockholders to be held on May 20, 2021 (the “Proxy Statement”) pursuant to Regulation 14A not later than 120 days after the end of the fiscal year covered by this report, and certain information therein is incorporated in this report by reference.

Item 10. *Directors, Executive Officers and Corporate Governance*

The information required by this item with respect to identification of directors is incorporated by reference to the information contained in the section captioned “Information About our Board of Directors” in the Proxy Statement. The information with respect to our executive officers, is incorporated by reference to the information contained in the section captioned “Executive Officers” in the Proxy Statement. Information with respect to Items 405 of Regulation S-K is incorporated by reference to the information contained in the sections of the Proxy Statement captioned “Section 16(a) Beneficial Ownership Reporting Compliance.” There will be no disclosure under Item 407(c)(3). Information with respect to Items 407(d)(4) and 407(d)(5) is incorporated by reference to the information contained in the sections of the Proxy Statement captioned “Corporate Governance—Committees of the Board of Directors.”

The Board of Directors of AXT, Inc. has adopted a Code of Conduct and Ethics (the “Code”) that applies to our principal executive officers, principal financial officer, and corporate controller, as well as all other employees. A copy of this Code has been posted on our Internet website at www.axt.com. Any amendments to, or waivers from, a provision of our Code that applies to our principal executive officer, principal financial officer, controller, or persons performing similar functions and that relates to any element of the Code enumerated in paragraph (b) of Item 406 of Regulation S-K shall be disclosed by posting such information on our website.

Item 11. *Executive Compensation*

The information required by this Item is incorporated herein by reference to information set forth in our Proxy Statement under the section entitled “Executive Compensation and Other Matters.”

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

The information required by this Item is incorporated herein by reference to information set forth in our Proxy Statement under the section entitled “Security Ownership of Certain Beneficial Owners and Management” and “Equity Compensation Plan Information.”

Item 13. *Certain Relationships and Related Transactions and Director Independence*

Information required by this item will be set forth in our Proxy Statement under the headings “Compensation Committee Interlocks and Insider Participation” and “Certain Relationships and Related Transactions,” which information is incorporated herein by reference.

Item 14. *Principal Accountant Fees and Services*

The information required by this Item is incorporated herein by reference to information set forth in our Proxy Statement under the section entitled “Ratification of Appointment of Independent Registered Public Accountants.”

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

| | |
|-------------------------------------------------------------------------|----|
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- (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.

REPORT OF INDEPENDENT REGISTERED PUBLIC ACCOUNTING FIRM

To the Board of Directors and Stockholders of AXT, Inc.

Opinion on the Consolidated Financial Statements

We have audited the accompanying consolidated balance sheets of AXT, Inc. (a Delaware corporation) and its subsidiaries (the “Company”) as of December 31, 2020 and 2019, 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, 2020, and the related notes (collectively referred to as the “consolidated financial statements”). In our opinion, the consolidated financial statements present fairly, in all material respects, the financial position of the Company as of December 31, 2020 and 2019, and the results of its operations and its cash flows for each of the three years in the period ended December 31, 2020, in conformity with accounting principles generally accepted in the United States of America.

Basis for Opinion

These consolidated financial statements are the responsibility of the Company’s management. Our responsibility is to express an opinion on the Company’s consolidated financial statements based on our audits. We are a public accounting firm registered with the Public Company Accounting Oversight Board (United States) (“PCAOB”) and are required to be independent with respect to the Company in accordance with the U.S. federal securities laws and the applicable rules and regulations of the Securities and Exchange Commission and the PCAOB.

We conducted our audits in accordance with the standards of the PCAOB. 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, whether due to error or fraud. The Company is not required to have, nor were we engaged to perform, an audit of its internal control over financial reporting. As part of our audits, we are required to obtain an understanding of internal control over financial reporting. Accordingly, we express no such opinion.

Our audits included performing procedures to assess the risks of material misstatement of the consolidated financial statements, whether due to error or fraud, and performing procedures that respond to those risks. Such procedures included examining, on a test basis, evidence regarding the amounts and disclosures in the consolidated financial statements. Our audits also included evaluating the accounting principles used and significant estimates made by management, as well as evaluating the overall presentation of the consolidated financial statements. We believe that our audits provide a reasonable basis for our opinion.

Critical Audit Matter

The critical audit matter communicated below is a matter arising from the current period audit of the consolidated financial statements that was communicated or required to be communicated to the audit committee and that: (1) relates to accounts or disclosures that are material to the consolidated financial statements and (2) involved our especially challenging, subjective, or complex judgments. The communication of critical audit matters does not alter in any way our opinion on the consolidated financial statements, taken as a whole, and we are not, by communicating the critical audit matter below, providing a separate opinion on the critical audit matter or on the accounts or disclosures to which it relates.

Inventories – Reserve for Excess and Obsolete Inventory

As described in Notes 1 and 3 to the consolidated financial statements, the Company’s consolidated inventories balance was \$51.5 million as of December 31, 2020, which was net of a reserve of \$17.7 million for excess and obsolete inventories. The Company’s inventories are stated at the lower of weighted average costs (approximated by standard cost) or net realizable value. The Company routinely evaluates the levels of its inventories in light of current market conditions in order to identify excess and obsolete inventories, and to provide a reserve for certain inventories to their estimated net realizable value based upon the age, quality and life expectancy of the product, and the projections for sale of the completed products. If actual demand were to be substantially lower than estimated, there could be a significant adverse impact on the carrying value of inventories and results of operations.

The principal considerations for our determination that performing procedures relating to reserve for excess and obsolete inventories is a critical audit matter are the significant amount of judgment by management in developing the assumptions of the forecasted product demand, which in turn led to significant auditor judgment, subjectivity, and effort in performing

audit procedures and evaluating audit evidence relating to the forecasted product demand. Additionally, for certain new product launches there may be limited historical data with which to evaluate forecasts.

Addressing the matter involved performing procedures and evaluating audit evidence in connection with forming our overall opinion on the consolidated financial statements. These procedures included testing the effectiveness of internal controls relating to management's reserve for excess and obsolete inventories, including internal controls over the development of assumptions related to forecasted product demand. The procedures also included, among others, testing management's process for developing the reserve for excess and obsolete inventories, testing the completeness and accuracy of the underlying data used in the estimate, and evaluating management's assumptions of forecasted product demand. Evaluating management's demand forecast for reasonableness involved considering historical sales or usage by product, comparing prior period estimates to actual results of the same period, and determining whether the demand forecast used was consistent with evidence obtained in other areas of the audit.

/s/ BPM LLP

We have served as the Company's auditor since 2004.

San Jose, California
March 23, 2021

AXT, INC.
CONSOLIDATED BALANCE SHEETS
(In thousands, except per share data)

| | December 31, | |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------|------------|
| | 2020 | 2019 |
| ASSETS | | |
| Current assets: | | |
| Cash and cash equivalents | \$ 72,602 | \$ 26,892 |
| Short-term investments | 240 | 9,427 |
| Accounts receivable, net of allowances of \$217 and \$34 as of December 31, 2020 and December 31, 2019 | 24,558 | 19,031 |
| Inventories | 51,515 | 49,152 |
| Prepaid expenses and other current assets | 15,603 | 8,703 |
| Total current assets | 164,518 | 113,205 |
| Long-term investments | 5,726 | — |
| Property, plant and equipment, net | 115,825 | 97,403 |
| Operating lease right-of-use assets | 2,683 | 2,938 |
| Other assets | 10,110 | 9,803 |
| Total assets | \$ 298,862 | \$ 223,349 |
| LIABILITIES, REDEEMABLE NONCONTROLLING INTERESTS AND STOCKHOLDERS' EQUITY | | |
| Current liabilities: | | |
| Accounts payable | \$ 12,669 | \$ 10,098 |
| Accrued liabilities | 15,995 | 11,681 |
| Bank loan | 10,411 | 5,747 |
| Total current liabilities | 39,075 | 27,526 |
| Noncurrent operating lease liabilities | 2,374 | 2,695 |
| Other long-term liabilities | 1,881 | 366 |
| Total liabilities | 43,330 | 30,587 |
| Commitments and contingencies (Note 16) | | |
| Redeemable noncontrolling interests (Note 18) | 47,563 | — |
| Stockholders' equity: | | |
| Preferred stock Series A, \$0.001 par value; 2,000 shares authorized; 883 shares issued and outstanding as of December 31, 2020 and December 31, 2019 (Liquidation preference of \$7,346 and \$7,169 as of December 31, 2020 and December 31, 2019) | 3,532 | 3,532 |
| Common stock, \$0.001 par value; 70,000 shares authorized; 41,967 and 40,632 shares issued and outstanding as of December 31, 2020 and December 31, 2019 | 42 | 41 |
| Additional paid-in capital | 230,381 | 236,957 |
| Accumulated deficit | (44,545) | (47,783) |
| Accumulated other comprehensive income (loss) | 3,209 | (4,862) |
| Total AXT, Inc. stockholders' equity | 192,619 | 187,885 |
| Noncontrolling interests | 15,350 | 4,877 |
| Total stockholders' equity | 207,969 | 192,762 |
| Total liabilities, redeemable noncontrolling interests and stockholders' equity | \$ 298,862 | \$ 223,349 |

See accompanying notes to consolidated financial statements.

AXT, INC.
CONSOLIDATED STATEMENTS OF OPERATIONS
(In thousands, except per share data)

| | Year Ended December 31, | | |
|---------------------------------------------------------------|-------------------------|------------|------------|
| | 2020 | 2019 | 2018 |
| Revenue | \$ 95,361 | \$ 83,256 | \$ 102,397 |
| Cost of revenue | 65,086 | 58,431 | 65,350 |
| Gross profit | 30,275 | 24,825 | 37,047 |
| Operating expenses: | | | |
| Selling, general and administrative | 19,200 | 19,305 | 19,003 |
| Research and development | 7,135 | 5,834 | 5,897 |
| Total operating expenses | 26,335 | 25,139 | 24,900 |
| Income (loss) from operations | 3,940 | (314) | 12,147 |
| Interest income (expense), net | (179) | 217 | 528 |
| Equity in income (loss) of unconsolidated joint ventures | 111 | (1,876) | (1,080) |
| Other income, net | 3,200 | 947 | 352 |
| Income (loss) before provision for income taxes | 7,072 | (1,026) | 11,947 |
| Provision for income taxes | 2,031 | 562 | 938 |
| Net income (loss) | 5,041 | (1,588) | 11,009 |
| Less: Net income attributable to noncontrolling interests | (1,803) | (1,012) | (1,355) |
| Net income (loss) attributable to AXT, Inc. | \$ 3,238 | \$ (2,600) | \$ 9,654 |
| Net income (loss) attributable to AXT, Inc. per common share: | | | |
| Basic | \$ 0.08 | \$ (0.07) | \$ 0.24 |
| Diluted | \$ 0.07 | \$ (0.07) | \$ 0.24 |
| Weighted-average number of common shares outstanding: | | | |
| Basic | 40,152 | 39,487 | 39,049 |
| Diluted | 41,025 | 39,487 | 40,265 |

See accompanying notes to consolidated financial statements.

AXT, INC.
CONSOLIDATED STATEMENTS OF COMPREHENSIVE INCOME (LOSS)
(In thousands)

| | Year Ended December 31, | | |
|-------------------------------------------------------------------------------------------------|--------------------------------|-------------------|-----------------|
| | 2020 | 2019 | 2018 |
| Net income (loss) | \$ 5,041 | \$ (1,588) | \$ 11,009 |
| Other comprehensive income (loss), net of tax: | | | |
| Change in foreign currency translation gain (loss), net of tax | 8,443 | (1,847) | (5,749) |
| Change in unrealized gain on available-for-sale debt investments, net of tax | 6 | 81 | 9 |
| Reclassification adjustment for gains included in net loss upon deconsolidation of a subsidiary | — | (617) | — |
| Total other comprehensive income (loss), net of tax | 8,449 | (2,383) | (5,740) |
| Comprehensive income (loss) | 13,490 | (3,971) | 5,269 |
| Less: Comprehensive income attributable to noncontrolling interests | (2,181) | (1,519) | (994) |
| Comprehensive income (loss) attributable to AXT, Inc. | <u>\$ 11,309</u> | <u>\$ (5,490)</u> | <u>\$ 4,275</u> |

See accompanying notes to consolidated financial statements.

AXT, INC.
CONSOLIDATED STATEMENTS OF STOCKHOLDERS' EQUITY
(In thousands)

| | Preferred Stock | | Common Stock | | | Accumulated Deficit | Accumulated Other Comprehensive Income (Loss) | AXT, Inc. Stockholders' Equity | Noncontrolling Interests | Total Stockholders' Equity |
|--------------------------------------------------------------------------------------------------------------------------------------|-----------------|---------|--------------|------|----------------------------|---------------------|-----------------------------------------------|--------------------------------|--------------------------|----------------------------|
| | Shares | \$ | Shares | \$ | Additional Paid-In Capital | | | | | |
| January 1, 2018 | 883 | 3,532 | 39,413 | 39 | 231,679 | (54,837) | 3,407 | 183,820 | 4,497 | 188,317 |
| Common stock options exercised | | | 238 | 1 | 627 | | | 628 | | 628 |
| Purchase of subsidiary shares from noncontrolling interests | | | | | 187 | | | 187 | (1,794) | (1,607) |
| Restricted stock awards canceled | | | (10) | | | | | — | | — |
| Stock-based compensation | | | | | 1,925 | | | 1,925 | | 1,925 |
| Issuance of common stock in the form of restricted stock | | | 344 | | | | | — | | — |
| Net income | | | | | | 9,654 | | 9,654 | 1,355 | 11,009 |
| Other comprehensive loss | | | | | | | (5,379) | (5,379) | (361) | (5,740) |
| Balance as of December 31, 2018 | 883 | 3,532 | 39,985 | 40 | 234,417 | (45,183) | (1,972) | 190,835 | 3,697 | 194,532 |
| Common stock options exercised | | | 113 | 1 | 267 | | | 268 | | 268 |
| Reclassification out of accumulated other comprehensive income and noncontrolling interests upon the deconsolidation of a subsidiary | | | | | | | (1,150) | (1,150) | 533 | (617) |
| Purchase of subsidiary shares from noncontrolling interests | | | | | (74) | | | (74) | (339) | (413) |
| Restricted stock awards canceled | | | (20) | | | | | | | — |
| Stock-based compensation | | | | | 2,346 | | | 2,346 | | 2,346 |
| Issuance of common stock in the form of restricted stock | | | 554 | | | | | | | — |
| Net loss | | | | | | (2,600) | | (2,600) | 1,012 | (1,588) |
| Other comprehensive loss | | | | | | | (1,740) | (1,740) | (26) | (1,766) |
| Balance as of December 31, 2019 | 883 | 3,532 | 40,632 | 41 | 236,957 | (47,783) | (4,862) | 187,885 | 4,877 | 192,762 |
| Common stock options exercised | | | 905 | 1 | 2,535 | | | 2,536 | | 2,536 |
| Sale of subsidiary shares to noncontrolling interests | | | | | 396 | | | 396 | | 396 |
| Purchase of subsidiary shares from noncontrolling interests | | | | | (1,398) | | | (1,398) | (202) | (1,600) |
| Restricted stock awards canceled | | | (13) | | | | | | | — |
| Stock-based compensation | | | | | 2,623 | | | 2,623 | | 2,623 |
| Issuance of common stock in the form of restricted stock | | | 443 | | | | | | | — |
| Adjustment to noncontrolling interests in connection with the reorganization and alignment of assets under Tongmei | | | | | (10,732) | | | (10,732) | 10,732 | — |
| Net dividend declared by joint ventures | | | | | | | | | (2,238) | (2,238) |
| Net income | | | | | | 3,238 | | 3,238 | 1,803 | 5,041 |
| Other comprehensive income | | | | | | | 8,071 | 8,071 | 378 | 8,449 |
| Balance as of December 31, 2020 | 883 | \$3,532 | 41,967 | \$42 | \$ 230,381 | \$ (44,545) | \$ 3,209 | \$ 192,619 | \$ 15,350 | \$ 207,969 |

AXT, INC.

CONSOLIDATED STATEMENTS OF CASH FLOWS

| | Year Ended December 31, | | |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------|------------------|------------------|
| | 2020 | 2019 | 2018 |
| Cash flows from operating activities: | | | |
| Net income (loss) | \$ 5,041 | \$ (1,588) | \$ 11,009 |
| Adjustments to reconcile net income (loss) to net cash provided by operating activities: | | | |
| Depreciation and amortization | 4,333 | 5,531 | 4,871 |
| Amortization of marketable securities premium | 34 | 37 | 158 |
| Impairment charge on equity investee | — | 1,068 | — |
| Stock-based compensation | 2,623 | 2,346 | 1,925 |
| Provision for doubtful accounts | 183 | — | — |
| (Gain) loss on disposal of equipment | 50 | 72 | (99) |
| Gain from deconsolidation of a subsidiary | — | (175) | — |
| (Gain) loss from equity method investments, net | (111) | 983 | 1,080 |
| Return on equity method investments | — | 362 | — |
| Changes in operating assets and liabilities: | | | |
| Accounts receivable | (5,333) | 441 | 2,819 |
| Inventories | (916) | 8,862 | (14,629) |
| Prepaid expenses and other current assets | (6,719) | 2,936 | (4,600) |
| Other assets | (104) | (1,188) | (1,888) |
| Accounts payable | 2,305 | (3,137) | 2,314 |
| Accrued liabilities* | 2,601 | (4,010) | 518 |
| Other long-term liabilities, including royalties | 1,878 | 118 | (260) |
| Net cash provided by operating activities | <u>5,865</u> | <u>12,658</u> | <u>3,218</u> |
| Cash flows from investing activities: | | | |
| Purchases of property, plant and equipment | (19,855) | (21,792) | (40,539) |
| Proceeds from sale of equipment | — | — | 99 |
| Purchases of available-for-sale debt securities | (5,968) | (8,725) | (9,937) |
| Proceeds from sales and maturities of available-for-sale debt securities | 9,401 | 22,189 | 19,550 |
| Net cash used in investing activities | <u>(16,422)</u> | <u>(8,328)</u> | <u>(30,827)</u> |
| Cash flows from financing activities: | | | |
| Proceeds from common stock options exercised | 2,536 | 268 | 628 |
| Proceeds from sale of previously consolidated subsidiary shares | — | 366 | — |
| Consideration paid to repurchase subsidiary shares from noncontrolling interests | — | (262) | (415) |
| Proceeds from short-term loan | 10,401 | 5,814 | — |
| Payments on short-term loan | (5,996) | — | — |
| Proceeds from sale of subsidiary shares to noncontrolling interests | 396 | — | — |
| Proceeds from issuance of Tongmei's common stock to redeemable noncontrolling interests net of issuance cost | 47,563 | — | — |
| Dividends paid by joint ventures to their minority shareholders | (2,238) | — | — |
| Net cash provided by (used in) financing activities | <u>52,662</u> | <u>6,186</u> | <u>213</u> |
| Effect of exchange rate changes on cash and cash equivalents | 3,605 | (150) | (430) |
| Net increase (decrease) in cash and cash equivalents | 45,710 | 10,366 | (27,826) |
| Cash and cash equivalents at the beginning of the year | 26,892 | 16,526 | 44,352 |
| Cash and cash equivalents at the end of the year | <u>\$ 72,602</u> | <u>\$ 26,892</u> | <u>\$ 16,526</u> |
| Supplemental disclosures: | | | |
| Income taxes paid, net of refunds | \$ 1,959 | \$ 749 | \$ 1,134 |
| Supplemental disclosure of non-cash flow information: | | | |
| Consideration payable to repurchase subsidiary shares from noncontrolling interests, included in accrued liabilities | \$ 1,439 | \$ 151 | \$ 1,192 |
| Reduction of noncontrolling interests in excess (deficit) of total consideration paid and payable in connection with the repurchase of subsidiary shares from noncontrolling interests | \$ (1,398) | \$ (74) | \$ 187 |
| Consideration payable in connection with construction, included in accrued liabilities | \$ 1,457 | \$ 1,447 | \$ 2,912 |

* Dividend accrued but not paid by joint ventures of \$0, \$0 and \$504 was included in accrued liabilities as of December 31, 2020, 2019 and 2018, respectively.

See accompanying notes to consolidated financial statements.

AXT, INC.

NOTES TO CONSOLIDATED FINANCIAL STATEMENTS

Note 1. The Company and Summary of Significant Accounting Policies

The Company

AXT, Inc. (“AXT”, “the Company”, “we,” “us,” and “our” refer to AXT, Inc. and its consolidated subsidiaries) is a worldwide materials science company that develops and produces 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 semiconductor or optoelectronic device. 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 do not design or manufacture the chips. We add value by researching, developing and producing the specialty material wafers. We have two product lines: specialty material substrates and raw materials integral to these substrates. In 2020, our substrate product group generated 79% of our revenue and raw materials product group generated 21%. 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 purified gallium, InP based material and pBN crucibles. We use purified gallium in producing our GaAs substrates and also sell 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 antimonite, gallium phosphide and other materials and alloys. Pyrolytic boron nitride (pBN) crucibles are 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, and our consolidated subsidiaries, Beijing Tongmei Xtal Technology Co., Ltd. (“Tongmei”), Baoding Tongmei Xtal Technology Co., Ltd. (“Baoding Tongmei”), ChaoYang Tongmei Xtal Technology Co., Ltd. (“ChaoYang Tongmei”), ChaoYang LiMei Semiconductor Technology Co., Ltd. (“ChaoYang LiMei”), Nanjing JinMei Gallium Co., Ltd. (“JinMei”), ChaoYang JinMei Gallium Ltd. (“ChaoYang JinMei”), MaAnShan JinMei Gallium Ltd., and Beijing BoYu Semiconductor Vessel Craftwork Technology Co., Ltd. (“BoYu”). Baoding Tongmei is located in the city of Dingxing, China. Each of ChaoYang Tongmei and ChaoYang LiMei is located in the city of Kazuo, China. All significant inter-company accounts and transactions have been eliminated. Investments in business entities in which we do not have controlling interests, but have the ability to exercise significant influence over operating and financial policies (generally 20-50% ownership), are accounted for by the equity method. For the years ended 2020 and 2019, we have five companies accounted for by the equity method. For the majority-owned subsidiaries that we consolidate, we reflect the portion we do not own as either noncontrolling interests in stockholder’s equity or as redeemable noncontrolling interests in temporary equity on our consolidated balance sheets and in our consolidated statements of operations.

When market conditions are warranted, we intend to construct facilities at the ChaoYang LiMei location to provide us with additional production capacity. For the years ended 2020 and 2019, expenses associated with ChaoYang LiMei had a de minimis impact on our consolidated financial statements.

As discussed in Note 6, “Investments in Privately-Held Raw Material Companies”, effective as of March 11, 2019, we reduced our ownership in Beijing JiYa Semiconductor Material Co., Ltd. (“JiYa”) from 46% to 39% by selling a portion of our JiYa shares to our investor partner, which is also JiYa’s landlord. As a result of this transaction, our investor partner became the largest shareholder of JiYa and assumed the right to appoint the general manager of JiYa and thereby exercised greater control over JiYa’s long-term strategic direction. Further, although our Chief Executive Officer remains on the board, as of March 11, 2019 he was no longer the chairman of JiYa’s board of directors and our Chief Financial Officer was no longer a member of JiYa’s board of financial supervisors. Therefore, we deconsolidated JiYa from our consolidated financial statements as of March 11, 2019 in accordance with Accounting Standards Codification (“ASC”) Topic 810, *Consolidation* (“ASC 810”). As of March 12, 2019, we accounted for our retained investment in JiYa under the equity method of accounting, as we continue to exercise significant influence.

Our consolidated balance sheet as of December 31, 2018, as reported, included JiYa’s assets and liabilities, after all significant inter-company accounts and transactions were eliminated. Our consolidated balance sheet as of December 31, 2020 and 2019, as reported, does not include the assets and liabilities of JiYa, since we deconsolidated JiYa as of March 11, 2019. Our consolidated statement of operations for the year 2019 includes JiYa’s results for the period through March 11, 2019.

As discussed in Note 6, in May 2019, we purchased the remaining 3% ownership interest of JinMei from retiring members of the JinMei management team for approximately \$413,000. As a result, our ownership of JinMei increased from 97% to 100%. As of June 1, 2019, we referred to JinMei as a wholly-owned subsidiary instead of a significantly controlled subsidiary and reduced the carrying value of the corresponding noncontrolling interests to zero. Before August 1, 2020, our ownership of ChaoYang JinMei was 100%. In August 2020, we sold an 8.5% ownership interest to current members of the ChaoYang JinMei management team for approximately \$396,000. As a result, our ownership of ChaoYang JinMei decreased from 100% to 91.5%. As of August 2020, we referred to ChaoYang JinMei as a significantly controlled subsidiary instead of a wholly-owned subsidiary.

During the quarter ended December 31, 2020, Tongmei entered into two sets of definitive transaction documents, each consisting of a capital increase agreement along with certain supplemental agreements in substantially the same form (collectively, the “Capital Increase Agreements”), with several private equity investors in China.

In preparation for Tongmei’s application for a listing on the Shanghai Stock Exchange’s Sci-Tech innovAtion boasRd (the “STAR Market”), in late December we reorganized our entity structures in China. JinMei and BoYu and its subsidiaries were assigned to Tongmei and effectively merged with Tongmei although they retained their own respective legal entity status and are wholly owned subsidiaries of Tongmei. The 33% minority interest stakeholders of BoYu converted their ownership to a 7.59% minority interest in Tongmei. The 8.5% minority interest stakeholders, employees of JinMei, converted their ownership to a 0.38% minority interest in Tongmei. Further, a number of employees, key managers and contributors purchased a 0.4% minority interest in Tongmei. As of December 31, 2020, Tongmei’s noncontrolling interests totaled 8.37%. Additionally, Baoding Tongmei and ChaoYang Tongmei, were assigned to Tongmei as wholly owned subsidiaries. AXT remains the controlling stakeholder of Tongmei and holds a majority of the Board of Director positions of Tongmei. The reorganization does not result in any change to the consolidated financials of AXT.

Use of Estimates

The preparation of financial statements in conformity with accounting principles generally accepted in the United States of America (“U.S. GAAP”) 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, short-term investments and long-term investments, accounts receivable, 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 sheets and classified as Level 3 assets and liabilities. As of December 31, 2020 and 2019, 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, net” for the years presented. The transaction loss for the year ended December 31, 2020 totaled \$411,000. The transaction gain totaled \$321,000 and \$165,000 for the years ended December 31, 2019 and 2018, 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), net of tax.

Revenue Recognition

We manufacture and sell high-performance compound semiconductor substrates including indium phosphide, gallium arsenide and germanium wafers, and our consolidated subsidiaries sell certain raw materials, including high purity gallium (6N and 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 purchase orders placed by our customers, and our terms and conditions of sale do not require customer acceptance. We account for a contract with a customer when there is a legally enforceable contract, which could be the customer’s purchase order, the rights of the parties are identified, the contract has commercial terms, and collectibility of the contract consideration is probable. The majority of our contracts have a single performance obligation to transfer products and are short term in nature, usually less than six months. Our revenue is measured based on the consideration specified in the contract with each customer in exchange for transferring products that are generally based upon a negotiated, formula, list or fixed price. Revenue is recognized when control of the promised goods is transferred to our customer, which is either upon shipment from our dock, receipt at the customer’s dock, or removal from consignment inventory at the customer’s location, in an amount that reflects the consideration we expect to be entitled to receive in exchange for those goods.

We have elected to account for shipping and handling as activities to fulfill the promise to transfer the goods. Shipping and handling fees billed to customers in a sales transaction are recorded as an offset to shipping and handling expenses. Sales taxes and value added taxes in foreign jurisdictions that are collected from customers and remitted to governmental authorities are accounted for on a net basis and, therefore, are excluded from revenue.

We do not provide training, installation or commissioning services. We provide for future returns based on historical data, prior experience, current economic trends and changes in customer demand at the time revenue is recognized. We do not recognize any asset associated with the incremental cost of obtaining revenue generating customer contracts. As such, sales commissions are expensed as incurred, given that the expected period of benefit is less than one year.

Contract Balances

We receive payments from customers based on a billing schedule as established in our contracts. Contract assets are recorded when we have a conditional right to consideration for our completed performance under the contracts. Accounts receivables are recorded when the right to this consideration becomes unconditional. We do not have any material contract assets as of December 31, 2020.

| | December 31, 2020 | December 31, 2019 |
|----------------------|----------------------|----------------------|
| Contract liabilities | \$ (374) | \$ (396) |

During the three and twelve months ended December 31, 2020, the Company recognized \$9,000 and \$251,000, respectively, of revenue that was included in the contract balances as of December 31, 2019.

Disaggregated Revenue

In general, revenue disaggregated by product types and geography (See Note 14) is aligned according to the nature and economic characteristics of our business and provides meaningful disaggregation of our results of operations. Since we operate in one segment, all financial segment and product line information can be found in the consolidated financial statements.

Practical Expedients and Exemptions

We elected to use the following practical expedients: (i) not to adjust the promised amount of consideration for the effects of a significant financing component when we expect, at contract inception, that the period between our transfer of a promised product or service to a customer and when the customer pays for that product or service will be one year or less; (ii) to expense costs as incurred for costs to obtain a contract when the amortization period would have been one year or less; (iii) not to assess whether promised goods or services are performance obligations if they are immaterial in the context of the contract with the customer.

In addition, we do not disclose the value of unsatisfied performance obligations for contracts with an original expected length of one year or less.

Accounting for Sales Taxes

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.

Financial instruments that potentially subject us to concentration of credit risk consist primarily of cash and cash equivalents, investments, and accounts receivable. We invest primarily in money market accounts, certificates of deposit and corporate bonds. 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. Two customers accounted for 11% and 10% of our accounts receivable as of December 31, 2020 and three customers accounted for 14%, 13% and 12% of our trade accounts receivable as of December 31, 2019.

One customer represented 11% of our revenue for the year ended December 31, 2020. One customer represented 15% of our revenue for the year ended December 31, 2019. One customer represented 13% of our revenue for the year ended December 31, 2018. Our top five customers, although not the same five customers for each period, represented 32% of our revenue for the year 2020 and 40% of our revenue for 2019 and 35% of our revenue for 2018, respectively.

For the year ended December 31, 2020, one third-party customer for the raw materials products from our consolidated subsidiaries accounted for over 10% of the revenue from raw materials sales. For the years ended December 31, 2019 and 2018, each of three third-party customers for the raw materials products from our consolidated subsidiaries accounted for over 10% of the revenue from raw materials sales. Our subsidiaries and raw material joint ventures are a key strategic benefit for us as they further diversify our sources of revenue.

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 securities as available-for-sale debt securities. Short-term and long-term investments are comprised of available-for-sale marketable securities, which consist primarily of certificates of deposit and corporate bonds. 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 (loss) 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, 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, 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 and recoveries are recognized when they are received. As of December 31, 2020 and 2019, our accounts receivable, net balance was \$24.6 million and \$19.0 million, respectively, which was net of an allowance for doubtful accounts of \$217,000 and \$34,000 in December 31, 2020 and 2019, respectively. During 2020, the allowance for doubtful accounts increased by \$183,000 due to the poor financial condition of a few customers. During 2019, the allowance for doubtful accounts decreased by \$324,000 primarily due to the deconsolidation of JiYa. 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 the future periods.

As of December 31, 2020 and 2019, the sales returns reserve (included in accrued liabilities) balance was \$81,000 and \$26,000, respectively. During 2020, we utilized \$82,000 and reserved an additional \$137,000 and during 2019, we utilized \$26,000 and reserved an additional \$5,000.

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, 2020 and 2019, accrued product warranties totaled \$609,000 and \$387,000, respectively. The increase in accrued product warranties is primarily attributable to increased claims for quality issues experienced by approximately four of our 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.

Inventories

Inventories are stated at the lower of cost (approximated by standard cost) or net realizable value. 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 reserve 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. When a reserve is recorded, a new lower cost basis for that inventory is established and subsequent changes in facts and circumstances do not result in the restoration or increase in the new cost basis.

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 39.5 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 20 years, automobiles 5 to 10 years, leasehold and building improvements over 10 years, or the lease term if shorter, and buildings over 39.5 years. Repairs and maintenance costs are expensed as incurred.

Impairment of Long-Lived Assets

We evaluate property, plant and equipment and intangible assets for impairment. 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 these 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 assets' 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 2020, 2019 and 2018.

Impairment of Investments

All available-for-sale debt 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 unconsolidated 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 each company'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 company, 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.

We have 25% ownership interest in a germanium materials company in China and we incurred an impairment charge during 2019. After receiving such company's preliminary first quarter 2019 financial results in early April 2019 and its projections for significant losses going forward, we determined that this asset was fully impaired and wrote the asset balance down to zero. This resulted in a \$1.1 million impairment charge in our first quarter 2019 financial results. Except as mentioned above, there were no impairment charges for the remainder of these investments during the years ended December 31, 2020 and 2019.

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 raw materials integral to these substrates. 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 10—"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 which are expensed as incurred. Tangible assets acquired for research and development purposes are capitalized if they have alternative future use.

Advertising Costs

Advertising costs, included in selling, general and administrative expenses, are expensed as incurred. Advertising costs for the years ended December 31, 2020, 2019 and 2018 were insignificant.

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 12.

Comprehensive Income (Loss)

The components of other comprehensive income (loss) 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, net of tax. The balance of accumulated other comprehensive income (loss) is as follows (in thousands):

| | As of December 31, | |
|----------------------------------------------------------------------------------|--------------------|------------|
| | 2020 | 2019 |
| Accumulated other comprehensive income (loss): | | |
| Unrealized gain (loss) on investments, net | \$ 3 | \$ (3) |
| Cumulative translation adjustment | 3,601 | (4,842) |
| | 3,604 | (4,845) |
| Less: Cumulative translation adjustment attributable to noncontrolling interests | 395 | 17 |
| Accumulated other comprehensive income (loss) attributable to AXT, Inc. | \$ 3,209 | \$ (4,862) |

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

Accounting Standard Update No. 2016-13, *Financial Instruments-Credit Losses (Topic 326): Measurement of Credit Losses on Financial Instruments* (“ASU 2016-13”) was issued in June 2016. Under ASU 2016-13, existing guidance on reporting credit losses for trade and other receivables and available for sale debt securities have been replaced with a new forward-looking “expected loss” model that has resulted in the earlier recognition of allowances for losses. Our adoption of ASU 2016-13 and its subsequent series of amendments during the twelve months ended December 31, 2020 using the modified retrospective transition approach did not result in a material impact on our consolidated financial statements. As part of our assessment of the adequacy of our allowances for credit losses, we consider a number of factors including, but not limited to, customer credit ratings, bankruptcy filings, published or estimated credit default rates, age of receivables, adequacy of our allowance for doubtful accounts and expected loss rates.

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, 2020 and 2019, our cash, cash equivalents and debt investments are classified as follows (in thousands):

| | December 31, 2020 | | | | December 31, 2019 | | | |
|-----------------------------------------------|-------------------|-----------------------|-------------------------|------------|-------------------|-----------------------|-------------------------|------------|
| | Amortized Cost | Gross Unrealized Gain | Gross Unrealized (Loss) | Fair Value | Amortized Cost | Gross Unrealized Gain | Gross Unrealized (Loss) | Fair Value |
| Classified as: | | | | | | | | |
| Cash | \$ 72,602 | \$ — | \$ — | \$ 72,602 | \$ 26,892 | \$ — | \$ — | \$ 26,892 |
| Cash equivalents: | | | | | | | | |
| Certificates of deposit ¹ | — | — | — | — | — | — | — | — |
| Total cash and cash equivalents | 72,602 | — | — | 72,602 | 26,892 | — | — | 26,892 |
| Investments (available-for-sale): | | | | | | | | |
| Certificates of deposit ² | 2,880 | 5 | — | 2,885 | 2,400 | 2 | — | 2,402 |
| Corporate bonds | 3,083 | — | (2) | 3,081 | 7,030 | 4 | (9) | 7,025 |
| Total investments | 5,963 | 5 | (2) | 5,966 | 9,430 | 6 | (9) | 9,427 |
| Total cash, cash equivalents and investments | \$ 78,565 | \$ 5 | \$ (2) | \$ 78,568 | \$ 36,322 | \$ 6 | \$ (9) | \$ 36,319 |
| Contractual maturities on investments: | | | | | | | | |
| Due within 1 year ³ | \$ 240 | | | \$ 240 | \$ 9,430 | | | \$ 9,427 |
| Due after 1 through 5 years ⁴ | 5,723 | | | 5,726 | — | | | — |
| | \$ 5,963 | | | \$ 5,966 | \$ 9,430 | | | \$ 9,427 |

1. Certificate of deposit with original maturities of less than three months.
2. Certificate of deposit with original maturities of more than three months.
3. Classified as "Short-term investments" in our consolidated balance sheets.
4. Classified as "Long-term investments" in our consolidated balance sheets.

We manage our debt investments as a single portfolio of highly marketable securities that is intended to be available to meet our current cash requirements. Certificates of deposit and corporate bonds are typically held until maturity.

Historically, the gross unrealized losses related to our portfolio of available-for-sale debt securities were immaterial, and primarily due to normal market fluctuations and not due to increased credit risk or other valuation concerns. Gross unrealized losses on our available-for-sale debt securities as of December 31, 2020 was \$2,000, and historically, such gross unrealized losses have been temporary in nature and we believe that it is probable the principal and interest will be collected in accordance with the contractual terms. We review our debt investment portfolio at least quarterly, or when there are changes in credit risks or other potential valuation concerns, to identify and evaluate whether an allowance for credit losses or impairment would be necessary. 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 debt investments would generate a loss if we sold them on December 31, 2020.

The following table summarizes the fair value and gross unrealized losses related to available-for-sale debt securities, aggregated by investment category and length of time that individual debt securities have been in a continuous unrealized loss position as of December 31, 2020 (in thousands):

| | In Loss Position < 12 months | | In Loss Position > 12 months | | Total In Loss Position | |
|--------------------------------|---------------------------------|---------------------------------|---------------------------------|---------------------------------|---------------------------|---------------------------------|
| | Fair Value | Gross Unrealized (Losses) | Fair Value | Gross Unrealized (Losses) | Fair Value | Gross Unrealized (Losses) |
| As of December 31, 2020 | | | | | | |
| Investments: | | | | | | |
| Corporate bonds | 2,048 | (2) | — | — | 2,048 | (2) |
| Total in loss position | \$ 2,048 | \$ (2) | \$ — | \$ — | \$ 2,048 | \$ (2) |

The following table summarizes the fair value and gross unrealized losses related to available-for-sale debt securities, aggregated by investment category and length of time that individual debt securities have been in a continuous unrealized loss position as of December 31, 2019 (in thousands):

| | In Loss Position < 12 months | | In Loss Position > 12 months | | Total In Loss Position | |
|--------------------------------|---------------------------------|-------------------------------|---------------------------------|-------------------------------|---------------------------|-------------------------------|
| | Fair Value | Gross Unrealized (Loss) | Fair Value | Gross Unrealized (Loss) | Fair Value | Gross Unrealized (Loss) |
| As of December 31, 2019 | | | | | | |
| Investments: | | | | | | |
| Corporate bonds | 4,515 | (9) | — | — | 4,515 | (9) |
| Total in loss position | \$ 4,515 | \$ (9) | \$ — | \$ — | \$ 4,515 | \$ (9) |

Investments in Privately-held Raw Material 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 the non-consolidated companies, are accounted for under the equity method and included in “Other assets” in the consolidated balance sheets and totaled \$6.4 million and \$6.0 million as of December 31, 2020 and 2019, respectively. As of December 31, 2020, there were five companies accounted for under the equity method. The year ended December 31, 2019 includes an impairment charge of \$1.1 million for one of our minority investments (see Note 6). We had no impairment charges during 2020 and 2018.

Fair Value Measurements

We invest primarily in money market accounts, certificates of deposit, corporate bonds and notes, and government securities. ASC Topic 820, *Fair Value Measurements and Disclosures* (“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 debt 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. We classify our available-for-sale debt 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, 2020. There have been no transfers between fair value measurement levels during the years ended December 31, 2020 and 2019.

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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 sheets and classified as Level 3 assets and liabilities. As of December 31, 2020, 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, 2020 (in thousands):

| | Balance as of December 31, 2020 | 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 | \$ 2,885 | \$ — | \$ 2,885 | \$ — |
| Corporate bonds | 3,081 | — | 3,081 | — |
| Total | <u>\$ 5,966</u> | <u>\$ —</u> | <u>\$ 5,966</u> | <u>\$ —</u> |

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, 2019 (in thousands):

| | Balance as of December 31, 2019 | 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 | \$ 2,402 | \$ — | \$ 2,402 | \$ — |
| Corporate bonds | 7,025 | — | 7,025 | — |
| Total | <u>\$ 9,427</u> | <u>\$ —</u> | <u>\$ 9,427</u> | <u>\$ —</u> |

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). For the year ended December 31, 2019, we recognized an impairment charge of \$1.1 million for one of our minority investments. We received its preliminary first quarter 2019 financial results in early April 2019 as well as its projections for significant losses going forward. Such projected losses would fully deplete our asset investment balance for this company in 2019. This company in which we have a minority investment is experiencing significant disruptions due to upgrades and repairs required to comply with stronger environmental regulations in China. As a result, we determined that this asset was fully impaired and wrote the asset balance down to zero. We had no impairment charges for 2020 and 2018.

Note 3. Inventories

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

| | December 31, 2020 | December 31, 2019 |
|---------------------|----------------------|----------------------|
| Inventories: | | |
| Raw materials | \$ 24,738 | \$ 20,677 |
| Work in process | 24,215 | 24,946 |
| Finished goods | 2,562 | 3,529 |
| | <u>\$ 51,515</u> | <u>\$ 49,152</u> |

As of December 31, 2020 and 2019, carrying values of inventories were net of inventory reserves of \$17.7 million and \$16.4 million, respectively, for excess and obsolete inventory and \$162,000 and \$91,000, respectively, for lower of cost or net realizable value reserves.

Note 4. Related Party Transactions

Effective as of March 11, 2019, we reduced our ownership in JiYa from 46% to 39% by selling a portion of our JiYa shares to our investor partner, which is also JiYa's landlord. Based on an independent third-party valuation analysis, we sold these shares for \$366,000. Previously we were the largest shareholder of JiYa and as such, we had the right to appoint the general manager of JiYa and the ability to exercise control in substance over JiYa's long-term strategic direction. Further, our Chief Executive Officer was the chairman of JiYa's board of directors and our Chief Financial Officer was a member of JiYa's board of financial supervisors. As a result of this transaction, our investor partner, Shanxi Aluminum Industrial Co., Ltd. became the largest shareholder of JiYa and assumed the right to appoint the general manager of JiYa and thereby exercised greater control over JiYa's long-term strategic direction. Further, although our Chief Executive Officer remains on the board, as of March 11, 2019, he was no longer chairman of JiYa's board of directors and our Chief Financial Officer was no longer on JiYa's board of financial supervisors.

Previously, we accounted for JiYa's financial performance under the consolidation method of accounting. As a result of the changes, we began to account for JiYa's financial performance under the equity method of accounting. Therefore, we deconsolidated JiYa from our consolidated financial statements as of March 11, 2019 in accordance with ASC 810. As of March 12, 2019, we accounted for our investment in JiYa under the equity method of accounting as we continue to have board representation and substantial ownership. Pro-forma financials have not been presented because we believe the effects were not material to our consolidated financial position and results of operations for all periods presented. JiYa continues to be a related party to us after deconsolidation, from whom we may purchase raw materials for production in the ordinary course of business from time to time.

Beginning in 2012, our consolidated joint venture, JinMei, became contractually obligated under an agency sales agreement to sell raw material on behalf of its equity investment entity. JinMei bills the customers and remits the receipts, net of its portions of sales commission, to this equity investment entity. For the years ended December 31, 2020, 2019 and 2018, JinMei recorded \$0, \$0 and \$24,000 of income from agency sales, respectively, which were included in "Other income, net" in the consolidated statements of operations.

In March 2012, Tongmei, entered into an operating lease for the land it owns with our consolidated joint venture, 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 31st of each year.

Tongmei also purchases raw materials from Donghai County Dongfang High Purity Electronic Materials Co., Ltd. for production in the ordinary course of business. As of December 31, 2020 and 2019, there were no amounts payable outstanding.

ChaoYang Tongmei also purchases raw materials from one of our equity investment entities, Emeishan Jia Mei High Purity Metals Co. Ltd. (“Jiamei”), for production in the ordinary course of business. As of December 31, 2020 and 2019, there no amounts payable outstanding.

Tongmei and ChaoYang 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, 2020 and 2019, there no amounts payable outstanding.

In July 2017, Tongmei, provided an inter-company loan to JinMei in the amount of \$768,000 in preparation for the acquisition of the land use rights and the construction of a new building. The inter-company loan carries an interest rate of 4.9% per annum. The principle is due in three installments between December 2021 and December 2023 while the interest is due in December of each year. As of December 31, 2020, JinMei repaid principal and interest totaling \$537,000 to Tongmei. As of December 31, 2020 and 2019, the remaining balance of principal and interest totaled \$303,000 and \$285,000, respectively. JinMei, is in the process of relocating its manufacturing operations to the city of Kazuo, located in the province of Liaoning near the Inner Mongolia Autonomous Region, near our own location.

In April 2016, our consolidated joint venture, BoYu, provided a personal loan of \$177,000 to one of its executive employees. This loan is collateralized by the officer’s shares in BoYu. The loan bears interest at 2.75% per annum. During the three months ended June 30, 2017, the repayment of the principal and interest totaling \$180,000 was received by our consolidated joint venture. In November 2017, BoYu provided another personal loan of \$291,000 to the same executive employee. This loan bears interest at 2.75% per annum. Principal and accrued interest are due on November 30, 2020. In May 2019, BoYu provided another personal loan of \$146,000 to the same executive employee. This loan bears interest at 2.75% per annum. Principal and accrued interest are due at such time BoYu pays a dividend to its shareholders. In March 2020, BoYu provided another personal loan of \$141,000 to the same executive employee. This loan bears interest at 2.75% per annum. Principal and accrued interest are due on December 31, 2024. On December 25, 2020, the executive repaid the principal of \$612,000 and interest of \$35,000 of the personal loans to BoYu. As of December 31, 2020 and 2019, the balances, including both principal and accrued interest, were \$0, and \$449,000, respectively, and included in “Other assets” in our consolidated balance sheets.

On November 2, 2017, our consolidated joint venture, BoYu, raised additional capital in the amount of \$2 million in cash from a third-party investor through the issuance of shares equivalent to 10% ownership of BoYu. This third-party investor is an immediate family member to the owner of one of BoYu's customers. For the years ended December 31, 2020 and 2019, BoYu has recorded \$0.3 million and \$0.2 million in revenue from this customer, respectively. As of December 31, 2020 and 2019, amounts receivable of \$0 and \$12,000, respectively, were included in “Accounts receivable” in our consolidated balance sheets. In December 2020, we purchased shares equivalent to 4% of BoYu from the same third-party investor for \$1.6 million and the remaining 6% was sold to another third-party investor.

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):

| | December 31, 2020 | December 31, 2019 |
|--------------------------------------------------------|----------------------|----------------------|
| Property, plant and equipment: | | |
| Machinery and equipment, at cost | \$ 48,206 | \$ 45,742 |
| <i>Less: accumulated depreciation and amortization</i> | <i>(37,832)</i> | <i>(37,115)</i> |
| Building, at cost | 94,567 | 38,837 |
| <i>Less: accumulated depreciation and amortization</i> | <i>(15,324)</i> | <i>(12,736)</i> |
| Leasehold improvements, at cost | 6,285 | 4,877 |
| <i>Less: accumulated depreciation and amortization</i> | <i>(4,616)</i> | <i>(4,035)</i> |
| Construction in progress | 24,539 | 61,833 |
| | <u>\$ 115,825</u> | <u>\$ 97,403</u> |

As of December 31, 2020, the balance of construction in progress was \$24.5 million, of which \$14.2 million was related to our buildings in our new Dingxing and Kazuo locations, \$4.0 million was for manufacturing equipment purchases not yet placed in service and \$6.3 million was from our construction in progress for our other consolidated subsidiaries. As of December 31, 2019, the balance of construction in progress was \$61.8 million, of which \$48.8 million was related to our buildings in our new Dingxing and Kazuo locations, \$3.4 million was for manufacturing equipment purchases not yet placed in service and \$9.6 million was from our construction in progress for our other consolidated subsidiaries.

Depreciation and amortization expense was \$4.3 million, \$5.5 million and \$4.9 million for the years ended December 31, 2020, 2019 and 2018, respectively.

From time to time we review our estimates of the useful lives of our property, plant and equipment. As a result of the review, we determined a portion of our manufacturing equipment was lasting longer than the estimate previously established for the respective useful lives. Where appropriate, we extended the useful life of the manufacturing equipment in our accounting records. In addition, the useful life of our buildings located in China was extended to better align with industry standards. The changes in our estimate of the useful life, effective January 1, 2020, were made in order to remain consistent with U.S. GAAP regarding management estimates. The effect of the change in the useful lives decreased our manufacturing costs for the year ended December 31, 2020 by approximately \$1.4 million and increased our basic and diluted net income per share by approximately \$0.03, respectively, as a result of lower depreciation expense.

Note 6. Investments in Privately-held Raw Material 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. These companies form part of our overall supply chain.

The investments are summarized below (in thousands):

| Company | Investment Balance as of | | Accounting Method | Ownership * Percentage |
|--------------------------------------------------------------------|--------------------------|-------------------|-------------------|------------------------|
| | December 31, 2020 | December 31, 2019 | | |
| Nanjing JinMei Gallium Co., Ltd. | \$ 592 | \$ 592 | Consolidated | **100 % |
| Chaoyang JinMei Gallium Co., Ltd. | 1,820 | 1,820 | Consolidated | **100 % |
| Beijing BoYu Semiconductor Vessel Craftwork Technology Co., Ltd. | 1,346 | 1,346 | Consolidated | **100 % |
| | <u>\$ 3,758</u> | <u>\$ 3,758</u> | | |
| Donghai County Dongfang High Purity Electronic Materials Co., Ltd. | \$ 1,651 | \$ 1,326 | Equity | **46 % |
| Beijing JiYa Semiconductor Material Co., Ltd. | 1,418 | 1,621 | Equity | 39 % |
| Xilingol Tongli Germanium Co., Ltd. | — | — | Equity | 25 % |
| Xiaoyi XingAn Gallium Co., Ltd. | 2,822 | 2,367 | Equity | **25 % |
| Emeishan Jia Mei High Purity Metals Co., Ltd. | 485 | 647 | Equity | 25 % |
| | <u>\$ 6,376</u> | <u>\$ 5,961</u> | | |

* These percentages reflect the ownership currently in effect upon the completion of the reorganization in China.

** In preparation for Tongmei’s application for a listing on the STAR Market, in late December 2020 we reorganized our entity structures in China. JinMei and BoYu and its subsidiaries, previously organized under AXT, Inc., were assigned to Tongmei and effectively merged with Tongmei although they retained their own respective legal entity status and are wholly owned subsidiaries of Tongmei. The 33% minority interest stakeholders of BoYu converted their ownership to a 7.59% minority interest in Tongmei. The 8.5% minority interest stakeholders, employees of JinMei, converted their ownership to a 0.38% minority interest in Tongmei. Further, a number of employees, key managers and contributors, purchased a 0.4% minority interest in Tongmei. As of December 31, 2020, Tongmei’s noncontrolling interests totaled 8.37%.

Effective as of March 11, 2019, we reduced our ownership in JiYa from 46% to 39% by selling a portion of our JiYa shares to our investor partner, which is also JiYa’s landlord. Based on an independent third-party valuation analysis, we sold these shares for \$366,000. Previously, we were the largest shareholder and, as such, we had the right to appoint the general manager of JiYa and the ability to exercise control in substance over JiYa’s long-term strategic direction. Further, our Chief Executive Officer was the chairman of JiYa’s board of directors and our Chief Financial Officer was a member of JiYa’s board of financial supervisors. As a result of this transaction, our investor partner, Shanxi Aluminum Industrial Co., Ltd., became the largest shareholder and assumed the right to appoint the general manager and thereby exercised greater control over JiYa’s long-term strategic direction. Further, although our Chief Executive Officer remains on the board, as of March 11, 2019 he was no longer the chairman of JiYa’s board of directors and our Chief Financial Officer was no longer a member of JiYa’s board of financial supervisors.

Previously we accounted for JiYa’s financial performance under the consolidation method of accounting. As a result of the changes we began to account for JiYa’s financial performance under the equity method of accounting. Therefore, we deconsolidated JiYa from our consolidated financial statements as of March 11, 2019 in accordance with ASC 810. As of March 12, 2019, we accounted for our investment in JiYa under the equity method of accounting as we continue to have board representation and substantial ownership. Pro-forma financials have not been presented because we believe the effects were not material to our consolidated financial position and results of operation for all periods presented. JiYa continues to be a related party to us after deconsolidation, whom we may purchase raw materials from for production in the ordinary course of business from time to time.

We recorded a gain on the deconsolidation of JiYa of \$175,000 as a component of “Equity in loss of unconsolidated joint ventures” during 2019 in the consolidated statements of operations and comprehensive income (loss).

On the date of deconsolidation, the fair value of the Company's investment in JiYa exceeded the Company's share of the net assets of JiYa, which generated the gain. As of March 12, 2019, we recorded our investment in JiYa at a fair value of \$2,040,000, which was based on an independent third-party valuation analysis. The valuation is based on the asset-based approach. The market-based approach is not deemed appropriate due to lack of availability of market data for comparable companies on the open market and the discounted cash flow approach is not deemed reliable because of the difficulty in predicting the future profitability of JiYa due to the volatility of the gallium market, the concentration of customers and the significant accumulated losses of JiYa. The asset-based approach examines the value of a company's assets net of its liabilities to derive a value for the equity holders. The gain on deconsolidation includes the following:

| | Amount (in thousands) |
|----------------------------------------------------------------------------------------------------------------------|--------------------------|
| Fair value of the consideration received | \$ 366 |
| Fair value of the retained investment in Beijing JiYa Semiconductor Material Co., Ltd. | 2,040 |
| Carrying value of noncontrolling interests, net of accumulated other comprehensive income attributable to subsidiary | 617 |
| Derecognition of Beijing JiYa Semiconductor Material Co., Ltd.'s net asset | (2,848) |
| Gain recognized on deconsolidation of Beijing JiYa Semiconductor Material Co., Ltd. | <u>\$ 175</u> |

| | Amount (in thousands) |
|----------------------------------------------------------------------------------------|--------------------------|
| Fair value of the retained investment in Beijing JiYa Semiconductor Material Co., Ltd. | \$ 2,040 |
| Carrying value of retained noncontrolling investment | (1,559) |
| Gain on retained noncontrolling investment due to remeasurement | <u>\$ 481</u> |

Before June 15, 2018, our ownership of JinMei was 83%. On June 15, 2018, we purchased a 12% ownership interest from one of the minority owners of JinMei for \$1.4 million. The \$1.4 million was scheduled to be paid in two installments. On June 15, 2018, we paid the first installment of \$163,000. In May 2019, we paid the second installment of \$1.2 million as the relocation of JinMei's headquarters and manufacturing operations was nearly complete, which had been previously included in "Accrued liabilities" in our consolidated balance sheets. As a result, our ownership of JinMei increased from 83% to 95%. In September 2018, we purchased a 2% ownership interest from one of the three remaining minority owners of JinMei for \$252,000. As a result, our ownership of JinMei increased from 95% to 97%. In May 2019, we purchased the remaining 3% ownership interest from retiring members of the JinMei management team for approximately \$413,000. The final payment to the JinMei management team was made in October, 2020. As a result, our ownership of JinMei increased from 97% to 100%. Prior to June 1, 2019, we reported JinMei as a consolidated joint venture as we had a controlling financial interest and have majority control of the board. As of June 1, 2019, we referred to it as a wholly-owned subsidiary and reduced the carrying value of the corresponding noncontrolling interests to zero. Before August 1, 2020, our ownership of ChaoYang JinMei was 100%. In August 2020, we sold an 8.5% ownership interest to current members of the ChaoYang JinMei management team for approximately \$396,000. As a result, our ownership of ChaoYang JinMei decreased from 100% to 91.5%. As of August 2020, we referred to ChaoYang JinMei as a significantly controlled subsidiary instead of a wholly-owned subsidiary. Our Chief Executive Officer is chairman of the JinMei board and we have appointed two other representatives to serve on the JinMei board.

Our ownership of BoYu is 67%. On November 2, 2017, BoYu raised additional capital in the amount of \$2 million in cash from a third-party investor through the issuance of shares equivalent to 10% ownership of BoYu. As a result, our ownership of BoYu was diluted from 70% to 63%. In December 2020, we purchased shares equivalent to 4% of BoYu from the same third-party investor for \$1.6 million. As a result, our ownership of BoYu increased from 63% to 67%. We continue to consolidate BoYu as we have a controlling financial interest and have majority control of the board and accordingly no gain was recognized as a result of this equity transaction. Our Chief Executive Officer is chairman of the BoYu board and we have appointed two other representatives to serve on the board.

An additional step in the STAR Market initial public offering (“IPO”) process involves certain entity reorganizations and alignment of assets under Tongmei. In this regard our two consolidated raw material companies, JinMei and BoYu and its subsidiaries were assigned to Tongmei in December 2020. This will increase the number of customers and employees attributable to Tongmei as well as increase Tongmei’s consolidated revenue.

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 2020, 2019 and 2018, our two consolidated raw material subsidiaries generated \$7.5 million, \$4.3 million and \$5.5 million of income, respectively, of which an income of \$1.8 million, an income of \$1.0 million and an income of \$1.4 million, respectively were allocated to noncontrolling interests, resulting in \$5.7 million, \$3.3 million and \$4.1 million of income, respectively, to our net income (loss).

For AXT’s minority investment entities that are not consolidated, the investment balances are included in “Other assets” in our consolidated balance sheets and totaled \$6.4 million and \$6.0 million as of December 31, 2020 and 2019, respectively. Our respective ownership interests in each of these companies are 46%, 39%, 25%, 25% and 25%. These minority investment entities are not considered variable interest entities because:

- all minority investment entities 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.

One of the minority investment entities in which we have a 25% ownership interest is a germanium materials company in China. This company provides results to us only on a quarterly basis. We received its preliminary first quarter 2019 financial results in early April 2019 as well as its projections for significant losses going forward. Such projected losses would fully deplete our asset investment balance for this company in 2019. The Company is experiencing significant disruptions due to upgrades and repairs required to comply with stronger environmental regulations in China. As a result, we determined that this asset was fully impaired and wrote the asset balance down to zero. This resulted in a \$1.1 million impairment charge in our first quarter 2019 financial results.

AXT’s minority investment entities are not consolidated and are accounted for under the equity method. Excluding one fully impaired entity, the equity entities had the following summarized income information (in thousands) for the years ended December 31, 2020, 2019 and 2018, respectively:

| | Year Ended December 31, | | | Our share for the Year Ended December 31, | | |
|-------------------------|----------------------------|------------|------------|-------------------------------------------------|------------|------------|
| | 2020 | 2019 | 2018 | 2020 | 2019 | 2018 |
| Net revenue | \$ 20,049 | \$ 18,991 | \$ 33,212 | \$ 6,252 | \$ 5,458 | \$ 8,549 |
| Gross profit | 4,907 | 2,013 | 6,457 | 1,504 | 558 | 1,675 |
| Operating income (loss) | 1,957 | (2,266) | (3,152) | 504 | (700) | (778) |
| Net income (loss) | \$ 1,014 | \$ (3,000) | \$ (4,750) | \$ 111 | \$ (1,876) | \$ (1,080) |

Excluding one fully impaired entity, these minority investment entities that are not consolidated, but rather are accounted for under the equity method, had the following summarized balance sheet information (in thousands) as of December 31, 2020 and 2019, respectively:

| | <u>As of December 31,</u> | |
|------------------------|---------------------------|-------------|
| | <u>2020</u> | <u>2019</u> |
| Current assets | \$ 24,136 | \$ 22,144 |
| Noncurrent assets | 11,339 | 11,990 |
| Current liabilities | 12,502 | 13,726 |
| Noncurrent liabilities | — | — |

Our portion of the income and losses, including impairment charges, from these minority investment entities that are not consolidated and are accounted for under the equity method was a gain of \$0.1 million for the year ended December 31, 2020 and a loss of \$1.9 million and \$1.1 million for the years ended December 31, 2019 and 2018, respectively. Dividends received from these minority investment entities were \$362,000 for the year ended December 31, 2019 and \$0 for each of the years ended December 31, 2020 and 2018. Excluding one fully impaired entity, undistributed retained earnings relating to our investments in these minority investment entities amounted to \$1.3 million and \$1.2 million as of December 31, 2020 and 2019, respectively.

Note 7. Balance Sheets Details

Other Assets

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

| | <u>As of December 31,</u> | |
|---------------------------------------|---------------------------|-----------------|
| | <u>2020</u> | <u>2019</u> |
| Equity method investments | \$ 6,376 | \$ 5,961 |
| Value added tax receivable, long term | 471 | 2,708 |
| Other intangible assets | 1,682 | 1,124 |
| Other assets | 1,581 | 10 |
| | <u>\$ 10,110</u> | <u>\$ 9,803</u> |

Accrued Liabilities

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

| | <u>December 31,</u> | <u>December 31,</u> |
|-----------------------------------------------------------------------|---------------------|---------------------|
| | <u>2020</u> | <u>2019</u> |
| Accrued compensation and related charges | \$ 4,417 | \$ 3,307 |
| Preferred stock dividends payable | 2,901 | 2,901 |
| Payable in connection with construction | 1,457 | 1,447 |
| Payable in connection with repurchase of subsidiaries shares | 1,439 | 151 |
| Accrued income taxes | 760 | 171 |
| Payable in connection with land restoration of Nanjing JinMei factory | 750 | 703 |
| Accrued professional services | 675 | 630 |
| Accrued product warranty | 609 | 387 |
| Current portion of operating lease liabilities | 445 | 319 |
| Advance from customers | 374 | 396 |
| Other tax payable | 295 | 50 |
| Other personnel-related costs | 101 | 180 |
| Accrual for sales returns | 81 | 26 |
| Other accrued liabilities | 1,691 | 1,013 |
| | <u>\$ 15,995</u> | <u>\$ 11,681</u> |

Note 8. Bank Loans and Line of Credit

On November 6, 2018, the Company entered into the Credit Agreement, which established a \$10 million secured revolving line of credit with a \$1.0 million letter of credit sublimit facility. The revolving credit facility is collateralized by substantially all of the assets of the Company located within the United States, subject to certain exceptions. The commitments under the Credit Agreement expire on November 30, 2020 and any loans thereunder will bear interest at a rate based on the daily one-month LIBOR for the applicable interest period plus a margin of 2%. As of December 31, 2019, no loans or letters of credit were outstanding under the Credit Agreement. Effective February 5, 2020, the Company amended the Credit Agreement. The line of credit was reduced from \$10 million to \$7 million. The commitments under the First Amendment To Credit Agreement expired on November 30, 2020, no loans or letters of credit were outstanding under the Credit Agreement at December 31, 2020.

On August 9, 2019, Tongmei entered into a credit facility with the Bank of China with a \$5.8 million line of credit at an annual interest rate of approximately 0.4% over the average interest rate quoted by the National Interbank Funding Center. Accrued interest is calculated monthly and paid quarterly. The annual interest rate was approximately 4.7% as of December 31, 2019. The credit facility is collateralized by Baoding Tongmei's land use rights and all of its buildings located at its facility in Dingxing. The primary intended use of the credit facility is for general purposes, which may include working capital and other corporate expenses.

On August 9, 2019, we borrowed \$2.8 million against the credit facility. The repayment of the full amount was due on August 9, 2020. On September 12, 2019, we borrowed an additional \$2.8 million against the credit facility. The repayment of the full amount was due on September 12, 2020. In August 2020, Tongmei repaid the full amount of the credit facility including all outstanding accrued interest of approximately \$5.9 million and simultaneously applied to renew the credit facility. The process of repaying a loan and then renewing the loan is customary in China.

In September 2020, the August 2019 borrowing was renewed and funded against the credit facility with an interest rate of 3.85%. The interest owed during the term of the loan was deducted prior to funding. The repayment of the loan is due on March 22, 2021, however the credit facility contains an option to renew for an additional six months.

In October 2020, the September 2019 borrowing was renewed and funded against the credit facility and an additional \$2.7 million was approved and funded against the credit facility with the annual interest rate of 4.7%. Accrued interest is calculated monthly and paid quarterly. The combined loan totals \$5.6 million. The repayment of the \$5.6 million is due on April 8, 2021, however, the credit facility contains an option to renew for an additional six months. As of December 31, 2020, \$8.9 million was included in "Bank loan" in our consolidated balance sheets.

In February 2020, our consolidated subsidiary, BoYu, entered into a credit facility with the Industrial and Commercial Bank of China ("ICBC") with a \$1.4 million line of credit at an annual interest rate of approximately 0.15% over the loan prime rate. Accrued interest is calculated monthly and paid quarterly. The annual interest rate was approximately 4.3% as of December 31, 2020. The credit facility is collateralized by BoYu's land use rights and its building located at its facility in Tianjin, China and BoYu's accounts receivable. The primary intended use of the credit facility is for general purposes, which may include working capital and other corporate expenses.

In March 2020, BoYu borrowed \$0.4 million against the credit facility. The repayment of the full amount is due in March 2021. In December 2020, BoYu borrowed an additional \$1.1 million against the credit facility. As of December 31, 2020, \$1.5 million was included in "Bank loan" in our consolidated balance sheets.

Note 9. 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, 2020 and 2019, 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.

Changes in AXT, Inc.'s ownership interest in consolidated subsidiaries

The effects of changes in the Company's ownership interests in its less than 100% owned subsidiaries on the Company's equity are as follows:

| | As of December 31, | |
|--------------------------------------------------------------------------------------------------------------------|--------------------|------------|
| | 2020 | 2019 |
| Net income (loss) attributable to AXT, Inc. | \$ 3,238 | \$ (2,600) |
| Increase (decrease) in additional paid-in capital for: | | |
| Sales of subsidiary shares to noncontrolling interest | 396 | — |
| Purchase of subsidiary shares from noncontrolling interest | (1,398) | (74) |
| Adjustment to noncontrolling interests in connection with the reorganization and alignment of assets under Tongmei | (10,732) | — |
| Net transfers to noncontrolling interests | (11,734) | (74) |
| Change from net income (loss) attributable to AXT, Inc., net of transfers to noncontrolling interest | \$ (8,496) | \$ (2,674) |

Stock Repurchase Program

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 2020, 2019 and 2018 under this program. As of December 31, 2020, approximately \$2.7 million remained available for future repurchases under this program.

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 \$2.9 million and we included this amount in "Accrued liabilities" in our consolidated balance sheets. In 2018, 2019 and 2020, we did not repurchase any of our outstanding common stock. 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 year to date dividends on the Series A preferred stock when calculating our earnings per share.

Note 10. Employee Benefit Plans and Stock-based Compensation

Stock Option Plans and Equity Incentive Plans

In May 2007, our stockholders approved our 2007 Equity Incentive Plan (the "2007 Plan"), which provides for the grant of incentive and non-qualified stock options to our employees, consultants and directors. The 2007 Plan is a restatement of the 1997 Stock Option Plan which expired in 2007. The 1,928,994 share reserve of the 1997 Stock Option 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 stockholders 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, 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 stockholders approved our 2015 Equity Incentive Plan (the “2015 Plan”). The 2015 Plan is a replacement of the 2007 Plan. The 399,562 share reserve of the 2007 Plan became the reserve of the 2015 Plan, together with 3,000,000 additional shares approved for issuance under the 2015 Plan. In May 2019, our stockholders approved 1,600,000 of additional shares 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 2015 Plan does allow for similar vesting to employees. As of December 31, 2020, approximately 0.6 million 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, 2018, 2019 and 2020 (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, 2018 | 2,666 | \$ 3.81 | 6.87 | \$ 13,149 |
| Granted | 246 | 5.77 | | |
| Exercised | (238) | 2.64 | | |
| Canceled and expired | (20) | 4.40 | | |
| Balance as of December 31, 2018 | 2,654 | \$ 4.09 | 6.28 | \$ 2,720 |
| Granted | 430 | 3.06 | | |
| Exercised | (113) | 2.37 | | |
| Canceled and expired | (18) | 4.47 | | |
| Balance as of December 31, 2019 | 2,953 | \$ 4.00 | 5.95 | \$ 3,040 |
| Granted | — | — | | |
| Exercised | (905) | 2.80 | | |
| Canceled and expired | (163) | 5.85 | | |
| Balance as of December 31, 2020 | 1,885 | \$ 4.42 | 6.17 | \$ 9,713 |
| Options vested as of December 31, 2020 and unvested options expected to vest, net of forfeitures | 1,872 | \$ 4.42 | 6.15 | \$ 9,636 |
| Options exercisable as of December 31, 2020 | 1,418 | \$ 4.52 | 5.41 | \$ 7,165 |

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The options outstanding and exercisable as of December 31, 2020 were in the following exercise price ranges (in thousands, except per share data):

| Range of Exercise Price | Options Outstanding as of December 31, 2020 | | | Options Vested and Exercisable as of December 31, 2020 | |
|-------------------------|---------------------------------------------|---------------------------------|---------------------------------------------|--------------------------------------------------------|---------------------------------|
| | Shares | Weighted-average Exercise Price | Weighted-average Remaining Contractual Life | Shares | Weighted-Average Exercise Price |
| \$ 2.14 - \$ 2.14 | 8 | \$ 2.14 | 3.33 | 8 | \$ 2.14 |
| \$ 2.18 - \$ 2.18 | 304 | \$ 2.18 | 4.84 | 304 | \$ 2.18 |
| \$ 2.36 - \$ 2.91 | 162 | \$ 2.56 | 3.29 | 162 | \$ 2.56 |
| \$ 3.06 - \$ 3.06 | 430 | \$ 3.06 | 8.85 | 107 | \$ 3.06 |
| \$ 4.79 - \$ 4.79 | 92 | \$ 4.79 | 0.82 | 92 | \$ 4.79 |
| \$ 5.21 - \$ 5.21 | 440 | \$ 5.21 | 5.82 | 440 | \$ 5.21 |
| \$ 5.61 - \$ 5.61 | 20 | \$ 5.61 | 1.16 | 20 | \$ 5.61 |
| \$ 5.77 - \$ 5.77 | 245 | \$ 5.77 | 7.85 | 128 | \$ 5.77 |
| \$ 7.95 - \$ 7.95 | 60 | \$ 7.95 | 6.08 | 59 | \$ 7.95 |
| \$ 9.50 - \$ 9.50 | 124 | \$ 9.50 | 6.82 | 98 | \$ 9.50 |
| | <u>1,885</u> | \$ 4.42 | 6.17 | <u>1,418</u> | \$ 4.52 |

There were 905,000, 113,000 and 238,000 options exercised in the years ended December 31, 2020, 2019 and 2018, respectively. The total intrinsic value of options exercised for the years ended December 31, 2020, 2019 and 2018, was \$3.2 million, \$266,000 and \$666,000, respectively.

As of December 31, 2020, the unamortized compensation costs related to unvested stock options granted to employees under our 2015 plan was approximately \$0.8 million, net of estimated forfeitures of \$71,000. These costs will be amortized on a straight-line basis over a weighted-average period of approximately 2.4 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, 2020 and 2019, as the amount was insignificant.

Restricted Stock Awards

A summary of activity related to restricted stock awards for the years ended December 31, 2018, 2019 and 2020 is presented below (in thousands, except per share data):

| Stock Awards | Shares | Weighted-Average Grant Date Share Value |
|------------------------------------|--------------|-----------------------------------------|
| Non-vested as of January 1, 2018 | 480 | \$ 7.13 |
| Granted | 344 | \$ 6.02 |
| Vested | (181) | \$ 6.04 |
| Forfeited | (10) | \$ 6.65 |
| Non-vested as of December 31, 2018 | 633 | \$ 6.85 |
| Granted | 554 | \$ 3.60 |
| Vested | (228) | \$ 6.46 |
| Forfeited | (20) | \$ 7.16 |
| Non-vested as of December 31, 2019 | 939 | \$ 5.02 |
| Granted | 443 | \$ 5.94 |
| Vested | (347) | \$ 5.44 |
| Forfeited | (13) | \$ 5.54 |
| Non-vested as of December 31, 2020 | <u>1,022</u> | \$ 5.27 |

Total fair value of stock awards vested during the years ended December 31, 2020, 2019 and 2018 was \$1.9 million, \$1.5 million and \$1.1 million, respectively. As of December 31, 2020, we had \$4.8 million of unrecognized

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 as of December 31, 2020 (in thousands, except per share data):

| | |
|--------------------------------------------------------------|--------------|
| Options outstanding | 1,885 |
| Restricted stock awards outstanding | 1,022 |
| Stock available for future grant: 2015 Equity Incentive Plan | 562 |
| Total | <u>3,469</u> |

Stock-based Compensation

We recorded \$2.6 million, \$2.3 million and \$1.9 million of stock-based compensation in our consolidated statements of operations for the years ended December 31, 2020, 2019 and 2018, respectively. The following table summarizes compensation costs related to our stock-based compensation awards (in thousands, except per share data):

| | 2020 | Year Ended December 31, 2019 | 2018 |
|--------------------------------------------------------------|----------|------------------------------------|----------|
| Cost of revenue | \$ 116 | \$ 125 | \$ 92 |
| Selling, general and administrative | 2,000 | 1,778 | 1,520 |
| Research and development | 507 | 443 | 313 |
| Total stock-based compensation | 2,623 | 2,346 | 1,925 |
| Tax effect on stock-based compensation | — | — | — |
| Net effect on net income (loss) | \$ 2,623 | \$ 2,346 | \$ 1,925 |
| Shares used in computing basic net income (loss) per share | 40,152 | 39,487 | 39,049 |
| Shares used in computing diluted net income (loss) per share | 41,025 | 39,487 | 40,265 |
| Effect on basic net income (loss) per share | \$ 0.07 | \$ (0.06) | \$ 0.05 |
| Effect on diluted net income (loss) per share | \$ 0.06 | \$ (0.06) | \$ 0.05 |

We estimate the fair value of stock options using a Black-Scholes option pricing model. There were no stock options granted during 2020. There were 430,000 and 246,000 stock options granted with a weighted-average grant date fair value of \$1.48 and \$2.74 per share during 2019 and 2018, respectively. The fair value of options granted was estimated at the date of grant using the following weighted-average assumptions:

| | 2020 | Year Ended December 31, 2019 | 2018 |
|--------------------------|------|------------------------------------|--------|
| Expected term (in years) | — | 6.1 | 5.8 |
| Volatility | — % | 49.5 % | 46.6 % |
| Expected dividend | — % | — % | — % |
| Risk-free interest rate | — % | 1.67 % | 3.09 % |

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 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 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 Savings Plan were \$188,000, \$176,000 and \$180,000 for the years ended December 31, 2020, 2019 and 2018, respectively.

Note 11. 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 2020 and 2019 (in thousands):

| | Year Ended December 31, | |
|-----------------------------------------------------------------------------------------------|----------------------------|---------------|
| | 2020 | 2019 |
| Beginning accrued product warranty | \$ 387 | \$ 236 |
| Accruals for warranties issued | 510 | 522 |
| Adjustments related to pre-existing warranties including expirations and changes in estimates | 186 | 227 |
| Cost of warranty repair | (474) | (598) |
| Ending accrued product warranty | <u>\$ 609</u> | <u>\$ 387</u> |

Note 12. Income Taxes

Consolidated income before provision for income taxes includes non-U.S. income of approximately \$12.1 million, \$2.8 million and \$6.5 million for the years ended December 31, 2020, 2019 and 2018, respectively. We recorded a current tax provision of \$2.0 million, \$0.6 million and \$0.9 million for the years ended December 31, 2020, 2019 and 2018, respectively. The components of the provision for income taxes are summarized below (in thousands):

| | <u>Year Ended December 31,</u> | | |
|----------------------------------|--------------------------------|---------------|---------------|
| | <u>2020</u> | <u>2019</u> | <u>2018</u> |
| Current: | | | |
| Federal | \$ — | \$ — | \$ — |
| State | 15 | 27 | 5 |
| Foreign | 2,016 | 535 | 933 |
| Total current | <u>2,031</u> | <u>562</u> | <u>938</u> |
| Deferred: | | | |
| Federal | — | — | — |
| State | — | — | — |
| Total deferred | <u>—</u> | <u>—</u> | <u>—</u> |
| Total provision for income taxes | <u>\$ 2,031</u> | <u>\$ 562</u> | <u>\$ 938</u> |

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

| | <u>Year Ended December 31,</u> | | |
|-------------------------------------------------------------------------|--------------------------------|----------------|--------------|
| | <u>2020</u> | <u>2019</u> | <u>2018</u> |
| Statutory federal income tax rate | 21.0 % | 21.0 % | 21.0 % |
| State income taxes, net of federal tax benefits | 0.2 | (2.1) | — |
| Valuation allowance | 0.8 | (173.0) | (2.6) |
| Stock-based compensation | (1.9) | (21.8) | 0.3 |
| Foreign tax rate differential | 2.1 | 137.7 | (11.4) |
| Foreign tax incentives | (3.8) | 32.2 | (2.9) |
| Foreign income inclusion | 7.8 | — | 2.6 |
| Tax effect in equity method loss or gain from unconsolidated affiliates | 1.1 | (47.8) | 3.2 |
| Foreign-derived intangible income | — | — | (2.4) |
| Other | 1.4 | (1.0) | 0.1 |
| Effective tax rate | <u>28.7 %</u> | <u>(54.8)%</u> | <u>7.9 %</u> |

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

| | <u>As of December 31,</u> | |
|-------------------------------------|---------------------------|-------------|
| | <u>2020</u> | <u>2019</u> |
| Deferred tax assets: | | |
| Net operating loss carryforwards | \$ 14,328 | \$ 14,979 |
| Accruals, reserves and other | 3,756 | 3,011 |
| Credit carryforwards | 1,685 | 1,685 |
| Operating lease liability | 178 | 209 |
| Gross deferred tax assets | 19,947 | 19,884 |
| Valuation allowance | (19,798) | (19,691) |
| Total deferred tax assets | <u>149</u> | <u>193</u> |
| Deferred tax liabilities: | | |
| Operating lease right-of-use assets | (149) | (193) |
| Total net deferred tax assets | <u>\$ —</u> | <u>\$ —</u> |

As of December 31, 2020, we have federal net operating loss (“NOL”) carryforwards of approximately \$57.0 million, which will begin to expire in 2024. In addition, we have federal tax credit carryforwards of approximately \$0.8 million, which will begin to expire in 2021. We have utilized all state net operating losses, primarily in the state of California, as of December 31, 2020.

The deferred tax assets valuation allowance as of December 31, 2020 is attributed to U.S. federal, and state deferred tax assets, which result primarily from future deductible accruals, reserves, NOL 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 \$0.1 million and \$0.2 million for the years ended December 31, 2020 and 2019, respectively, whereas the valuation allowance decreased by \$2.6 million for the year ended December 31, 2018.

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 \$973,000, \$211,000 and \$764,000 for 2020, 2019 and 2018, respectively. As of December 31, 2020, the favorable tax rate is still valid for the Company and it will stay the same for next year if there is no change of the business nature. 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 research and development (“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. Historically, we didn’t record such benefit until we received the tax refund from the Chinese government. Beginning in 2019, we record the tax benefit in the year it incurs the cost rather than in the year the tax benefit is received. This will better align the costs with the tax benefit. 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 R&D credit carryforwards may be subject to a substantial annual limitation due to ownership changes that might have occurred previously or that could occur in the future, as provided by Section 382 of the Internal Revenue Code of 1986 (“Section 382”), 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 there is a change of control, utilization of our NOL or tax credit 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 our NOL carryforwards and R&D 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 consolidated balance sheets or statements of operations if an adjustment were required.

During fiscal year 2020, 2019 and 2018, the amount of gross unrecognized tax benefits remains unchanged. The total amount of unrecognized tax benefits was \$14.6 million as of December 31, 2020 and 2019. The Company recognizes interest and penalties related to uncertain tax positions as part of the provision for income taxes. To date, such interest and penalties have not been material. 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.

We comply with the laws, regulations, and filing requirements of all jurisdictions in which we conduct business. We regularly engage in discussions and negotiations with tax authorities regarding tax matters in various jurisdictions.

We file income tax returns in the U.S. federal, various states and foreign jurisdictions. Currently, there is no tax audit in any of the jurisdictions and we do not expect there will be any significant change to this.

On June 29, 2020, Governor Newsom signed the highly anticipated budget package for California’s fiscal year that began on July 1, 2020. As part of the budget package, Assembly Bill 85 (“AB 85”) was enacted into law. The bill contains several tax changes to help with the budget deficit. Notably, AB 85 contains two major tax changes: (1) it suspends the usage of NOLs; and (2) it limits certain business tax credits for tax years 2020, 2021, and 2022. The budget has no impact to the Company since the Company has no NOLs and business credits to utilize.

On Sunday, December 27, 2020, a new \$900 billion Coronavirus relief bill was signed into law by the President. The bill includes updates to the Families First Coronavirus Act, CARES Act, the Employee Social Security Deferral and the Paycheck Protection Program. Since the Company has no taxable income, most of the acts have no direct impact or are not applicable to the Company.

Note 13. 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, | | |
|----------------------------------------------------------------------------------------------------------|----------------------------|-------------------|-----------------|
| | 2020 | 2019 | 2018 |
| Numerator: | | | |
| Net income (loss) attributable to AXT, Inc. | \$ 3,238 | \$ (2,600) | \$ 9,654 |
| Less: Preferred stock dividends | (177) | (177) | (177) |
| Net income (loss) available to common stockholders | <u>\$ 3,061</u> | <u>\$ (2,777)</u> | <u>\$ 9,477</u> |
| Denominator: | | | |
| Denominator for basic net income (loss) per share - weighted-average common shares | 40,152 | 39,487 | 39,049 |
| Effect of dilutive securities: | | | |
| Common stock options | 602 | — | 1,106 |
| Restricted stock awards | 271 | — | 110 |
| Denominator for dilutive net income (loss) per common shares | <u>41,025</u> | <u>39,487</u> | <u>40,265</u> |
| Net income (loss) attributable to AXT, Inc. per common share: | | | |
| Basic | \$ 0.08 | \$ (0.07) | \$ 0.24 |
| Diluted | <u>\$ 0.07</u> | <u>\$ (0.07)</u> | <u>\$ 0.24</u> |
| Options excluded from diluted net income (loss) per share as the impact is anti-dilutive | | | |
| | <u>862</u> | <u>2,953</u> | <u>266</u> |
| Restricted stock excluded from diluted net income (loss) per share as the impact is anti-dilutive | | | |
| | <u>161</u> | <u>939</u> | <u>227</u> |

Note 14. 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 integral to these substrates. 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, | | |
|--------------------------|----------------------------|------------------|-------------------|
| | 2020 | 2019 | 2018 |
| Product Type: | | | |
| Substrates | \$ 75,587 | \$ 67,849 | \$ 81,008 |
| Raw materials and others | 19,774 | 15,407 | 21,389 |
| Total | <u>\$ 95,361</u> | <u>\$ 83,256</u> | <u>\$ 102,397</u> |

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, | | |
|--------------------------------------------------|----------------------------|------------------|-------------------|
| | 2020 | 2019 | 2018 |
| Geographical region: | | | |
| China | \$ 35,150 | \$ 26,796 | \$ 31,492 |
| Taiwan | 16,485 | 16,204 | 20,078 |
| Japan | 7,624 | 6,258 | 10,305 |
| Asia Pacific (excluding China, Taiwan and Japan) | 5,458 | 7,592 | 8,488 |
| Europe (primarily Germany) | 19,673 | 18,178 | 22,013 |
| North America (primarily the United States) | 10,971 | 8,228 | 10,021 |
| Total | <u>\$ 95,361</u> | <u>\$ 83,256</u> | <u>\$ 102,397</u> |

Long-lived assets consist primarily of property, plant and equipment, and operating lease right-of-use assets 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, | |
|--------------------------------------------------------------|--------------------|-------------------|
| | 2020 | 2019 |
| Long-lived assets by geographic region, net of depreciation: | | |
| North America | \$ 836 | \$ 1,069 |
| China | 117,672 | 99,272 |
| | <u>\$ 118,508</u> | <u>\$ 100,341</u> |

Note 15. Other income, net

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

| | Year Ended December 31, | | |
|------------------------------------------|------------------------------------|---------------|---------------|
| | 2020 | 2019 | 2018 |
| Foreign exchange gain (loss) | \$ (411) | \$ 321 | \$ 165 |
| Gain from local China government subsidy | 3,800 | 808 | — |
| Other income (expense) | (189) | (182) | 187 |
| | <u>\$ 3,200</u> | <u>\$ 947</u> | <u>\$ 352</u> |

Note 16. 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 equipment, office space, warehouse and facilities under long-term operating leases expiring at various dates through July 2029. The majority of our lease obligations relate to our lease agreement for a nitrogen system to be used during the manufacturing process for our facility in Dingxing, China. The equipment lease became effective in August 2019 and will expire in July 2029. There are no variable lease payments, residual value guarantees or any restrictions or covenants imposed by the equipment lease. The remainder relate to our lease agreement for our facility in Fremont, California with approximately 19,467 square feet, which expires in 2020. Under the terms of the facility lease agreement, in May 2020, we were granted an extension to the term of the lease for an additional three years. There are no variable lease payments, residual value guarantees or any restrictions or covenants imposed by the facility lease. All other operating leases have a term of 12 months or less.

Leases are classified as either finance leases or operating leases. A lease is classified as a finance lease if any one of the following criteria are met: the lease transfers ownership of the asset by the end of the lease term, the lease contains an option to purchase the asset that is reasonably certain to be exercised, the lease term is for a major part of the remaining useful life of the asset or the present value of the lease payments equals or exceeds substantially all of the fair value of the asset. A lease is classified as an operating lease if it does not meet any one of these criteria. All of our leases are classified as operating leases and substantially all of our operating leases are comprised of equipment and office space leases. None of our leases are classified as, finance leases.

For all leases at the lease commencement date, a right-of-use asset and a lease liability are recognized. The right-of-use asset represents the right to use the leased asset for the lease term. The lease liability represents the present value of the lease payments under the lease.

The right-of-use asset is initially measured at cost, which primarily comprises the initial amount of the lease liability, plus any initial direct costs incurred, consisting mainly of brokerage commissions, less any lease incentives received. All right-of-use assets are reviewed for impairment. The lease liability is initially measured at the present value of the lease payments, discounted using the interest rate implicit in the lease or, if that rate cannot be readily determined, our secured incremental borrowing rate for the same term as the underlying lease.

Lease payments included in the measurement of the lease liability comprise the following: the fixed noncancelable lease payments, payments for optional renewal periods where it is reasonably certain the renewal period

will be exercised, and payments for early termination options unless it is reasonably certain the lease will not be terminated early.

Lease expense for operating leases consists of the lease payments plus any initial direct costs, primarily brokerage commissions, and is recognized on a straight-line basis over the lease term.

We have elected not to recognize right-of-use assets and lease liabilities for short-term leases that have a term of 12 months or less. The effect of short-term leases on our right-of-use asset and lease liability was not material.

As of December 31, 2020, the maturities of our operating lease liabilities (excluding short-term leases) are as follows (in thousands):

| Maturity of Lease Liabilities | | |
|--------------------------------------------------------|-----------|--------------|
| 2021 | \$ | 566 |
| 2022 | | 583 |
| 2023 | | 574 |
| 2024 | | 284 |
| 2025 | | 284 |
| Thereafter | | 1,020 |
| Total minimum lease payments | | 3,311 |
| Less: Interest | | (492) |
| Present value of lease obligations | | 2,819 |
| Less: Current portion, included in accrued liabilities | | (445) |
| Long-term portion of lease obligations | \$ | 2,374 |

The weighted average remaining lease term and the weighted-average discount rate for our operating leases are as follows:

| | December 31, 2020 | December 31, 2019 |
|-----------------------------------------------|------------------------------|------------------------------|
| Weighted-average remaining lease term (years) | 7.15 | 7.94 |
| Weighted-average discount rate | 4.61 % | 4.61 % |

Supplemental cash flow information related to leases where we are the lessee is as follows (in thousands):

| | Year Ended December 31, | |
|----------------------------------------------------------------------------------------------------------|------------------------------------|-------------|
| | 2020 | 2019 |
| Cash paid for amounts included in the measurement of lease liabilities: | | |
| Operating cash flows from operating leases | \$ 456 | \$ 267 |
| Supplemental noncash information on lease liabilities arising from obtaining right-of-use assets: | | |
| Leased assets obtained in exchange for new operating lease liabilities | \$ — | \$ 2,072 |

The components of lease expense are as follows (in thousands) within our consolidated statements of operations:

| | Year Ended | |
|--------------------------|--------------|--------|
| | December 31, | |
| | 2020 | 2019 |
| Operating lease | \$ 512 | \$ 358 |
| Short-term lease expense | 89 | 60 |
| Total | \$ 601 | \$ 418 |

Royalty Agreement

In 2010, we and a competitor had entered into a royalty agreement with a term of eight years, terminating December 31, 2018. We were obligated to make annual payments over an eight-year period. For the year ended December 31, 2018, royalty expense under this agreement was \$565,000, which was net of claim for credit of \$10,000. These expenses were included in cost of revenue.

In 2020, we and a competitor entered into a cross license and covenant agreement (the “Cross License Agreement”), which has a term that began on January 1, 2020 and expires on December 31, 2029. The Cross License Agreement is a fixed-cost cross license and not a variable-cost cross license that is based on revenue or units. Under the Cross License Agreement, we are obligated to make annual payments over a 10-year period. For the year ended December 31, 2020, royalty expense under this agreement was \$174,000.

Land Purchase and Investment Agreement

We have established a wafer process production line in Dingxing, China. In addition to a land rights and building purchase agreement that we entered into with a private real estate development company to acquire our new manufacturing facility, we also entered into a cooperation agreement with the Dingxing local government. In addition to pledging its full support and cooperation, the Dingxing local government will issue certain credits or rebates to us as we achieve certain milestones. We, in turn, agreed to hire local workers over time, pay taxes when due and eventually demonstrate a total investment of approximately \$90 million in value, assets and capital. The investment will include cash paid for the land and buildings, cash on deposit in our name at local banks, the gross value of new and used equipment (including future equipment that might be used for indium phosphide and germanium substrates production), the deemed value for our customer list or the end user of our substrates, for example, the end users of 3-D sensing VCSELs (vertical cavity surface emitting lasers), a deemed value for employment of local citizens, a deemed value for our proprietary process technology, other intellectual property, other intangibles and additional items of value. There is no timeline or deadline by which this must be accomplished, rather it is a good faith covenant entered into between AXT and the Dingxing local government. Further, there is no specific penalty contemplated if either party breaches the agreement. However, the agreement does state that each party has a right to seek from the other party compensation for losses. Under certain conditions, the Dingxing local government may purchase the land and building at the appraised value. We believe that such cooperation agreements are normal, customary and usual in China and that the future valuation is flexible. We have a similar agreement with the city of Kazuo, China, although on a smaller scale. The total investment targeted by AXT in Kazuo is approximately \$15 million in value, assets and capital. In addition, BoYu has a similar agreement with the city of Kazuo. The total investment targeted by BoYu in Kazuo is approximately \$8 million in value, assets and capital.

Note 17. Unaudited Quarterly Consolidated Financial Data

| | Quarter | | | |
|----------------------------------------------------------------|---------------------------------------|-----------|-----------|-----------|
| | First | Second | Third | Fourth |
| | (in thousands, except per share data) | | | |
| 2020: | | | | |
| Revenue | \$ 20,723 | \$ 22,134 | \$ 25,469 | \$ 27,035 |
| Gross profit | 5,522 | 6,768 | 8,823 | 9,162 |
| Net income (loss) attributable to AXT, Inc. | (178) | 361 | 991 | 2,064 |
| Net income (loss) attributable to AXT, Inc. per share, basic | \$ (0.01) | \$ 0.01 | \$ 0.02 | \$ 0.05 |
| Net income (loss) attributable to AXT, Inc. per share, diluted | \$ (0.01) | \$ 0.01 | \$ 0.02 | \$ 0.05 |
| 2019: | | | | |
| Revenue | \$ 20,208 | \$ 24,797 | \$ 19,841 | \$ 18,410 |
| Gross profit | 6,695 | 8,506 | 5,759 | 3,865 |
| Net income (loss) attributable to AXT, Inc. | (1,104) | 1,451 | (898) | (2,049) |
| Net income (loss) attributable to AXT, Inc. per share, basic | \$ (0.03) | \$ 0.04 | \$ (0.02) | \$ (0.05) |
| Net income (loss) attributable to AXT, Inc. per share, diluted | \$ (0.03) | \$ 0.04 | \$ (0.02) | \$ (0.05) |

Note 18. Redeemable Noncontrolling Interests

As discussed in Note 1, during the quarter ended December 31, 2020, Tongmei entered into the Capital Investment Agreements with private equity funds that invested approximately \$48.1 million in the form of redeemable noncontrolling interests representing 7.06% of the outstanding shares of Tongmei. The initial carrying amount of the redeemable noncontrolling interests was recorded at fair value on the date of issuance of Tongmei's common stock, net of issuance costs and presented in temporary equity on the consolidated balance sheets. This classification is due to the existence of certain contingencies that could result in potential redemption at the fixed purchase price as described below. We currently do not believe that this is probable thus no accretion of the issuance costs has been recorded.

Pursuant to the Capital Investment Agreements with the Investors, each Investor has the right to require AXT to redeem any or all Tongmei shares held by such Investor at the original purchase price paid by such Investor, without interest, in the event of a material adverse change or if Tongmei does not achieve its IPO on or before December 31, 2022. This right is suspended when Tongmei submits its formal application to the China Securities Regulatory Commission ("CSRC"). Tongmei currently plans to submit its formal application to the CSRC in the third quarter of 2021. However, if on December 31, 2022 the IPO application has been submitted and accepted by the CSRC or the stock exchange and such submission remains under review, then the date when such Investor is entitled to exercise such redemption right shall be deferred to a date when such submission is rejected by the CSRC or stock exchange, or the date when Tongmei withdraws its IPO application. The process of going public on the STAR Market includes several periods of review and is therefore a lengthy process. Tongmei does not expect to complete the IPO until mid-2022. The listing of Tongmei on China's STAR Market will not change the status of AXT as a U.S. public company. There can be no assurances that Tongmei will complete its IPO by December 31, 2022, or at all. In the event that Investors exercise their redemption rights, we may be required to seek additional capital in order to redeem their Tongmei shares and there would be no assurances that such capital would be available on terms acceptable to us, if at all. Any redemptions could have a material adverse effect on our business, financial condition and results of operations.

The components of the change in redeemable noncontrolling interests for the year ended December 31, 2020 are presented in the following table (in thousands):

| | |
|--------------------------------------------------------------------------------------------|------------------|
| Balance as of January 1, 2020 | \$ - |
| Increase in redeemable noncontrolling interests due to issuance of Tongmei's common stock | 48,102 |
| Equity issuance costs incurred | (539) |
| Net income attributable to redeemable noncontrolling interests | - |
| Effect of foreign currency translation attributable to redeemable noncontrolling interests | - |
| Balance as of December 31, 2020 | <u>\$ 47,563</u> |

Note 19. Subsequent Events

In 2020, the private equity funds had transferred approximately \$48.1 million of new capital to Tongmei. An additional investment of approximately \$1.5 million of new capital was funded in early January 2021. Under China regulations these investments must be formally approved by the appropriate government agency and are not deemed to be dilutive until such approval is granted. The government approved the entire approximately \$49 million investment on January 25, 2021 at which time the private equity funds owned a minority interest in Tongmei of 7.28%.

In January 2021, we purchased 0.55% shares of Tongmei from Beijing Bomeilian Special Ceramics Co., Ltd., previously a minority interest shareholder of BoYu, for \$3.73 million. As a result of this purchase, and of the government's approval January 25, 2021 of the private equity funds we now own 85.5% of Tongmei.

In February 2021, Tongmei signed a joint venture agreement with certain investors to fund a new company, ChaoYang XinMei High Purity Semiconductor Materials Co., Ltd. ("ChaoYang XinMei"). The agreement calls for a total investment of approximately \$3 million in which Tongmei will fund approximately \$1.8 million for a 58.5 percent ownership of ChaoYang XinMei. In February 2021, the investors completed the initial funding of approximately \$1.5 million. Tongmei's portion of the investment was approximately \$0.9 million.

Item 16. Form 10-K Summary

Not applicable.

AXT, Inc.
EXHIBITS
TO
FORM 10-K ANNUAL REPORT
For the Year Ended December 31, 2020

| 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 |
| 4.1 | Description of Securities |
| 10.1(8)* | Form of Indemnification Agreement for directors and officers |
| 10.3(9)** | 6-inch Supply Agreement dated December 31, 2008 between AXT, Inc. and IQE plc |
| 10.4(10)** | 4-inch Supply Agreement dated December 31, 2008 between AXT, Inc. and IQE plc |
| 10.5(11)* | 2007 Equity Incentive Plan (amended December 8, 2008) |
| 10.6(12)* | Forms of agreements under the 2007 Equity Incentive Plan |
| 10.7(13)* | Amended and Restated Employment Offer Letter between the Company and Dr. Morris S. Young dated December 4, 2012 |
| 10.8(14)* | Employment Letter Agreement between the Company and Mr. Gary L. Fischer |
| 10.9(15)* | 2015 Equity Incentive Plan |
| 10.10(16)* | Executive Incentive Plan |
| 10.11(17)* | Credit Agreement, dated as of November 2, 2018, by and between AXT, Inc. and Wells Fargo Bank, National Association |
| 10.12 | First Amendment to Credit Agreement, dated as of February 5, 2020, by and between AXT, Inc. and Wells Fargo Bank, National Association |
| 10.13 | Form of Capital Increase Agreement between Beijing Tongmei Xtal Technologies Co., Ltd. and certain investors |
| 10.13(a) | Schedule identifying agreements substantially identical to the form of Capital Increase Agreement filed as Exhibit 10.13 hereto |
| 10.14 | Form of First Supplemental Agreement between Beijing Tongmei Xtal Technology Co., Ltd. and certain investors |
| 10.14(a) | Schedule identifying agreements substantially identical to the form of First Supplemental Agreement filed as Exhibit 10.14 hereto |
| 10.15 | Form of Second Supplemental Agreement between Beijing Tongmei Xtal Technology Co., Ltd. and certain investors |
| 10.15(a) | Schedule identifying agreements substantially identical to the form of Second Supplemental Agreement filed as Exhibit 10.15 hereto |
| 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) |

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| | |
|---------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 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 | Inline XBRL Instance. |
| 101.SCH | Inline XBRL Taxonomy Extension Schema. |
| 101.CAL | Inline XBRL Taxonomy Extension Calculation Linkbase. |
| 101.DEF | Inline XBRL Taxonomy Extension Definition Linkbase. |
| 101.LAB | Inline XBRL Taxonomy Extension Label Linkbase. |
| 101.PRE | Inline XBRL Taxonomy Extension Presentation Linkbase. |
| 104 | Cover Page Interactive Data File (formatted as inline XBRL and contained in Exhibit 101) |

-
- (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.
 - (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 10.29 to registrant's Form 8-K filed with the SEC on January 5, 2009.
 - (10) Incorporated by reference to exhibit 10.30 to registrant's Form 8-K filed with the SEC on January 5, 2009.
 - (11) Incorporated by reference to exhibit 10.31 to registrant's Form 10-K filed with the SEC on March 31, 2009.
 - (12) Incorporated by reference to exhibit 10.20 to registrant's Form 10-K filed with the SEC on March 22, 2010.
 - (13) Incorporated by reference to exhibit 10.1 to registrant's Form 8-K filed with the SEC on December 4, 2012.
 - (14) Incorporated by reference to exhibit 10.1 to registrant's Form 8-K filed with the SEC on August 12, 2014.
 - (15) Incorporated by reference to appendix A to the registrant's Definitive Proxy Statement on Schedule 14A filed with the SEC on April 8, 2015.
 - (16) Incorporated by reference to exhibit 10.1 to registrant's Form 8-K filed with the SEC on February 26, 2016.
 - (17) Incorporated by reference to exhibit 10.1 registrant's Form 8-K filed with the SEC on November 9, 2018.

* Management contract or compensatory plan.

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

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: March 23, 2021

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.

| <u>Signature</u> | <u>Title</u> | <u>Date</u> |
|---------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------|----------------|
| <u>/s/ MORRIS S. YOUNG</u> Morris S. Young | Chief Executive Officer and Director <i>(Principal Executive Officer)</i> | March 23, 2021 |
| <u>/s/ GARY L. FISCHER</u> Gary L. Fischer | Chief Financial Officer and Corporate Secretary <i>(Principal Financial Officer and Principal Accounting Officer)</i> | March 23, 2021 |
| <u>/s/ JESSE CHEN</u> Jesse Chen | Chairman of the Board of Directors | March 23, 2021 |
| <u>/s/ DAVID C. CHANG</u> David C. Chang | Director | March 23, 2021 |
| <u>/s/ LEONARD LEBLANC</u> Leonard LeBlanc | Director | March 23, 2021 |
| <u>/s/ CHRISTINE RUSSELL</u> Christine Russell | Director | March 23, 2021 |

**DESCRIPTION OF THE REGISTRANT'S SECURITIES
REGISTERED PURSUANT TO SECTION 12 OF THE
SECURITIES EXCHANGE ACT OF 1934**

DESCRIPTION OF CAPITAL STOCK

The following information describes our common stock and preferred stock, as well as certain provisions of our restated certificate of incorporation, as amended (the "certificate of incorporation"), and second amended and restated bylaws, as amended (the "bylaws"). This summary does not purport to be complete and is qualified in its entirety by the provisions of our certificate of incorporation and bylaws, copies of which have been filed as exhibits to this Annual Report on Form 10-K, as well as to the applicable provisions of the Delaware General Corporation Law.

General

Our authorized capital stock consists of 70,000,000 shares of common stock with a \$0.001 par value per share (the "common stock") and 2,000,000 shares of preferred stock with a \$0.001 par value per share (the "preferred stock"), 1,000,000 shares of which are designated as "Series A Preferred Stock" and 200,000 of which are designated as "Series B Preferred Stock." Our board of directors may establish the rights and preferences of the preferred stock from time to time.

Common Stock

Each holder of our common stock is entitled to one vote for each share on all matters to be voted upon by the stockholders. Subject to any preferential rights of any outstanding preferred stock, holders of our common stock are entitled to receive ratably the dividends, if any, as may be declared from time to time by the board of directors out of funds legally available therefor. We have never declared or paid any cash dividend on our capital stock and do not anticipate paying any cash dividends in the foreseeable future. If there is a liquidation, dissolution or winding up of our company, holders of our common stock would be entitled to share ratably in our assets remaining after the payment of liabilities and any preferential rights of any outstanding preferred stock.

Holders of our common stock have no preemptive or conversion rights or other subscription rights, and there are no redemption or sinking fund provisions applicable to the common stock. The outstanding shares of common stock are fully paid and non-assessable. The rights, preferences and privileges of the holders of our common stock are subject to, and may be adversely affected by, the rights of the holders of shares of any series of preferred stock that we may designate and issue in the future.

Our common stock is listed on the NASDAQ Global Select Market under the symbol "AXTI." The transfer agent and registrar for the common stock is Broadridge Corporate Issuer Solutions, Inc.

Preferred Stock

Our certificate of incorporation provides that we may issue up to 2,000,000 shares of preferred stock. As of March 23, 2021, 883,000 shares of our Series A Preferred Stock were issued and outstanding and 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. Other than the Series A Preferred Stock, no shares of preferred stock are currently outstanding.

Under the terms of our certificate of incorporation, our board of directors is authorized to issue shares of preferred stock in one or more series without stockholder approval. Our board of directors has the discretion to determine the rights, preferences, privileges and restrictions, including voting rights, dividend rights, conversion rights, redemption privileges and liquidation preferences, of each series of preferred stock. There are no restrictions presently on the repurchase or redemption of any shares of our preferred stock.

The issuance of shares of preferred stock will affect, and may adversely affect, the rights of holders of common stock. It is not possible to state the actual effect of the issuance of any shares of preferred stock on the rights of holders

of common stock until our board of directors determines the specific rights attached to that preferred stock. The effects of issuing additional preferred stock could include one or more of the following:

- restricting dividends on the common stock;
- diluting the voting power of the common stock;
- impairing the liquidation rights of the common stock; or
- delaying or preventing changes in control or management of our company.

Preferred stock will be fully paid and nonassessable upon issuance.

Effect of Certain Provisions of our Certificate of Incorporation and Bylaws and the Delaware Anti-Takeover Statute

Some provisions of Delaware law and our certificate of incorporation and bylaws contain provisions that could make the following transactions more difficult:

- acquisition of us by means of a tender offer;
- acquisition of us by means of a proxy contest or otherwise; or
- removal of our incumbent officers and directors.

Those provisions, summarized below, are expected to discourage coercive takeover practices and inadequate takeover bids and to promote stability in our management. These provisions are also designed to encourage persons seeking to acquire control of us to first negotiate with our board of directors.

Certificate of Incorporation and Bylaws

Our certificate of incorporation and our bylaws provide for, among other things, the following:

- *Undesignated Preferred Stock.* The ability to authorize undesignated preferred stock makes it possible for our board of directors to issue one or more series of preferred stock with voting or other rights or preferences that could impede the success of any attempt to change control of our company. These and other provisions may have the effect of deferring hostile takeovers or delaying changes in control or management of our company.
 - *Stockholder Meetings.* Our bylaws provide that in general a special meeting of stockholders may be called only by our board of directors, its chairman or our president.
 - *Requirements for Advance Notification of Stockholder Nominations and Proposals.* Our bylaws establish advance notice procedures with respect to stockholder proposals and the nomination of candidates for election as directors, other than nominations made by or at the direction of our board of directors or a committee of the board of directors.
 - *Board Classification.* Our board of directors is divided into three classes. The directors in each class are elected to serve for a three-year term, one class being elected each year by our stockholders. This system of electing and removing directors may tend to discourage a third party from making a tender offer or otherwise attempting to obtain control of us, because it generally makes it more difficult and time consuming for stockholders to replace a majority of the directors.
 - *Limits on Ability of Stockholders to Act by Written Consent.* We have provided in our bylaws that our stockholders may not act by written consent. This limit on the ability of our stockholders to act by written consent may lengthen the amount of time required to take stockholder actions. As a result, a holder controlling a majority of our capital stock would not be able to amend our bylaws or remove directors without holding a meeting of our stockholders called in accordance with our bylaws.
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- *Amendment of Certificate of Incorporation and Bylaws.* The amendment of the above provisions of our certificate of incorporation and bylaws requires approval by holders of at least two-thirds of our outstanding capital stock entitled to vote generally in the election of directors.
- *Election and Removal of Directors.* Our certificate of incorporation and bylaws contain provisions that establish specific procedures for appointing and removing members of our board of directors. Under our certificate of incorporation and bylaws, vacancies and newly created directorships on our board of directors may be filled only by a majority of the directors then serving on the board of directors. Under our certificate of incorporation and bylaws, directors may be removed, with or without cause, by the affirmative vote of the holders of a majority of the shares then entitled to vote at an election of directors.
- *No Cumulative Voting.* The Delaware General Corporation Law provides that stockholders are not entitled to the right to cumulate votes in the election of directors unless our certificate of incorporation provides otherwise. Our certificate of incorporation and bylaws do not expressly provide for cumulative voting. Without cumulative voting, a minority stockholder may not be able to gain as many seats on our board of directors as the stockholder would be able to gain if cumulative voting were permitted. The absence of cumulative voting makes it more difficult for a minority stockholder to gain a seat on our board of directors to influence our board of directors' decision regarding a takeover.

Delaware Anti-Takeover Statute

We are subject to the provisions of Section 203 of the Delaware General Corporation Law regulating corporate takeovers. In general, Section 203 prohibits a publicly-held Delaware corporation from engaging, under certain circumstances, in a business combination with an interested stockholder for a period of three years following the date the person became an interested stockholder unless:

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

Generally, a business combination includes a merger, asset or stock sale, or other transaction resulting in a financial benefit to the interested stockholder. An interested stockholder is a person who, together with affiliates and associates, owns or, within three years prior to the determination of interested stockholder status, did own 15% or more of a corporation's outstanding voting stock.

FIRST AMENDMENT TO CREDIT AGREEMENT AND WAIVER

This FIRST AMENDMENT TO CREDIT AGREEMENT AND WAIVER (this "Amendment"), dated as of February 5, 2020, is entered into by and between AXT, INC., a Delaware corporation ("Borrower"), and WELLS FARGO BANK, NATIONAL ASSOCIATION ("Bank").

RECITALS

WHEREAS Borrower is currently indebted to Bank pursuant to the terms and conditions of that certain Credit Agreement between Borrower and Bank, dated as of November 2, 2018 (as amended from time to time, the "Credit Agreement"). Each capitalized term used but not otherwise defined herein has the meaning ascribed thereto in the Credit Agreement.

WHEREAS Borrower has informed Bank that it has failed to maintain its financial condition as of September 30, 2019, pursuant to the terms of Section 4.9(a) of the Credit Agreement, and that such failure has resulted in an Event of Default under to Section 6.1(c) of the Credit Agreement (the "Profitability Default" and, together with all other Events of Default under the Credit Agreement resulting therefrom, the "Specified Defaults").

WHEREAS, on and subject to the terms and conditions of this Agreement: (a) Borrower has requested that Bank waive the Specified Defaults and agree to certain changes in the terms and conditions set forth in the Credit Agreement; and (b) Bank has agreed to Borrower's requests.

NOW, THEREFORE, for valuable consideration, the receipt and sufficiency of which are hereby acknowledged, the parties hereto agree that the Credit Agreement and the other Loan Documents, as applicable, shall be amended and the parties hereto agree as follows, provided that nothing contained herein shall terminate any security interests, guaranties, subordination or other documents in favor of Bank, all of which shall remain in full force and effect unless otherwise expressly provided herein:

1. Borrower acknowledges that each of the Specified Defaults constitutes an Event of Default under the Credit Agreement. Pursuant to the request of Borrower and subject to the terms and conditions of this Amendment, Bank hereby waives the Specified Defaults. The limited waiver set forth in this Section 1 shall be limited precisely as written and shall not be deemed to constitute: (a) an amendment, consent or waiver of any other terms or conditions of the Credit Agreement or any other document related to the Credit Agreement; or (b) a consent to any future amendment, consent or waiver, whether of any subsequent breach of the same provisions or otherwise. Except as expressly set forth in this Amendment, the Credit Agreement and each other document executed and delivered in connection with the Credit Agreement shall continue in full force and effect.

2. Section 1.1.(a) of the Credit Agreement is hereby deleted in its entirety and replaced with the following:

(a) Line of Credit. Subject to the terms and conditions of this Agreement, Bank hereby agrees to make advances to Borrower from time to time up to and including November 30, 2020, not to exceed at any time the aggregate principal amount of Seven Million Dollars (\$7,000,000.00) ("Line of Credit"), the proceeds of which shall be used for Borrower's working capital requirements and other general corporate purposes. Borrower's obligation to repay advances under the Line of Credit shall be evidenced by a promissory note dated as of November 2, 2018 (as the same may be amended, supplemented and/or otherwise modified from time to time, the "Line of Credit Note"), all terms of which are incorporated

herein by this reference.

3. Section 1.2.(c) of the Credit Agreement is hereby deleted in its entirety and replaced with the following:

(c) Unused Commitment Fee. Borrower shall pay to Bank a fee equal to three-eighths of one percent (0.375%) per annum (computed on the basis of a 360-day year, actual days elapsed) on the daily unused amount of the Line of Credit, which fee shall be calculated on a quarterly basis by Bank and shall be due and payable by Borrower in arrears on the fifteenth (15th) day of each fiscal quarter during the term hereof and on the maturity date hereof.

4. Section 2.1. of the Credit Agreement is hereby deleted in its entirety and replaced with the following:

SECTION 2.1. LEGAL STATUS. (a) Borrower is a corporation, duly organized and existing and in good standing under the laws of Delaware, and is qualified or licensed to do business (and is in good standing as a foreign corporation, if applicable) in all jurisdictions in which such qualification or licensing is required or in which the failure to so qualify or to be so licensed could have a material adverse effect on Borrower; and (b) no member of the Borrowing Group (as defined below) is a Sanctioned Target (as defined below) of economic or financial sanctions, sectoral sanctions, secondary sanctions, trade embargoes or restrictions and anti-terrorism laws imposed, administered or enforced from time to time by the United States of America, the United Nations Security Council, the European Union, the United Kingdom, any other governmental authority with jurisdiction over Borrower or any member of the Borrowing Group (collectively, "Sanctions"). As used herein, "Borrowing Group" means: (i) Borrower, (ii) any direct or indirect parent of Borrower, (iii) any affiliate or subsidiary of Borrower, (iv) any Third Party Obligor (as defined below), and (v) any officer, director or agent acting on behalf of any of the parties referred to in items (i) through and including (iv) with respect to the obligations hereunder, this Agreement or any of the other Loan Documents. "Sanctioned Target" means any target of Sanctions, including (i) persons on any list of targets identified or designated pursuant to any Sanctions, (ii) persons, countries, or territories that are the target of any territorial or country-based Sanctions program, (iii) persons that are a target of Sanctions due to their ownership or control by any Sanctioned Target(s), or (iv) persons otherwise a target of Sanctions, including vessels and aircraft, that are designated under any Sanctions program.

5. Section 2.5. of the Credit Agreement is hereby deleted in its entirety and replaced with the following:

SECTION 2.5. CORRECTNESS OF FINANCIAL STATEMENT AND OTHER INFORMATION. The annual financial statement of Borrower dated December 31, 2017, and all interim financial statements delivered to Bank since said date, true copies of which have been delivered by Borrower to Bank prior to the date hereof, (a) are complete and correct and present fairly the financial condition of Borrower, (b) disclose all liabilities of Borrower that are

required to be reflected or reserved against under generally accepted accounting principles, whether liquidated or unliquidated, fixed or contingent, and (c) have been prepared in accordance with generally accepted accounting principles consistently applied. Since the dates of such financial statements there has been no material adverse change in the financial condition of Borrower, nor has Borrower mortgaged, pledged, granted a security interest in or otherwise encumbered any of its assets or properties except in favor of Bank or as otherwise permitted by Bank in writing. All information provided from time to time by Borrower or any Third Party Obligor to Bank for the purpose of enabling Bank to fulfill its regulatory and compliance requirements, standards and processes was complete and correct at the time such information was provided and, except as specifically identified to Bank in a subsequent writing, remains complete and correct today.

6. The following Section 2.12. is hereby added to the Credit Agreement immediately following Section 2.11.:

SECTION 2.12 SANCTIONS, ANTI-MONEY LAUNDERING AND ANTI-CORRUPTION LAWS. (a) each member of the Borrowing Group has instituted, maintains and complies with policies, procedures and controls reasonably designed to assure compliance with Anti-Money Laundering Laws and Anti-Corruption Laws (each as defined below), and Sanctions; and (b) to the best of Borrower's knowledge, after due care and inquiry, no member of the Borrowing Group is under investigation for an alleged violation of any Sanctions, Anti-Money Laundering Laws or Anti-Corruption Laws by a governmental authority that enforces such laws. As used herein: "Anti-Corruption Laws" means: (i) the U.S. Foreign Corrupt Practices Act of 1977, as amended; (ii) the U.K. Bribery Act 2010, as amended; and (iii) any other anti-bribery or anti-corruption laws, regulations or ordinances in any jurisdiction in which the Borrower or any member of the Borrowing Group is located or doing business. "Anti-Money Laundering Laws" means applicable laws or regulations in any jurisdiction in which the Borrower or any member of the Borrowing Group is located or doing business that relates to money laundering, any predicate crime to money laundering, or any financial record keeping and reporting requirements related thereto.

7. Section 4.4.(b) of the Credit Agreement is hereby deleted in its entirety and replaced with the following:

(b) comply with, and cause Borrower's Subsidiaries to comply with, the requirements of all laws, rules, regulations and orders, including all Sanctions, Anti-Money Laundering Laws, and Anti-Corruption Laws, other than those referenced in Section 4.4(a), of any jurisdiction in which such entity is located or doing business, or otherwise is applicable to such entity, except to the extent that failure to so comply could not result in a Material Adverse Effect;

8. Section 4.9. of the Credit Agreement is hereby deleted in its entirety and replaced with the following:

SECTION 4.9. FINANCIAL CONDITION. Maintain the consolidated financial condition of Borrower and its Subsidiaries as follows using generally accepted accounting principles consistently applied and used consistently with prior practices (except to the extent modified by the definitions herein):

(a) As presented in the Borrower's Form 10-Ks and 10-Qs filed with the SEC: (i) a net loss after taxes not greater than \$2,200,000.00 for the fiscal quarter ending December 31, 2019, (ii) a net loss after taxes not greater than \$2,300,000.00 for the fiscal quarter ending March 31, 2020, (iii) a net profit after taxes not less than \$200,000.00 for the fiscal quarter ending June 30, 2020, and (iv) a net profit after taxes not less than \$300,000.00 for the fiscal quarter ending September 30, 2020.

(b) Quick Ratio not less than 1.10 to 1.0 at each fiscal quarter end, with "Quick Ratio" defined as the aggregate of (i) cash and cash equivalents, short-term investments and long-term investments of cash (as detailed in Borrower's Form 10-Ks and 10-Qs filed with the SEC), of which at least Seven Million Dollars (\$7,000,000.00) is unrestricted cash held in Borrower's U.S. operating and investment accounts, plus accounts receivable billed or invoiced from the United States to account debtors worldwide; divided by the sum of (ii) total current liabilities plus, without duplication, the outstanding balance remaining under the Line of Credit, plus, without duplication, the outstanding balance remaining under that certain promissory note from Borrower's subsidiary Beijing Tongmei Xtal Technology Co., Ltd. to Industrial and Commercial Bank of China in the original principal amount of Fifty Million Renminbi (¥50,000,000.00) ("the ICBC Debt"), plus, without duplication, the outstanding balance remaining under the Specified ChaoYang Debt (as hereinafter defined).

9. Section 4.10. of the Credit Agreement is hereby deleted in its entirety and replaced with the following:

SECTION 4.10. NOTICE TO BANK. Promptly (but in no event more than five (5) days after the occurrence of each such event or matter and in no event more than one (1) business day after the occurrence of each such event or matter described below with respect to Sanctions, Anti-Money Laundering Laws, and Anti-Corruption Laws) give written notice to Bank in reasonable detail of: (a) the occurrence of any Event of Default, or any condition, event or act which with the giving of notice or the passage of time or both would constitute an Event of Default; (b) any change in the name or the organizational structure of Borrower, including, by illustration, merger, conversion or division; (c) the occurrence and nature of any Reportable Event or Prohibited Transaction, each as defined in ERISA, or any funding deficiency with respect to any Plan; (d) any termination or cancellation of any insurance policy which Borrower is required to maintain, or any uninsured or partially uninsured loss through liability or property damage, or through fire, theft or any other cause affecting Borrower's property; or (e) any breach of any covenant contained herein related to Sanctions, Anti-Money Laundering Laws, and Anti-Corruption Laws the Borrower's inability to make the representations and warranties contained herein related to Sanctions, Anti-Money

Laundering Laws, and Anti-Corruption Laws on any date, or the failure of any representations and warranties contained herein related to Sanctions, Anti-Money Laundering Laws, and Anti-Corruption Laws to be true and correct in all respects on or as of any date.

10. Section 5.1. of the Credit Agreement is hereby deleted in its entirety and replaced with the following:

SECTION 5.1. USE OF FUNDS. SOURCES OF REPAYMENT AND COLLATERAL.

(a) Use, or permit any member of the Borrowing Group to use, any of the proceeds of any credit extended hereunder except for the purposes stated in Article I hereof, or directly or indirectly use any such proceeds to fund, finance or facilitate any activities, business or transactions: (i) that are prohibited by Sanctions; (ii) that would be prohibited by Sanctions if conducted by Bank or any of Bank's affiliates; or (iii) that would be prohibited by any Anti-Money Laundering Laws or Anti-Corruption Laws.

(b) Fund any repayment of the obligations hereunder or under any other Loan Document with proceeds, or provide any property as collateral for any such obligations, or permit any third party to provide any property as collateral for any such obligations, that is directly or indirectly derived from any transaction or activity that is prohibited by any Sanctions, Anti-Money Laundering Laws or Anti-Corruption Laws, or that could otherwise cause Bank or any of Bank's affiliates to be in violation of any Sanctions, Anti-Money Laundering Laws or Anti-Corruption Laws.

11. Section 5.2. of the Credit Agreement is hereby deleted in its entirety and replaced with the following:

SECTION 5.2. CAPITAL EXPENDITURES. Make any additional investment in fixed assets: (a) in the fiscal quarter ending December 31, 2018, in excess of an aggregate of Thirty-Two Million Dollars (\$32,000,000.00); (b) in the fiscal year 2019, in excess of an aggregate of Ten Million Dollars (\$10,000,000.00); provided that any unused amounts in the fiscal quarter ending December 31, 2018 under this provision may be carried over and utilized in fiscal year 2019; or (c) in fiscal year 2020, in excess of an aggregate of Twenty-Five Million Dollars (\$25,000,000.00).

12. Section 5.4. of the Credit Agreement is hereby deleted in its entirety and replaced with the following:

SECTION 5.4. OTHER INDEBTEDNESS. Create, incur, assume or permit to exist any indebtedness for borrowed money or liabilities resulting from borrowings, loans or advances, whether secured or unsecured, matured or unmatured, liquidated or unliquidated, joint or several, except (a) the liabilities of Borrower to Bank; (b) purchase money indebtedness incurred in connection with the purchase of equipment in an aggregate amount incurred after the date of this Agreement not in excess of One Million Dollars (\$1,000,000.00); (c) indebtedness

consisting of loans or advances permitted pursuant to Sections 5.7(b), (c), (d), and (f) hereto; (d) the ICBC Debt existing as of the date hereof in an amount not to exceed Eight Million Dollars (\$8,000,000.00); and (e) indebtedness, in an aggregate original principal amount not to exceed Twelve Million Dollars (\$12,000,000.00), incurred by Borrower's subsidiary ChaoYang Tongmei Xtal Technology in 2020 but only to the extent such indebtedness is incurred and evidenced by documentation in form and substance satisfactory to Bank (the "Specified ChaoYang Debt").

13. Section 6.1.(c) of the Credit Agreement is hereby deleted in its entirety and replaced with the following:

(c) Any default in the performance of or compliance with: (1) any collateral value requirement set forth herein or in any other Loan Document; (2) any negative covenant set forth in Article V hereof; (3) any affirmative covenant set forth in Article IV hereof requiring the delivery of financial statements and other information to Bank; (4) any obligation, agreement or other provision contained herein or in any other Loan Document related to Sanctions, Anti-Money Laundering Laws, or Anti-Corruption Laws; or (5) any obligation, agreement or other provision contained herein or in any other Loan Document (other than those defaults specifically described as constituting an "Event of Default" under any other subsection of this Section 6.1.), and with respect to such default(s) that by their nature can be cured (excluding any defaults specifically described as constituting an "Event of Default" under any other subsection of this Section 6.1., none of which shall be subject to a cure period), such default shall continue for a period of twenty (20) days from its occurrence.

14. The effective date of this Amendment shall be the date that all of the following conditions set forth in this Section have been satisfied, as determined by Bank and evidenced by Bank's system of record. Notwithstanding the occurrence of the effective date of this Amendment, Bank shall not be obligated to extend credit under this Amendment or any other Loan Document until all conditions to each extension of credit set forth in the Credit Agreement have been fulfilled to Bank's satisfaction.

- (a) Approval of Bank Counsel. All legal matters incidental to the effectiveness of this Amendment shall be satisfactory to Bank's counsel.
- (b) Documentation. Bank shall have received, in form and substance satisfactory to Bank, each of the following, duly executed by all parties:
- (i) This Amendment.
 - (ii) First Modification to Revolving Line of Credit Note.
 - (iii) Such other documents as Bank may require under any other Section of this Amendment.
- (c) Regulatory and Compliance Requirements. All regulatory and compliance requirements, standards and processes shall be completed to the satisfaction of Bank.
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15. The promissory notes or other instruments or documents executed in connection with the credit(s) subject to the Credit Agreement may calculate interest at a rate equal to the sum of an index rate of interest plus a margin rate of interest. In the event any index rate of interest would be less than zero percent (0.0%), then the index rate of interest shall be deemed to be zero percent (0.0%) and the applicable promissory note or other instrument or document shall bear interest at a rate equal to the margin rate of interest.
 16. Except as specifically provided herein, all terms and conditions of the Credit Agreement remain in full force and effect, without waiver or modification. All terms defined in the Credit Agreement shall have the same meaning when used in this Amendment. This Amendment and the Credit Agreement shall be read together, as one document. This Amendment is a Loan Document.
 17. Borrower hereby remakes all representations and warranties contained in the Credit Agreement and reaffirms all covenants set forth therein. Borrower further certifies that as of the date of this Amendment there exists no Event of Default, other than the Specified Defaults, nor any condition, act or event which with the giving of notice or the passage of time or both would constitute any such Event of Default.
 18. Borrower hereby covenants that Borrower shall provide to Bank from time to time such other information as Bank may request for the purpose of enabling Bank to fulfill its regulatory and compliance requirements, standards and processes. Borrower hereby represents and warrants to Bank that all information provided from time to time by Borrower or any Third Party Obligor to Bank for the purpose of enabling Bank to fulfill its regulatory and compliance requirements, standards and processes was complete and correct at the time such information was provided and, except as specifically identified to Bank in a subsequent writing, remains complete and correct today, and shall be complete and correct at each time Borrower is required to reaffirm the representations and warranties set forth in the Credit Agreement.
 19. In consideration of the benefits provided to Borrower under the terms and provisions hereof, Borrower hereby agrees as follows ("General Release"):
 - (a) Borrower, for itself and on behalf of its successors and assigns, does hereby release, acquit and forever discharge Bank, all of Bank's predecessors in interest, and all of Bank's past and present officers, directors, attorneys, affiliates, employees and agents, of and from any and all claims, demands, obligations, liabilities, indebtedness, breaches of contract, breaches of duty or of any relationship, acts, omissions, misfeasance, malfeasance, causes of action, defenses, offsets, debts, sums of money, accounts, compensation, contracts, controversies, promises, damages, costs, losses and expenses, of every type, kind, nature, description or character, whether known or unknown, suspected or unsuspected, liquidated or unliquidated, each as though fully set forth herein at length (each, a "Released Claim" and collectively, the "Released Claims"), that Borrower now has or may acquire as of the later of: (i) the date this Amendment becomes effective through the satisfaction (or waiver by Bank) of all conditions hereto; or (ii) the date that Borrower has executed and delivered this Amendment to Bank (hereafter, the "Release Date"), including without limitation, those Released Claims in any way arising out of, connected with or related to any and all prior credit accommodations, if any, provided by Bank, or any of Bank's predecessors in interest, to Borrower, and any agreements, notes or documents of any kind related thereto or the transactions contemplated thereby or hereby, or any other agreement or document referred to herein or therein.
 - (b) Borrower hereby acknowledges, represents and warrants to Bank as follows:
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- (i) Borrower understands the meaning and effect of Section 1542 of the California Civil Code which provides:

Section 1542. CERTAIN CLAIMS NOT AFFECTED BY GENERAL RELEASE. A GENERAL RELEASE DOES NOT EXTEND TO CLAIMS THAT THE CREDITOR OR RELEASING PARTY DOES NOT KNOW OR SUSPECT TO EXIST IN HIS OR HER FAVOR AT THE TIME OF EXECUTING THE RELEASE AND THAT, IF KNOWN BY HIM OR HER, WOULD HAVE MATERIALLY AFFECTED HIS OR HER SETTLEMENT WITH THE DEBTOR OR RELEASED PARTY.

- (ii) With regard to Section 1542 of the California Civil Code, Borrower agrees to assume the risk of any and all unknown, unanticipated or misunderstood defenses and Released Claims which are released by the provisions of this General Release in favor of Bank, and Borrower hereby waives and releases all rights and benefits which it might otherwise have under Section 1542 of the California Civil Code with regard to the release of such unknown, unanticipated or misunderstood defenses and Released Claims.

- (c) Each person signing below on behalf of Borrower acknowledges that he or she has read each of the provisions of this General Release. Each such person fully understands that this General Release has important legal consequences and each such person realizes that they are releasing any and all Released Claims that Borrower may have as of the Release Date. Borrower hereby acknowledges that it has had an opportunity to obtain a lawyer's advice concerning the legal consequences of each of the provisions of this General Release.
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- (d) Borrower hereby specifically acknowledges and agrees that: (i) none of the provisions of this General Release shall be construed as or constitute an admission of any liability on the part of Bank; (ii) the provisions of this General Release shall constitute an absolute bar to any Released Claim of any kind, whether any such Released Claim is based on contract, tort, warranty, mistake or any other theory, whether legal, statutory or equitable; and (iii) any attempt to assert a Released Claim barred by the provisions of this General Release shall subject Borrower to the provisions of applicable law setting forth the remedies for the bringing of groundless, frivolous or baseless claims or causes of action.
20. This Amendment shall be governed by and interpreted in accordance with the laws of the State California, except if preempted by Federal law. In any action brought or arising out of this Agreement, Borrower hereby consents to the jurisdiction of any Federal or State Court having proper venue within the City and County of San Francisco, California and also consents to the service of process by any means authorized by California or Federal law. The headings used in this Amendment are for convenience only and shall be disregarded in interpreting the substantive provisions of this Amendment. Time is of the essence of each term of the Loan Documents, including this Amendment. If any provision of this Amendment or any of the Loan Documents shall be determined by a court of competent jurisdiction to be invalid, illegal or unenforceable, that portion shall be deemed severed therefrom, and the remaining parts shall remain in full force as though the invalid, illegal or unenforceable portion had never been a part thereof.

[Signature Page(s) Continue on Next Page.]

IN WITNESS WHEREOF, the parties hereto, intending to be legally bound hereby, have caused this Amendment to be effective as of the effective date set forth herein.

AXT, INC.

WELLS FARGO BANK,
NATIONAL ASSOCIATION

By: /s/ Morris S. Young
Name: Morris S. Young
Title: Chief Executive Officer

By: /s/ Victor Choi
Name: Victor Choi
Title: Vice President

Capital Increase Agreement
on
Beijing Tongmei Xtal Technology Co., Ltd.

Among

Guangshuo Semiconductor Equipment (Shanghai) Co., Ltd.,

Beijing Tongmei Xtal Technology Co., Ltd.

and
AXT, INC.

January 2021

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CAPITAL INCREASE AGREEMENT

This CAPITAL INCREASE AGREEMENT (hereinafter referred to as the “Agreement”) is entered into as of [DD] [MM], 2021 in Beijing by and among:

Party A: Guangshuo Semiconductor Equipment (Shanghai) Co., Ltd.

Domicile: Room 603, No. 15, Lane 218, Haiji No.6 Road, Nanhui New Town, Pudong New Area, Shanghai

Legal Representative: Zhang Shuheng

Party B: Beijing Tongmei Xtal Technology Co., Ltd. (hereinafter referred to as the “Target Company” or “the Company”)

Domicile: No. 4 East Second Street, Industrial Development Zone, Tongzhou District, Beijing, PRC

Legal Representative: Morris Young

Party C: AXT, INC.

Domicile: 4281 TECHNOLOGY DR FREMONT CA 94538

Authorized Representative: Morris Young

(Party A, Party B and Party C are collectively referred to as the “Parties” herein; each party or any party is referred to as the “Party”, as the context requires)

WHEREAS,

1. Party A is the investor of the Target Company, a limited partnership duly incorporated and validly existing in accordance with the laws of the People’s Republic of China, with its registered address at Room 603, No. 15, Lane 218, Haiji No.6 Road, Nanhui New Town, Pudong New Area, Shanghai, PRC.

2. Party B is the Target Company, a limited liability company incorporated and validly existing in accordance with the laws of the People's Republic of China, under the Unified Social Credit Code 91110000700004889C, with a registered capital of RMB 820.960319 million, and with its registered address at No. 4 East Second Street, Industrial Development Zone, Tongzhou District, Beijing, PRC. The legal representative of it is Morris Young.
3. Party C is an American company listed on NASDAQ (stock code: AXTI), with its address at 4281 TECHNOLOGY DR FREMONT CA 94538.
4. The Parties agree that Party A shall subscribe for Party B's newly increased registered capital in accordance with the terms and conditions specified in this Agreement.

NOW, THEREFORE, the Parties hereto agree as follows through friendly negotiation:

Article 1 Definitions and Interpretation

- 1.1 Unless otherwise specified in this Agreement, the following words and expressions shall have the following meanings:

| | |
|--------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Agreement | refers to this Capital Increase Agreement, including amendments and supplements made thereto from time to time; |
| Company, Target Company | refers to Beijing Tongmei Xtal Technology Co., Ltd. |
| Affiliates | refers to relevant companies whose financial statements shall be consolidated upon the current and subsequent reorganization of the Target Company in accordance with the <i>Accounting Standards for Business Enterprises</i> of PRC ; |
| Controlling Shareholder | refers to AXT, INC., a company listed on NASDAQ in the United States, with the stock code AXTI; |
| Articles of Association | refers to the Company's Articles of Association, including amendments and supplements made thereto from time to time; |
| Capital Increase | refers to the subscription of newly increased registered capital of the Target Company by Party A with the equivalent cash in RMB of USD 90742 in accordance with the terms and conditions of this Agreement among the proposed financing of USD 90742 (Party A shall make payment in RMB. The specific amount shall be calculated as per the middle rate of USD against RMB (i.e. 1 U.S. dollar = RMB 6.6205) announced by the People's Bank of China on 2:00 p.m., November 13, 2020, i.e. Party A makes an investment of RMB 0.600758 million) |

| | |
|-----------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Capital Contribution | refers to the total amount of capital contributed by Party A to the Target Company to subscribe for the newly increased registered of the Target Company in accordance with the provisions of this Agreement, that is USD 90742. (Party A shall make the contribution in RMB, and the specific amount shall be calculated by referring to the middle rate of USD against RMB (i.e. 1 U.S. dollar = 6.6205 yuan) announced by the People's Bank of China on 2:00 p.m., November 13, 2020, i.e. Party A makes an investment of RMB 0.600758 million). |
| IPO | refers to the initial public offering and listing on domestic stock exchanges by the Target Company with the approval of the competent authorities; |
| Related Parties | <p>The Company's related party refers to the natural person, legal person or any other organization in any of the following circumstances: 1) the natural, legal person or any other organization that controls the Company directly or indirectly; 2) the natural person holding more than 5% shares directly or indirectly; 3) the Company's director, supervisor or senior manager; 4) family members having close relations with the related natural person described in 1), 2) and 3), including spouse, spouse's sibling and the parents of children's spouse; 5) legal person or other organization that directly holds more than 5% shares of the Company; 6) director, supervisor, senior manager or other major leader of the legal person or other organization that controls the Company directly or indirectly; 7) legal person or other organization directly or indirectly controlled by the related legal person or natural person described in 1) – 6) or in which the aforesaid related natural person (except for chairman) acts as director or senior manager, unless it is the Company or its holding subsidiary; 8) legal person or other organization indirectly holding more than 5% shares of the Company; 9) other natural person, legal person or other organization that CSRC, Shanghai Stock Exchange or the Company judges having special relationship with the Company in accordance with the principle of substance over form, which may make the Company's interests incline towards it.</p> <p>Within the 12 months after the transaction date or upon the validity of relevant transaction agreement or implementation of relevant argument, the legal person or other organization or natural person in any of the circumstances described in the preceding paragraph shall be deemed as the Company's related party.</p> <p>The Company will not form an associated relationship with the legal person that the legal person or other organization listed in Paragraph 1 controls directly or indirectly or other organization that is under the control of the identical state-owned assets regulatory agency, except that legal representative, general manager, leader or over half of directors of the legal person or other organization double as the Company's director, supervisor or senior manager.</p> |

| | |
|--------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| PRC | refers to the People's Republic of China, for the purpose of this Agreement, excluding Hong Kong Special Administrative Region, Macau Special Administrative Region and Taiwan. |
| Yuan | refers to Chinese Yuan, the statutory currency of PRC. |
| USD | refers to US dollar, the statutory currency of the United States. |
| Working Day | refers to the normal working day of banks in China (excluding Saturday, Sunday and statutory holidays of PRC). |

- 1.2 Any reference to the terms and annexes in this Agreement refer to the terms and annexes of this Agreement (unless otherwise indicated). The annexes to this Agreement shall be deemed as an integral part of this Agreement.
- 1.3 Any reference to the documents in this Agreement shall include the modifications, combinations, supplements, updates and substitutions made thereto from time to time.
- 1.4 The terms of any law or regulation shall refer to the terms of the law or regulation revised from time to time (whether before or after the execution date of this Agreement).
- 1.5 The headlines are only for the convenience of reading, and shall not affect the interpretation of this Agreement.
- 1.6 Unless otherwise stated, if any date of implementation under this Agreement falls on a non-working day, such implementation shall be postponed to the first working day following the non-working day.

Article 2 Capital Increase

2.1 Capital Increase

Prior to the signature of this Agreement, the Target Company signed relevant capital increase agreements with Liaoning Haitong Innovation Securities Investment Co., Ltd. (hereinafter referred to as “Haitong Innovation Securities”), Liaoning Haitong New Kinetic Energy Equity Investment Fund Partnership (L.P.) (hereinafter referred to as “Haitong New Kinetic Energy”) and Liaoning Haitong New Energy Low-carbon Industry Equity Investment Fund Co., Ltd. (hereinafter referred to as “Haitong New Energy”). According to agreements, Haitong Innovation Securities, Haitong New Kinetic Energy and Haitong New Energy increased an investment in RMB equivalent to USD 10 million, USD 9 million and USD 3.5 million respectively to the Target Company based on the pre-investment valuation of USD 624 million (the specific amount shall be calculated as per the middle rate of USD against RMB (i.e. 1 U.S. dollar = RMB 6.6205) announced by the People's Bank of China on 2:00 p.m., November 13, 2020, i.e. Haitong Innovation Securities makes an investment of RMB 66.205 million, Haitong New Kinetic Energy adds an investment of RMB 59.5845 million and Haitong New Energy adds an investment of RMB 23.17175 million respectively) (the above are collectively known as “Haitong capital increase”).

Prior to the signature of this Agreement, the Target Company signed relevant capital increase agreements with Fujian Province Anxin Industry Investment Fund Partnership (L.P.) (hereinafter referred to as Anxin Industry Investment), Jinggangshan Meicheng Equity Investment Partnership (L.P.) (hereinafter referred to as Jinggangshan Meicheng), Hefei Huadeng Phase 2 Integrated Circuit Industry Investment Partnership (L.P.) (hereinafter referred to as Huadeng Phase 2), Qingdao Xinxingyi Equity Investment Fund Partnership (L.P.) (hereinafter referred to as Qingdao Xinxing), Qiji (Hangzhou) Investment Co., Ltd. (hereinafter referred to as Hangzhou Qiji), Gongqingcheng Yihua Tongze Investment Partnership (L.P.) (hereinafter referred to as Gongqingcheng Yihua). According to agreements, Anxin Industry Investment, Jinggangshan Meicheng, Hefei Huadeng Phase 2, Qingdao Xinxing, Hangzhou Qiji and Gongqingcheng Yihua increased an investment in RMB equivalent to USD 6.797 million, USD 4.531 million, USD 5.287 million, USD 3.021 million, USD 3.021 million and USD 1.343 million respectively to the Target Company based on the pre-investment valuation of USD 624 million (the specific

amount shall be calculated as per the middle rate of USD against RMB (i.e. 1 U.S. dollar = RMB 6.6205) announced by the People's Bank of China on 2:00 p.m., November 13, 2020, i.e. Anxin Industry Investment makes an investment of RMB 45 million, Jingtangshan Meicheng adds an investment of RMB 30 million, Huadeng Phase 2 adds an investment of RMB 35 million, Qingdao Xinxing adds an investment of RMB 20 million, Hangzhou Qiji adds an investment of RMB 20 million and Gongqingcheng Yihua adds an investment of RMB 8.892 million respectively) (the above are collectively known as "Anxin capital increase").

Prior to the signature of this Agreement, the Target Company signed relevant capital increase agreements with Sunrise Baoying (Ningbo) Investment Center (L.P.) (hereinafter referred to as Sunrise Baoying). According to agreements, Sunrise Baoying (Ningbo) Investment Center (L.P.) increased an investment in RMB equivalent to USD 1 million to the Target Company based on the pre-investment valuation of USD 624 million (the specific amount shall be calculated as per the middle rate of USD against RMB (i.e. 1 U.S. dollar = RMB 6.6205) announced by the People's Bank of China on 2:00 p.m., November 13, 2020, i.e. Haitong Innovation Securities makes an investment of RMB 6.6205 million(the above are collectively known as "Sunrise capital increase").

The Target Money under this Agreement agrees to attract financing of USD 90742. Party A agrees to subscribe the newly added capital of the Target Company with the equivalent cash in RMB of equivalent to USD 90742. (Party A shall make payment in RMB. The specific amount shall be calculated as per the middle rate of USD against RMB (i.e. 1 U.S. dollar = RMB 6.6205) announced by the People's Bank of China on 2:00 p.m., November 13, 2020, i.e. Party A makes an investment of RMB 0.600758 million). After this round of capital increase, on the basis of considering Haitong capital increase, Anxin capital increase, Sunrise capital increase as well as the completion of equity financing of other two investors and not considering the subsequent equity financing, Party A holds a total of 0.0135% equities of the Target Company.

2.2 Purpose of Capital Contribution

All the capital contribution shall be used by Target Company for purposes related to its current main business or recombination (The specific meaning shall be subject to the supplementary agreement signed and concluded by the Parties). Except as described above, the Target Company shall not use the above capital contribution for other purposes without Party A's prior written consent.

2.3 Payment of Capital Contribution

(1) Party A shall make the payment of USD 90742 to Party B in a lump-sum within 10 working days upon the establishment of the following prerequisites: (Party A shall make the contribution in RMB, and the specific amount shall be converted by referring to the middle rate of USD against RMB announced by the People's Bank of China on November 13, 2020, i.e. RMB 0.600758 million).

① Party B agrees upon the resolution of board of shareholders on the capital increase and relevant capital increase agreements;

② Party C agrees upon the board resolution on the capital increase and relevant capital increase agreements;

(2) The details of the bank account used by the Target Company to receive the capital contribution are as follows:

Account Name: Beijing Tongmei Xtal Technology Co., Ltd.

Account Number: 32205600822-2

Bank Name: BOC Tongzhou Branch

2.4 Completion of Capital Increase

1 The completion of the capital increase shall be subject to the completion of the registration of change in connection with to the capital increase with industry and commerce department and the acquisition of the renewed business license;

2 Party A shall use its best efforts to actively cooperate with the Target Company in going through the procedures of change, filing and reporting with the applicable market supervision and management department (industry and commerce) and the competent commercial department for the capital increase.

Article 3 Undertakings, Representations and Warrants

3.1 Representations and Warranties of Party A:

(1) Party A is legally incorporated and validly existing in accordance with the laws of PRC; Party A and its shareholders are not included in the “three types of shareholders” of contractual private equity funds, asset management plans and trust plans; and Party A has obtained the qualifications of being shareholder required by laws and regulations.

(2) Party A has independent legal status and full civil capacity to enter into and perform this Agreement, and can independently act as a subject of litigation.

(3) Party A has acquired all the authorizations, approvals or filings required for the execution, delivery and performance of this Agreement and completion the transaction under this Agreement. The execution and performance of this Agreement by Party A will not violate the provisions of relevant laws and regulations and normative documents or the terms of major contractual documents that are binding upon it.

(4) Party A has prepared sufficient funds for this capital increase and the source of funds is true and legal.

3.2 Representations and Warranties of Party B and Party C:

(1) Party B and Party C have obtained internal approval and authorization for the execution and performance of this Agreement, and the authorization documents have been provided to Party A.

(2) Party B and Party C have independent legal status and full capacity for civil capacity to enter into and perform this Agreement, and can independently act as a subject of litigation.

(3) Party B and Party C undertake that they have obtained all authorizations and internal decision-making procedures necessary for the execution and performance of this Agreement and the completion of the transaction under this Agreement. The execution of this Agreement and the and performance of the obligations hereunder by Party B and Party C will not violate any agreement entered into individually or jointly as a party or the provisions of relevant laws, regulations and normative documents.

(4) As of the execution date of this Agreement, where Party C is subjected to any hostile acquisition or attempt to change Party C's control power initiated by any subject or person, without prejudice to director's loyalty, diligence and fiduciary duties under laws of the US, Party C's board of directors shall take actions such as issuing securities with voting rights or other priority rights in accordance with relevant provisions of applicable laws, certificate of incorporation, and articles of incorporation, so as to avoid the material change in Party C's equity structure, board of directors and management.

Article 4 Termination of Agreement

- 4.1 This Agreement can be terminated by the Parties by consensus.
- 4.2 In case of the following events, Party B and Party C are entitled to send a written notice of termination of this Agreement to Party A, and this Agreement shall be terminated as of the date of receipt of such written notice by Party A:
- (1) Party A is in violation of this Agreement or any other transaction documents, and fails to rectify and remedy its default within a reasonable period as required by Party B and Party C in the written notice requesting for the rectification of such default;
 - (2) The representations and warranties made by Party A in this Agreement are untrue, inaccurate, or misleading, fraudulent or concealed in material respects.
- 4.3 In case of the following events, Party A is entitled to send a written notice of termination of this Agreement to Party B and Party C, and this Agreement shall be terminated as of the date of receipt of such written notice by Party B or Party C:
- (1) Party B or Party C is in violation of this Agreement or any other transaction documents, and fails to rectify and remedy its default within a reasonable period as required by Party A in the written notice requesting for the rectification of such default;
 - (2) The representations and warranties made by Party B and Party C together or separately in this Agreement are untrue, inaccurate, or misleading, fraudulent or concealed in material respects.

(3) Party B and Party C fail to finish the relevant matters agreed in the written supplementary agreement by the parties.

- 4.4 Where this Agreement is cancelled prior to the completion of the capital increase, Party A does not need to pay any investment. Should Party A have affected the payment, Party B shall refund Party A within 10 working days upon the cancelation of this Agreement.
- 4.5 Upon the cancellation or termination of this Agreement, other transaction documents (if any) signed by the Parties regarding the capital increase shall be automatically cancelled or terminated with this Agreement.
- 4.6 Upon the termination of this Agreement, except for Article 5 (Liability for Default), Article 6 (Confidentiality), this paragraph, and Article 8 (Governing Law and Resolution of Disputes), the Parties shall neither enjoy the rights under this Agreement, nor shall assume the obligations and responsibilities under this Agreement, and nothing in this Agreement shall relieve any party from its liability for default of this Agreement incurred prior to the termination.

Article 5 Liability for Default

- 5.1 In case of any violation of this Agreement or any other transaction documents by any party, the breaching party shall compensate for the losses incurred thereby to other parties hereto (including related fees and expenses, interest, fines and attorney fees incurred by such default).
- 5.2 For the avoidance of doubt, the Parties agree that when the Agreement is terminated by the parties in accordance with relevant provisions under this Agreement, the provisions of the preceding paragraph on compensation for losses shall not affect Party A's right to request the Target Company to return the capital contribution made.

Article 6 Confidentiality

- 6.1 Except as otherwise provided in this Agreement, each party to this Agreement shall treat as strictly confidential all information contained in this Agreement or received or obtained through negotiation and/or signing of this Agreement, including but not limited to any information related to the following matters, and shall not disclose or make use of such information.
- (1) The existence and terms of this Agreement;
 - (2) Negotiations related to this Agreement; or
 - (3) Business activities conducted by a party to this Agreement, the party or any of its related parties.
- 6.2 During the Term of this Agreement and before the relevant confidential information becomes public information (hereinafter referred to as the “Confidentiality Period”), without the prior written consent of other parties hereto, each party neither may use the confidential information of other parties for any purpose other than the execution and performance of this Agreement, nor disclose or provide such confidential information to any third party other than the Parties hereto, and shall take all necessary measures to ensure that its current and future directors, officers, employees and professional consultants such as lawyers, accountants, financial consultants, etc. comply with the above-mentioned confidentiality obligations during the confidentiality period, otherwise the party shall compensate other parties for their losses.
- 6.3 Provided that, under the following circumstances, this Article 6 shall not prohibit the disclosure or use of any information within the following scope:
- (1) The disclosure or use required by applicable laws, any rules of the stock exchange where the shares of any party are listed, or any government agency;
 - (2) Disclosure or use required for the purpose of any legal proceedings caused by this Agreement or any other agreement signed under or pursuant to this Agreement, or the disclosure is related to the tax affairs of the disclosing party and made to the tax department;

- (3) Disclosure made to any party's officers, directors, employees, lawyers, accountants, financial consultants and other agents or representatives who need to know the information for the completion of the transactions contemplated by this Agreement or any agreement entered into under this Agreement, provided that such persons promise to comply with the provisions of Article 6 with respect to such information as if they were a party to this Agreement;
- (4) Such information can be acquired from public channels (except for acquisition by violation of the confidentiality agreement (if any) or this Agreement); or
- (5) Prior written consent for disclosure or use has been given by other parties.

Article 7 Term

- 7.1 This Agreement shall become effective as of the date of execution by the Parties.
- 7.2 This Agreement will remain effective upon its commencement, unless it is cancelled or terminated in accordance with the provisions of this Agreement.

Article 8 Governing Law and Resolution of Disputes

- 8.1 The formation, validity, performance, alteration, termination, interpretation of this Agreement, as well as the settlement of disputes caused by or related to this Agreement, shall be governed by the laws of the PRC.
- 8.2 Any dispute arising from or in connection with this Agreement shall be resolved by the Parties hereto through friendly negotiation with their best efforts; the aforesaid negotiation shall commence immediately upon the notification of the dispute in writing by one party to other parties.
- 8.3 If the Parties cannot resolve the dispute through friendly negotiation within 30 days from the service of the notice mentioned in Article 9.2, any party is entitled to file an application with the China International Economic and Trade Arbitration Commission for arbitration applying the arbitration rules of the China International Economic and Trade Arbitration Commission in effect at the time of the arbitration. The arbitration

proceedings shall be conducted in Chinese in Beijing. The arbitration award is final and binding upon the Parties.

- 8.4 In the event of any dispute or controversy during the arbitration period, except for the rights and obligations in connection with the dispute involved in such arbitration, each party shall continue to perform its other obligations under this Agreement (and shall be entitled to exercise its right under this Agreement).

Article 9 Notices

- 9.1 All notices, requests, claims, demands and other formal communications (hereinafter referred to as "Notices") under this Agreement shall be made in writing and signed or sealed by the sender or its authorized representative. Such notice shall be delivered by hand, registered airmail or fax and other electronic communication means to the following addresses designated by the Parties:

(1) If to Party A:

Party A: Guangshuo Semiconductor Equipment (Shanghai) Co., Ltd.

Address: Room 603, No. 15, Lane 218, Haiji No.6 Road, Nanhui New Town, Pudong New Area, Shanghai

E-mail: steven_zhang@lumentime.com

Fax: 021-61702388

Attention: Zhang Shuheng

(2) If to Party B:

Address: No. 4 East Second Street, Zhangjiawan Industrial Development Zone, Tongzhou District, Beijing, PRC

E-mail: ze.hao@axt.com

Fax: 010-61562245

Attention: Hao Ze

(3) If to Party C:

Address: 4281 Technology Drive, Fremont CA 94538-6339 USA

E-mail: gfischer@axt.com

Fax: (001-510) 583-5901

Attention: Gary Fischer

Any notice shall be addressed to relevant parties listed in this Article (or other recipients of other parties notified by relevant parties in accordance with the provisions of this Article).

9.2 Any notice delivered by hand, registered airmail or fax, and other electronic communication means shall be deemed to have been served:

(1) In the case of delivery by hand and obtaining of written receipt, if it is delivered before 17:00 on the working day of the place of service, the time when the written receipt is signed shall be the time of service; if it is delivered after 17:00 on the working day or at any time on the non-working day of the place of service, the notice shall be deemed as being served at 9:00 on the next working day of the place of service;

(2) If the registered airmail is domestic mail in China and is sent by express mail service with postage prepaid, it shall be deemed as being served on the fifth working day from the date of mailing;

(3) If the registered airmail is sent from or to any place outside of China and sent by international express mail service with postage prepaid, it shall be deemed to be served on the tenth working day from the date of mailing;

(4) In the case of delivery by fax or other electronic communication means, it shall be deemed as being served after sending, as evidenced by the sending report confirming the successful sending and the oral receipt confirmation (the sender shall record it in writing and sign it). Provided that, if the fax or other electronic communication is sent

after 17:00 on the working day or at any time on a non-working day of the place of service, it shall be deemed as being served at 9:00 on the next working day of the place of service.

Article 10 Miscellaneous

- 10.1 The Parties unanimously agree that from the date of completion of the change registration for the capital increase with the industry and commerce department, the Target Company's accumulated and newly increased undistributed profits over the years will be shared by the Target Company's new and old shareholders after the capital increase in proportion to their respective paid-up capital.
- 10.2 Unless otherwise specified, the failure or delay in the exercise of any right, power or privilege under this Agreement by any party shall not be deemed as a waiver of that right, power or privilege by such party; the exercise of any right, power or privilege in whole or in part shall not be regarded as the interference with the exercise of other rights, powers or privileges.
- 10.3 Without prejudice to the provisions of other terms of this Agreement, if any term or part of this Agreement is determined to be invalid, illegal or unenforceable under the laws of PRC, or violation of the public interest, the validity, legality and enforceability of the remaining of the Agreement shall not be affected or impaired in any way. The Parties shall conduct friendly negotiations to agree on the term satisfactory to the Parties to substitute the invalid term.
- 10.4 Unless otherwise agreed in this Agreement, each party shall respectively bear the legal and other expenses incurred by itself in the preparation, negotiation and conclusion of the Agreement and other transaction documents.
- 10.5 This Agreement and its annexes constitute a complete agreement among the Parties hereto. Unless otherwise agreed in this Agreement, the amendment, modification, waiver, cancellation or termination of the Agreement must be signed by the Parties in a written agreement.

- 10.6 Matters not covered in this Agreement shall be amicably negotiated by the Parties, and a written supplementary agreement shall be executed by the Parties by consensus. The supplementary agreement shall have the same legal effect as the Agreement.
- 10.7 No Party shall assign any of its rights or obligations under this Agreement, unless with the prior written consent of the Parties.
- 10.8 This Agreement is executed in sextuplicate with one copy for each party, and the rest shall be maintained by the Target Company for future use. Each copy has the same legal effect.

(The remainder of this page is intentionally left blank)

(No text on this page, and only for the signature of *Capital Increase Agreement on Beijing Tongmei Xtal Technology Co., Ltd. among Guangshuo Semiconductor Equipment (Shanghai) Co., Ltd., Beijing Tongmei Xtal Technology Co., Ltd. and AXT, INC.*)

Guangshuo Semiconductor Equipment (Shanghai) Co., Ltd. (seal)

Legal representative or authorized representative (signature):

(No text on this page, and only for the signature of *Capital Increase Agreement on Beijing Tongmei Xtal Technology Co., Ltd. among Guangshuo Semiconductor Equipment (Shanghai) Co., Ltd., Beijing Tongmei Xtal Technology Co., Ltd. and AXT, INC.*)

Beijing Tongmei Xtal Technology Co., Ltd. (Seal)

Legal representative or authorized representative (signature):

(No text on this page, and only for the signature of *Capital Increase Agreement on Beijing Tongmei Xtal Technology Co., Ltd. among Guangshuo Semiconductor Equipment (Shanghai) Co., Ltd., Beijing Tongmei Xtal Technology Co., Ltd. and AXT, INC.*)

AXT, INC.

Authorized representative (signature):

**Schedule identifying agreements substantially identical to
the form of Capital Increase Agreement filed as Exhibit 10.13 hereto**

**Subscribed Capital of Beijing
Tongmei Xtal Technology Co., Ltd.**

| Investor | Purchase Price (RMB) | Capital % |
|-----------------------------------------------------------------------------------|---------------------------------|------------------|
| Liaoning Haitong New Energy Equity Investment (Limited Partnership) | 11,840,774 | 1.3373% |
| Liaoning Haitong New Energy Low-Carbon Industry Equity Investment Co., Ltd. | 4,604,745 | .5201% |
| Haitong Innovation Securities Investment Co., Ltd. | 13,156,415 | 1.4859% |
| Fujian Province An Xin Industry Investment Fund Partnership (Limited Partnership) | 8,942,416 | 1.01% |
| Jinggangshan Meicheng Equity Investment Partnership (Limited Partnership) | 5,961,172 | .6733% |
| Hefei Walden II IC Industry Investment Partnership (Limited Partnership) | 6,955,797 | .7856% |
| Qingdao Xinxingyi Equity Investment Fund Partnership (Limited Partnership) | 3,974,553 | .4489% |
| Qiji (Hangzhou) Investment Consulting Co., Ltd. | 3,974,553 | .4489% |
| Gongqingcheng Yi Hua Tong Ze Investment Partnership (Limited Partnership) | 1,766,907 | .1996% |
| Sunrise Baoying (Ningbo) Investment Center (Limited Partnership) | 1,315,642 | .1486% |
| Xiamen He Yong Zhi Cheng Equity Investment Partnership (Limited Partnership) | 860,468 | .0972% |
| Hangzhou Jingyue Technology Development Partnership (Limited Partnership) | 993,611 | .1122% |

Supplementary Agreement

to

Capital Increase Agreement on Beijing Tongmei Xtal Technology Co., Ltd.

Among

Guangshuo Semiconductor Equipment (Shanghai) Co., Ltd.,

Beijing Tongmei Xtal Technology Co., Ltd.

and

AXT, INC.

January 2021

Supplementary Agreement to Capital Increase Agreement

The Supplementary Agreement to the Capital Increase Agreement (hereinafter referred to as the “Supplementary Agreement”) is entered into as of [DD] [MM], 2021 in Beijing by and among:

Party A: Guangshuo Semiconductor Equipment (Shanghai) Co., Ltd.,

Domicile: Room 603, No. 15, Lane 218, Haiji No.6 Road, Nanhui New Town, Pudong New Area, Shanghai

Legal Representative: Zhang Shuheng

Party B: Beijing Tongmei Xtal Technology Co., Ltd. (hereinafter referred to as the “Target Company” or “the Company”)

Domicile: No.4, East Second Street, Industrial Development Zone, Tongzhou District, Beijing, PRC

Legal Representative: Morris Young

Party C: AXT, INC. (hereinafter referred to as “controlling shareholder”)

Domicile: 4281 TECHNOLOGY DR FREMONT CA 94538

Authorized Representative: Morris Young

(Party A, Party B and Party C are collectively referred to as the “Parties” and individually a “Party” in the Supplementary Agreement, as required by the context)

WHEREAS:

1. Party A is the investor of the Target Company, a limited partnership duly incorporated and validly existing in accordance with the laws of the People’s Republic of China, with its registered address at Room 603, No. 15, Lane 218, Haiji No.6 Road, Nanhui New Town, Pudong New Area, Shanghai, PRC.

2. Party B is the Target Company, a limited liability company incorporated and effectively existing pursuant to Chinese laws, with a unified social credit code of 91110000700004889C and a registered capital of RMB 820.960319 million, its registered address is No.4, East Second Street, Industrial Development Zone, Tongzhou District, Beijing, and its legal representative is Morris Young.
3. Party C is an American company (stock code: AXTI) listed on NASDAQ, with its address at 4281 TECHNOLOGY DR FREMONT CA 94538.
4. The Parties have entered into the *Capital Increase Agreement on Beijing Tongmei Xtal Technology Co., Ltd.* (hereinafter referred to as the *Capital Increase Agreement*) on [DD] [MM], 2021. Party A consents to subscribe for the corresponding newly-increased registered capital of the Target Company in RMB cash equivalent to USD 90742 (Party A shall make payment in RMB. The specific amount shall be calculated as per the middle price of USD against RMB (i.e. 1 U.S. dollar = RMB 6.6205) announced by the People's Bank of China on 2:00 p.m., November 13, 2020, i.e. Party A makes an investment of RMB 0.600758 million).

To further define the rights and obligations of the Parties in this round of capital increase of the Company, the Parties consent to enter into the Supplementary Agreement, and reach supplementary agreements to the *Capital Increase Agreement* as below:

ARTICLE 1 DEFINITION AND INTERPRETATION

1.1 Unless otherwise stated herein or otherwise defined in the context, definitions and interpretations in the Supplementary Agreement shall have the same meaning as those in the *Capital Increase Agreement*.

ARTICLE 2 INDUSTRIAL AND COMMERCIAL CHANGES

2.1 Upon the establishment of employee stock ownership platform, the Target Company shall go through the registration formality of industrial and commercial change regarding Party A's additional investment for the Target Company within ten working days after Party A finishes the capital increase or accepts the Company's equity. The formalities must be finished no later than March 31, 2021. Where the Company fails to finish the formalities within the due time, Party B shall notify Party A in written form and both parties can prolong the period appropriately via consultation.

ARTICLE 3 VALUATION OF TARGET COMPANY AND INVESTMENT PROPORTION OF PARTY A

3.1 The Parties agree and acknowledge that, subject to Article 5 (Restructuring of the Target Company) of the Supplementary Agreement, the pre-investment valuation of the Target Company prior to this round of capital increase is USD 624 million. The Target Company plans to attract financing of USD 90742 million from Party A. The after-investment valuation is USD 673 million (including USD 22.5 million corresponding to Haitong capital increase and USD 24 million corresponding to Anxin capital increase, USD 1 million corresponding to Sunrise capital increase and USD 1.409258 million corresponding to equity financing of other two investors).

3.2 The actual investment of Party A in this round of capital increase is USD 90742 million. Premised on the above valuation in Article 3.1, in light of that fact that the employee stock ownership platform of the Target Company has become a shareholder of the Target Company and Chaoyang Jinmei Gallium Co., Ltd. and the shareholder (s) other than Party C of Beijing Boyu Semiconductor Vessel Craftwork Technology Co., Ltd. have become the shareholders of the Target Company, and without considering other equity financing after this round of capital

increase, Party A's equity ratio in the Target Company after this round of capital increase should be no less than 0.0135%.

ARTICLE 4 DELIVERY

4.1 Within five working days from the completion of the change of the industrial and commercial registration of this round of capital increase, the Parties shall complete the delivery mentioned in Article 4.2 of the Supplementary Agreement at the Target Company or other places otherwise consented by the Parties (hereinafter referred to as "delivery"). The date of completion of such delivery is referred to as "date of delivery" in the Supplementary Agreement.

4.2 On the date of delivery, the Target Company shall deliver the following documents to Party A:

- (a) The original capital verification report issued by an accounting firm registered in China on the increase of registered capital and paid-in situation of the Target Company;
- (b) The original of capital contribution certificate signed by legal representative of the Target Company and affixed with the official seal of the Target Company, which lists the equities that all shareholders hold in the Target Company and the ratio; copy of the new business license with official seal of the Target Company; a

copy (copies) of the updated register of shareholders of the Target Company, and the original for Party A to check. Party A has been registered as a shareholder of the Target Company in the register of shareholders.

ARTICLE 5 RESTRUCTURING OF THE TARGET COMPANY

After entering into the Supplementary Agreement, the Target Company shall launch the following restructuring with a view to ensure eligible listing (as defined below):

5.1 The Target Company shall, prior to March 31, 2021, complete the acquisition of all shares of Baoding Tongmei Xtal Manufacturing Co., Ltd., Chaoyang Tongmei Xtal Technology Co., Ltd., Chaoyang Jinmei Gallium Co., Ltd., Beijing Boyu Semiconductor Vessel Craftwork Technology Co., Ltd. (including two holding subsidiaries affiliated to it, i.e., Boyu (Tianjin) Semiconductor Materials Co., Ltd. and Boyu (Chaoyang) Semiconductor Technology Co., Ltd.) and Nanjing Jinmei Gallium Co., Ltd. (including 25% equities of Xiaoyi Xing'an Gallium Co., Ltd. it holds) and go through the registration of industrial and commercial changes. As a result, Baoding

Tongmei Xtal Manufacturing Co., Ltd., Chaoyang Tongmei Xtal Technology Co., Ltd., Chaoyang Jinmei Gallium Co., Ltd., Beijing Boyu Semiconductor Vessel Craftwork Technology Co., Ltd. and Nanjing Jinmei Gallium Co., Ltd. have become wholly-owned subsidiaries of the Target Company, and the Target Company has become the only subject for the control and IPO (in the future) that AXT, INC. (a crystal technology company in the US) implements in China.

5.2 The Target Company shall hold a wholly-owned subsidiary in the United States prior to March 31, 2021. The U.S. subsidiary shall assume responsibility for the sales of overseas customers, take over the personnel of the controlling shareholder- AXT, INC. and afford the personnel expenses (except for the personnel expenses required to maintain the controlling shareholder's listing status in the US), in order that the sales of the Target Company - AXT, INC. and its subsidiaries are all conducted via the Target Company and its subsidiaries, and the sales price of the Target Company and its subsidiaries shall be close to the consignment price of the controlling shareholder - AXT, INC.

ARTICLE 6 VALUATION ADJUSTMENT

6.1 The capital increase price of this round of capital increase is determined based on the assets, personnel and business size of the Target Company upon completion of the restructuring of the Target Company as specified in Article 5.1 of the Supplementary Agreement. If there is any change in the restructuring scope of the Target Company prescribed in Article 5.1 of the Supplementary Agreement, Party B shall inform Party A in written form within five working days from the date of change, and Party A shall be entitled to reasonably adjust the investment valuation in principle of good faith based on the assets, personnel and business size of the changed restructuring scope, and adjust the capital increase price accordingly. Adjusted price = price prior to adjustment * operating income of adjusted assets under the combined caliber/operating income of assets prior to adjustment under simulated consolidation scope. Adjustment methods include, without limitation, increasing Party A's shareholding ratio in the Target Company, giving equity or cash compensation to Party B and/or Party C, etc.

6.2 In the case that the change of the restructuring scope of the Target Company results in decrease of over 20% in the operating income under the consolidation scope or is not recognized by Party A, Party A shall be entitled to unilaterally decide to rescind the *Capital Increase Agreement*, and the Target Company shall return the investment funds actually paid by Party A.

ARTICLE 7 ARRANGEMENTS DURING TRANSITION PERIOD

7.1 The period from the date of entering into the *Capital Increase Agreement* to the completion for industrial and commercial change for the restructuring of the Target Company as specified in the Supplementary Agreement is referred to as “transition period”.

7.2 Party B and Party C undertake to ensure that the Target Company and its subsidiaries (including the companies that the Target Company intends to restructure as specified in Article 5.1 of this Agreement, similarly hereinafter) operate pursuant to the normal business operation mode that conforms to laws and past practices during the transition period.

7.3 During the transition period, when the business assets of the Target Company and its subsidiaries has a major unfavorable change described in 6.2, Party A shall be entitled to start the valuation adjustment mechanism pursuant to Article 6 of the Supplementary Agreement or cancel the Capital Increase Agreement unilaterally. In such case, the Target Company shall refund Party A the investment having been paid.

ARTICLE 8 EQUITY REPURCHASE

8.1 Qualified listing

The Parties shall do their utmost to urge the Target Company to complete the initial public offering of shares and be listed on the domestic stock exchange (hereinafter referred to as "eligible listing" or "IPO") prior to December 31, 2022 (or other date consented by the Parties through consensus and written consent, hereinafter referred to as "expected completion date of listing").

With a view to complete the eligible listing of the Target Company, the Parties consent to cooperate with the Target Company in taking or urging other parties to take all essential and appropriate actions, making or urging other parties to do all essential or appropriate behaviors and offer all corresponding assistance and cooperation, including, without limitation, the revision, alteration and termination of relevant clauses of the Supplementary Agreement, in line with the review requirements of the stock exchange, China Securities Regulatory Commission and other regulatory authorities.

8.2 Equity Repurchase

Where the Target Company is under any of the following circumstances, Party C shall repurchase part or all of the equity of the Target Company held by Party A as required by Party A:

(1) Where the Company fails to achieve IPO by the expected date of completion. If the Company's IPO declaration material has been formally accepted by the securities regulatory authority or stock exchange and is under audit, the repurchase launch occasion agreed in this provision shall be postponed to the date when the Company fails in the audit/registration in securities regulatory authority or stock exchange with respect to the IPO application or withdraws the IPO declaration materials.

(2) Equity repurchase under other circumstances:

1) There are major changes in the main business of the Target Company, which has resulted in substantial obstacles to the IPO listing of the Company;

2) The Target Company has an associated transaction or guarantee that may generate material adverse effect on Party A's interests with associated parties by violating the articles of association;

3) Before the IPO of the Target Company, the controlling shareholder and its concerted actors control the equity ratio of the Target Company less than 51% or lose control of the Company in other ways;

4) Where Party C is subjected to any hostile acquisition or attempt to change Party C's control power initiated by any subject or person, Party C's Board of Directors, without prejudice to director's loyalty, diligence and fiduciary duties under laws of the US, fails to response to it by taking the actions (e.g. issuing securities with voting right or any other nature of priority rights) according to relevant provisions of applicable law, registered certificate and the articles of association, causing material changes in Party C's shareholding structure, Board of Directors and management.

5) Party C or the Target Company and its subsidiaries have seriously dishonored their commitments and warranties or violated other obligations under the *Capital Increase Agreement* and the Supplementary Agreement,

and besides, they fail to correct and make up for their breach within the reasonable time limit indicated by the written notice sent by Party A which reasonably requires them to correct the breach.

(3) Party A shall submit a repurchase request to Party C in written form within fifteen (15) days from the date of the repurchase prescribed in this Article, in order that Party C are provided with sufficient time to make repurchase arrangements.

(4) Party C shall, within ninety (90) days after Party A raises the repurchase request in written form, enter into an equity transfer agreement with Party A, and fully pay the corresponding equity repurchase price within the period indicated in the relevant repurchase legal documents.

8.3 Calculation Method of Equity Repurchase Price

The equity repurchase price of the Target Company is the investment fund actually paid by Party A when it acquires the equity.

8.4 The Parties further consent that, in the case that the Target Company fails to complete the listing prior to the expected completion date of listing, Party C shall also be entitled to send a repurchase notice to Party A in written form, and repurchase all the equity of the Target Company held by Party A at the price prescribed in Article 8.3 of the Supplementary Agreement.

ARTICLE 9 EQUITY TRANSFER

9.1 Restrictions on Equity Transfer

(1) Under no circumstances shall Party A directly or indirectly transfer any corporate equity to an entity (“competitor”) or its affiliated party that maintains a competitive relationship with the business of the Target Company unless it acquires the written consent of the Target Company ahead of time.

(2) Within one year after the eligible listing of the Target Company (or longer period provided by applicable laws and regulations), Party A shall not transfer or entrust others to manage the shares of the Target Company held by it in any form, nor propose that the Target Company repurchase the shares of the Target Company held by it. Upon expiration of the aforesaid time limit, the shares of the Target Company held by Party A can be traded in the relevant market, except for those prohibited from being sold in accordance with the mandatory provisions of applicable laws, and the transaction shall strictly follow laws, administrative regulations, departmental rules, normative documents and relevant regulations of regulatory authorities such as exchanges, and corresponding information disclosure obligations shall be fulfilled.

9.2 Preemptive Rights

In the case that the controlling shareholder plans to transfer all or part of the Company's equity to a third party after the capital increase is accomplished and prior to the IPO of the Target Company, the controlling shareholder shall inform Party A of the above transfer matters beforehand in writing, and Party A shall be entitled to the preemptive right under the same conditions.

Despite the foregoing agreement, (1) the equity transfer arising out of the employee incentive plan as implemented by the Target Company; (2) He Junfang's transfer of some equities of the Target Company he holds via its controlled Beijing Bomeilian Special Ceramics Co., Ltd. or other subject after the restructuring specified in the Supplementary Agreement (the transfer price of every RMB 1 registered capital shall be no lower than the RMB 1 registered capital price corresponding to the capital increase this time) is not subject to the aforesaid preemptive right. Party A agrees to waive the preemptive right.

9.3 Priority right to sell

In the case that the controlling shareholder, as the transferring shareholder, plans to transfer the corporate equity held by it to a third party (hereinafter referred to as the “transferee”) other than the rest shareholders (except for transferring the corporate equity held by it incurred by the execution of the Company's employee incentive plan), and Party A does not exercise the preemptive right as indicated in Article 9.2 of the Supplementary Agreement, Party A shall be entitled to send a written notice (hereinafter referred to as the “notice of priority right to sell”) to the controlling shareholder within twenty (20) working days upon receipt of the transfer notice, requiring to sell the Company's equities that Party A holds at the date thereof to a third party in priority at the same price and under the same terms and conditions as those of the controlling shareholder's transfer of equity to a third party (hereinafter referred to as “the priority right to sell”), and specify the proportion of the equity to be transferred to the registered capital in the notice of priority right to sell. In such case, the controlling shareholder shall promote the third party's agreement on the acceptance of Party A's equities.

In the event that Party A fails to issue a notice of priority right to sell within the above time limit, or exercises the preemptive right pursuant to Article 9.2 of the Supplementary Agreement, it shall be deemed that Party A has waived exercising the priority right to sell.

ARTICLE 10 ANTI-DILUTION

10.1 After the capital increase is accomplished, in the case that the Target Company increases its registered capital, under the same conditions, Party A shall be entitled to the priority to subscribe based on the proportion of its paid-in capital contribution at that time, except for the newly added/issued registered capital for implementing the employee incentive plan of the Target Company,.

10.2 Subject to the Supplementary Agreement, upon completion of this round of capital increase, if Party B increases in capital and share at a price lower than the price per share when Party A invests in Party B, Party A, according to the following agreement of this article, adjust the unit price of the Company's equities it holds by means of "generalized weighted average" ("adjusted price"), so that the price per share of all equity held by Party A in the Company shall not be higher than the price per share of the newly-added registered capital subscribed by the new investors in the rear round of financing ("anti-dilution adjustment"), and adjust the equity ratio obtained by the previous investment accordingly in accordance with 10.3 herein Party A's price per share shall be adjusted accordingly under the circumstances of share split, dividend payment, joint stock and restructuring.

$$\text{Adjusted price} = \text{OCP} * (\text{OS} + (\text{NP}/\text{OCP})) / (\text{OS} + \text{NS})$$

Registered capital amount that Party A holds after the adjustment = Total price of shares that Party A obtains/adjusted price

OCP= Price of every RMB of registered capital to the Company's equities that Party A holds prior to anti-dilution adjustment

OS= Sum of the Company's registered capital before subsequent capital increase and the registered capital that can be obtained by exercising the option

NP= Corresponding total investment in the Company's subsequent capital increase

NS= Corresponding newly increased registered capital for the Company's subsequent capital increase

10.3 Upon completion of this round of capital increase and prior to the IPO of the Target Company, when it is necessary to make anti-dilution adjustment, Party A shall be entitled to require the Target Company and the controlling shareholder to compensate Party A's equity, and the measures that can be selected include: (i) under the premise permitted by law, Party A subscribes for the newly-increased registered capital of the Company at the nominal consideration of RMB 1 yuan or at the lowest price provided by law; (ii) under the premise permitted by law, the controlling shareholder transfers the equity required for adjustment to Party A at the nominal consideration of RMB 1 yuan or at the lowest price provided by law; (iii) equity compensation methods provided by other laws.

10.4 Where the Target Company has one or multiple rounds of subsequent financing after the accomplishment of capital increase and before IPO of the Company, it shall calculate the equity compensation proportion respectively as per 10.3 herein for every round of financing.

ARTICLE 11 RIGHT TO KNOW

11.1 Upon completion of the capital increase, Party A shall be entitled to consult the Articles of Association, minutes of Shareholders' meetings, resolutions of the Board of Directors and minutes of meetings, resolutions of the Board of Supervisors and minutes of meetings, and financial and accounting reports, provided that the capital increase complies with relevant domestic and foreign laws and regulations and regulatory rules.

ARTICLE 12 GOVERNANCE OF THE COMPANY

12.1 Upon completion of the capital increase, the Target Company shall hold a Directors' meeting and invite all Directors to attend as stipulated in the Articles of Association. The resolutions of the Board of Directors shall be approved by more than half of all Directors, including but not limited to the following contents:

- (1) Formulation and modification of the Company's Articles of Association;
- (2) Formulation of the Company's major business policy and investment plan;
- (3) Formulation of the Company's annual financial budget and accounting plan;
- (4) Formulation of the Company's profits distribution scheme and loss recovery plan;
- (5) The Company's increase or decrease of its registered capital, issuance of bonds or other securities, and plans for listing;
- (6) The Company's external acquisition, sale of material assets, annexation, merger, reorganization, overseas investment, establishment of a joint venture, dissolution or liquidation;
- (7) Approval, modification and management of employee equity incentive plan or employee stock ownership plan in any other form;
- (8) A single guarantee amount exceeds 10% of the Company's latest audited net assets;
- (9) The total amount of external guarantee provided by the Company and its holding subsidiaries reaches or exceeds any guarantee provided after 50% of the Company's latest audited net assets;
- (10) The guarantee provided for the guarantee object whose asset-liability ratio exceeds 70%;
- (11) The guarantee provided for the Controlling Shareholder and its affiliates.

ARTICLE 13 COMMITMENTS, REPRESENTATIONS AND WARRANTIES

13.1 Representations and warranties of Party A:

(1) Party A is legally established and effectively exists in accordance with Chinese laws. Party A and its Shareholders are not classified as the “three types of shareholders” such as contractual private equity funds, asset management plans, and trust plans, and have the shareholder qualification stipulated by laws and regulations.

(2) Party A has independent legal status and full capacity for civil conduct to sign and perform the Supplementary Agreement and can act independently as a litigation subject.

(3) Party A has obtained all authorizations, approvals or registrations necessary for it to execute, deliver and perform the Supplementary Agreement and complete the transactions hereunder. The execution and performance hereof by Party A shall not violate the provisions of any relevant laws, regulations and normative documents or the clauses of any material contractual documents binding upon it.

(4) Party A has prepared sufficient funds for this capital increase and the source of funds is true and legal.

13.2 Representations and warranties of Party B and Party C (except for the circumstance having been disclosed to Party A):

(1) The execution and performance hereof by Party B and Party C have been internally approved and authorized, and such authorization document has been provided for Party A;

(2) Party B and Party C have independent legal status and full capacity for civil conduct to sign and perform the Supplementary Agreement and can act independently as a litigation subject.

(3) Party B and Party C commit that they have obtained all the authorization, approval or filing necessary for the execution and performance hereof and the completion of the transactions hereunder. The execution hereof by Party B and Party C and the performance of their obligations hereunder shall not violate any agreement entered into individually or jointly as a party or the provisions of any relevant laws, regulations and normative documents or the clauses of any material contractual documents binding upon them.

(4) As of the date of execution hereof, in the event that Party C is subjected to any hostile takeover or attempt to change Party C’s control right initiated by any entity or person, Party C’s Board of Directors, without prejudice to director’s loyalty, diligence and fiduciary duties under laws of the US, shall response to it by taking the actions (e.g. issuing securities with voting right or any other nature of priority rights) according to relevant provisions of applicable law, registered certificate and the articles of association, so as to avoid material changes to Party C’s shareholding structure, Board of Directors and management..

(5) As of the date of execution hereof, Party C shall neither operate, directly or indirectly, or for others, any business that is identical to, similar to or in competition with the Company’s main business, nor cause an adverse impact on the Company’s completion of the IPO on account of the matters related to horizontal competition.

(6) As of the date of execution hereof, Party B and Party C shall further regulate and reduce affiliated transactions, and shall not cause an adverse impact on the Company’s completion of the IPO on account of such transactions.

(7) The Target Company has not provided guarantees, loans or loans in disguise to the Controlling Shareholder or its affiliates or any third party, and there is neither mortgage, pledge, lien or other forms of guarantee or counter-

guarantee for important assets such as equity, real estate, land use rights, trademarks and patents, or other forms of contingent debts, liabilities or obligations. The execution and performance hereof will not entitle the Creditors of the Target Company (including, but not limited to, the lending bank) to declare that the debt is maturing

prematurely or to demand guarantees or increased interest or otherwise to change the terms and conditions of the debt.

(8) The Target Company is not involved in any material claim, lawsuit, arbitration, judicial investigation, administrative investigation or punishment, and the Controlling Shareholder is not involved in any material claim, lawsuit, arbitration, judicial investigation, administrative investigation or punishment concerning the Target Company. The Directors and Senior Managers of the Target Company are not involved in any material claim, lawsuit, arbitration, judicial investigation, administrative investigation or punishment as a result of the acts of the Target Company, and the Controlling Shareholder is not involved in any material claim, lawsuit, arbitration, judicial investigation, administrative investigation or punishment concerning the Directors and Senior Managers of the Target Company.

(9) On the signing date and the closing date hereof, the important agreements (including business, lease, loan and mortgage agreements) being executed by the Target Company shall be legal, valid and binding upon the relevant Parties. The important and ongoing affiliated transaction agreements made and concluded by and among the Target Company and the affiliates have complied with legal procedures and been disclosed to Party A. There is no circumstance that may cause the Target Company to be liable for breach of contract or indemnify the other Party, and there is no breach of contract which may have a material adverse effect on the Target Company. The agreements and contracts between the Target Company and third parties have been or will be performed in full and legally, and there is no circumstance where the Target Company shall bear major liabilities to any third party for any of its acts prior to the date of execution hereof.

(10) The Target Company has duly submitted a true and complete tax return to the Chinese tax authorities. The Target Company and its affiliates have paid in full the taxes (including, but not limited to, enterprise income tax, business tax, value-added tax, etc.) payable prior to the date of execution hereof in accordance with applicable Chinese tax laws, regulations and normative documents. The Target Company does not receive any notice of challenge, investigation or punishment from the government authorities concerning tax matters.

(11) All rights and interests in the intellectual property rights owned by the Target Company are legal without infringing the intellectual property rights of others. The important intellectual property rights of the Target Company are not involved in dispute, claim or any mortgage, pledge or other guarantee rights or restrictions.

(12) The Target Company has established legal labor relations with its employees without any major disputes, as well as the corresponding arbitration or litigation procedures. The Target Company and its subsidiaries have paid the social insurance premium, housing provident fund and other fees payable by the employees in accordance with applicable laws prior to the date of execution hereof.

(13) The restructuring agreed in ARTICLE 5.1 hereof by the Target Company will not materially and adversely affect its business, assets, personnel integrity and independence.

(14) Within 4 months after the end of each financial year, Party B and Party C commit to submit to Party A the Target Company's audit report of the previous year; the Target Company shall, within 15 days prior to the beginning of each financial year, provide Party A with the plans for annual operation, annual budget and investment of the following year; the annual audit of the Target Company shall be conducted by an accounting firm registered in China.

(15) This Agreement shall be legally binding up Party B and Party C once it comes into force,

ARTICLE 14 TERMINATION OF SPECIAL STIPULATIONS

14.1 The Supplementary Agreement shall terminate automatically on the date when the Target Company formally submits IPO application materials to China Securities Regulatory Commission (CSRC) or the stock exchange.

ARTICLE 15 MISCELLANEOUS

15.1 It is agreed by the Parties hereto that the Supplementary Agreement shall constitute an integral part of the *Capital Increase Agreement* and shall prevail in case of any inconsistency between the Supplementary Agreement and the *Capital Increase Agreement*. In case of any unfinished matters in the Supplementary Agreement, the provisions of the *Capital Increase Agreement* shall prevail.

15.2 The Supplementary Agreement shall take effect on the date of execution by the Parties hereto.

15.3 According to the needs of the change of business registration, the Parties agree to cooperate with each other to, in accordance with the format required by the industrial and commercial administration department, separately enter into a simplified Capital Increase

Agreement (the "Format Version") concerning the capital increase. In case of any conflict or inconsistency between the Format Version and the *Capital Increase Agreement* or the Supplementary Agreement, the provisions of the *Capital Increase Agreement* and the Supplementary Agreement shall prevail.

15.4 The Supplementary Agreement is made in triplicate, with each Party holding one copy. Each copy shall be equally authentic.

(The remainder of this page is intentionally left blank)

(No text on this page, and only for the signature of *Supplementary Agreement to Capital Increase Agreement on Beijing Tongmei Xtal Technology Co., Ltd. among Guangshuo Semiconductor Equipment (Shanghai) Co., Ltd., Beijing Tongmei Xtal Technology Co., Ltd. and AXT, INC.*)

Guangshuo Semiconductor Equipment (Shanghai) Co., Ltd., (Seal)

Legal representative or authorized representative (signature):

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Beijing Tongmei Xtal Technology Co., Ltd. (Seal)

Legal representative or authorized representative (signature):

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AXT, INC.

Authorized representative (signature):

**Schedule identifying agreements substantially identical to
the form of First Supplemental Agreement filed as Exhibit 10.14 hereto**

**Subscribed Capital of Beijing
Tongmei Xtal Technology Co., Ltd.**

| Investor | Purchase Price (RMB) | Capital % |
|-----------------------------------------------------------------------------------|---------------------------------|------------------|
| Liaoning Haitong New Energy Equity Investment (Limited Partnership) | 11,840,774 | 1.3373% |
| Liaoning Haitong New Energy Low-Carbon Industry Equity Investment Co., Ltd. | 4,604,745 | .5201% |
| Haitong Innovation Securities Investment Co., Ltd. | 13,156,415 | 1.4859% |
| Fujian Province An Xin Industry Investment Fund Partnership (Limited Partnership) | 8,942,416 | 1.01% |
| Jingangshan Meicheng Equity Investment Partnership (Limited Partnership) | 5,961,172 | .6733% |
| Hefei Walden II IC Industry Investment Partnership (Limited Partnership) | 6,955,797 | .7856% |
| Qingdao Xinxingyi Equity Investment Fund Partnership (Limited Partnership) | 3,974,553 | .4489% |
| Qiji (Hangzhou) Investment Consulting Co., Ltd. | 3,974,553 | .4489% |
| Gongqingcheng Yi Hua Tong Ze Investment Partnership (Limited Partnership) | 1,766,907 | .1996% |
| Sunrise Baoying (Ningbo) Investment Center (Limited Partnership) | 1,315,642 | .1486% |
| Xiamen He Yong Zhi Cheng Equity Investment Partnership (Limited Partnership) | 860,468 | .0972% |
| Hangzhou Jingyue Technology Development Partnership (Limited Partnership) | 993,611 | .1122% |

Supplementary Agreement II
to
Capital Increase Agreement on Beijing Tongmei Xtal Technology Co., Ltd.

Among

Guangshuo Semiconductor Equipment (Shanghai) Co., Ltd.,

Beijing Tongmei Xtal Technology Co., Ltd.

And

AXT, INC.

January 2021

Supplementary Agreement II to Capital Increase Agreement

The Supplementary Agreement II to the Capital Increase Agreement (hereinafter referred to as the “Agreement”) is made and entered into by and among the Parties below in Beijing on [DD] [MM], 2021.

Party A: Guangshuo Semiconductor Equipment (Shanghai) Co., Ltd.,

Domicile: Room 603, No. 15, Lane 218, Haiji No.6 Road, Nanhui New Town, Pudong New Area, Shanghai

Legal Representative: Zhang Shuheng

Party B: Beijing Tongmei Xtal Technology Co., Ltd.

Domicile: No.4, East Second Street, Industrial Development Zone, Tongzhou District, Beijing, PRC

Legal Representative: Morris Young

Party C: AXT, INC.

Domicile: 4281 TECHNOLOGY DR FREMONT CA 94538

Authorized Representative: Morris Young

(Party A, Party B and Party C are collectively referred to as the “Parties” and individually a “Party” in the Agreement, as required by the context)

WHEREAS:

1. Party A is the investor of the Target Company, a limited partnership duly incorporated and validly existing in accordance with the laws of the People’s Republic of China, with its registered address at Room 603, No. 15, Lane 218, Haiji No.6 Road, Nanhui New Town, Pudong New Area, Shanghai, PRC.
2. Party B is the Target Company, a limited liability company incorporated and effectively existing pursuant to Chinese laws, with a unified social credit code of

91110000700004889C and a registered capital of RMB 820.960319 million, its registered address is No.4, East Second Street, Industrial Development Zone, Tongzhou District, Beijing, PRC, and its legal representative is Morris Young.

3. Party C is a NASDAQ listed company (stock code: AXTI) with its address at 4281 TECHNOLOGY DR FREMONT CA 94538.
4. The Parties have signed and entered into the *Capital Increase Agreement on Beijing Tongmei Xtal Technology Co., Ltd.* (hereinafter referred to as the “Capital Increase Agreement”) and the *Supplementary Agreement to Capital Increase Agreement on Beijing Tongmei Xtal Technology Co., Ltd.* (hereinafter referred to as the “Supplementary Agreement”) on [DD] [MM], 2021. Party A consents to subscribe for the corresponding newly-increased registered capital of the Target Company in RMB cash equivalent to USD 90742 in total (Party A makes payment in RMB, and the specific amount is calculated as per the central parity of the exchange rate of USD to RMB (i.e. 1 U.S. dollar = RMB 6.6205) of the People’s Bank of China on 2:00 p.m., November 13, 2020, i.e. RMB 0.600758 million).

To further define the rights and obligations of the Parties in this round of capital increase of the Company, the Parties consent to make and enter into the Agreement, and reach supplementary agreements to the *Capital Increase Agreement* and *Supplementary Agreement* as below:

ARTICLE 1 DEFINITION AND INTERPRETATION

1.1 Unless otherwise stated herein or otherwise defined in the context, definitions and interpretations in the Agreement shall have the same meaning as those in the *Capital Increase Agreement* and *Supplementary Agreement*.

ARTICLE 2 EQUITY REPURCHASE

2.1 Qualified Listing

The Parties shall do their utmost to urge the Target Company to complete the initial public offering of shares and be listed on the domestic stock exchange (hereinafter referred to as “eligible listing” or “IPO”) prior to December 31, 2022 (or other date consented by the Parties through consensus and written consent, hereinafter referred to as “expected completion date of listing”). With a view to complete the eligible listing of the Target Company, the Parties consent that the provisions of Article 8 EQUITY REPURCHASE of the *Supplementary Agreement* shall terminate automatically upon formal submission of IPO application materials to the securities regulatory authority or the stock exchange by the Target Company.

2.2 Equity Repurchase

The Parties hereto further agree that if the Target Company fails or is unable to complete the qualified listing prior to the aforesaid expected date of listing, the provisions on repurchase set forth in Article 8 of the *Supplementary Agreement* shall take effect automatically and shall become effective retroactively as of the date of execution of the *Supplementary Agreement*, i.e.:

Where the Target Company is under any of the following circumstances, Party C shall repurchase part or all of the equity of the Target Company held by Party A as required by Party A:

(1) Where the Company fails to achieve IPO by the expected date of completion. If the Company’s IPO declaration material has been formally accepted by the securities regulatory authority or stock exchange and is under audit, the repurchase launch occasion agreed in this provision can be postponed to the date when the Company fails in the audit/registration in securities regulatory authority or stock exchange with respect to the IPO application or withdraws the IPO declaration materials.

(2) Equity repurchase under other circumstances:

1) There are major changes in the main business of the Target Company, which has resulted in substantial obstacles to the IPO listing of the Company;

2) The Target Company violates the provisions of the Articles of Association and conducts related transactions or guarantees with its affiliated parties that may have a material adverse impact on Party A's interests;

3) Before the IPO of the Target Company, the controlling shareholder and its concerted actors control the equity ratio of the Target Company less than 51% or lose control of the Company in other ways;

4) Where Party C is subjected to any hostile acquisition or attempt to change Party C's control power initiated by any subject or person, Party C's Board of Directors, without prejudice to director's loyalty, diligence and fiduciary duties under laws of the US, fails to response to it by taking the actions (e.g. issuing securities with voting right or any other nature of priority rights) according to relevant provisions of applicable law, registered certificate and the articles of association, causing material changes in Party C's shareholding structure, Board of Directors and management.

5) Party C or the Target Company and its subsidiaries have seriously dishonored their commitments and warranties or violated other obligations under the *Capital Increase Agreement* and the *Agreement*, and besides, they fail to correct and make up for their breach within the reasonable time limit indicated by the written notice sent by Party A which reasonably requires them to correct the breach.

(3) Party A shall submit a repurchase request to Party C in written form within fifteen (15) days from the date of the repurchase prescribed in this Article, in order that Party C are provided with sufficient time to make repurchase arrangements.

(4) Party C shall, within ninety (90) days after Party A raises the repurchase request in written form, enter into an equity transfer agreement with Party A, and fully pay the corresponding equity repurchase price within the period indicated in the relevant repurchase legal documents.

2.3 Calculation Method of Equity Repurchase Price

The equity repurchase price of the Target Company is the investment fund actually paid by Party A when it acquires the equity.

2.4 The Parties further consent that, in the case that the Target Company fails to complete the listing prior to the expected completion date of listing, Party C shall also be entitled to send a repurchase notice to Party A in written form, and repurchase all the equity of the Target Company held by Party A at the price prescribed in Article 2.3 of the Agreement.

ARTICLE 3 COMMITMENTS, REPRESENTATIONS AND WARRANTIES

The commitments, representations and warranties made by the Parties under the *Capital Increase Agreement* and *Supplementary Agreement* shall apply to the Agreement.

ARTICLE 4 MISCELLANEOUS

4.1 It is agreed by the Parties hereto that the Agreement shall constitute an integral part of the *Capital Increase Agreement* and the *Supplementary Agreement*, and shall prevail in case of any inconsistency there between. In case of any unfinished matters in the Agreement, the provisions of the *Capital Increase Agreement* and the *Supplementary Agreement* shall prevail.

4.2 The Agreement shall take effect on the date of signature by the Parties hereto.

4.3 The Agreement is made in triplicate, with each Party holding one copy. Each copy shall be equally authentic.

(The remainder of this page is intentionally left blank)

(No text on this page, and only for the signature of *Supplementary Agreement II to Capital Increase Agreement on Beijing Tongmei Xtal Technology Co., Ltd. among Guangshuo Semiconductor Equipment (Shanghai) Co., Ltd., Beijing Tongmei Xtal Technology Co., Ltd. and AXT, INC.*)

Guangshuo Semiconductor Equipment (Shanghai) Co., Ltd., (Seal)

Legal representative or authorized representative (signature):

(No text on this page, and only for the signature of *Supplementary Agreement II to Capital Increase Agreement on Beijing Tongmei Xtal Technology Co., Ltd. among Guangshuo Semiconductor Equipment (Shanghai) Co., Ltd., Beijing Tongmei Xtal Technology Co., Ltd. and AXT, INC.*)

Beijing Tongmei Xtal Technology Co., Ltd. (Seal)

Legal representative or authorized representative (signature):

(No text on this page, and only for the signature of Supplementary Agreement II to Capital Increase Agreement on Beijing Tongmei Xtal Technology Co., Ltd. among Guangshuo Semiconductor Equipment (Shanghai) Co., Ltd., Beijing Tongmei Xtal Technology Co., Ltd. and AXT, INC.)

AXT, INC.

Authorized Representative (signature):

**Schedule identifying agreements substantially identical to
the form of Second Supplemental Agreement filed as Exhibit 10.15 hereto**

**Subscribed Capital of Beijing
Tongmei Xtal Technology Co., Ltd.**

| Investor | Purchase Price (RMB) | Capital % |
|-----------------------------------------------------------------------------------|---------------------------------|------------------|
| Liaoning Haitong New Energy Equity Investment (Limited Partnership) | 11,840,774 | 1.3373% |
| Liaoning Haitong New Energy Low-Carbon Industry Equity Investment Co., Ltd. | 4,604,745 | .5201% |
| Haitong Innovation Securities Investment Co., Ltd. | 13,156,415 | 1.4859% |
| Fujian Province An Xin Industry Investment Fund Partnership (Limited Partnership) | 8,942,416 | 1.01% |
| Jinggangshan Meicheng Equity Investment Partnership (Limited Partnership) | 5,961,172 | .6733% |
| Hefei Walden II IC Industry Investment Partnership (Limited Partnership) | 6,955,797 | .7856% |
| Qingdao Xinxingyi Equity Investment Fund Partnership (Limited Partnership) | 3,974,553 | .4489% |
| Qiji (Hangzhou) Investment Consulting Co., Ltd. | 3,974,553 | .4489% |
| Gongqingcheng Yi Hua Tong Ze Investment Partnership (Limited Partnership) | 1,766,907 | .1996% |
| Sunrise Baoying (Ningbo) Investment Center (Limited Partnership) | 1,315,642 | .1486% |
| Xiamen He Yong Zhi Cheng Equity Investment Partnership (Limited Partnership) | 860,468 | .0972% |
| Hangzhou Jingyue Technology Development Partnership (Limited Partnership) | 993,611 | .1122% |

COMPUTATION OF RATIO OF EARNINGS TO FIXED CHARGES

| | Year Ended December 31, | | | | |
|------------------------------------------------------------------------------------------|-------------------------|---------------|------------------|------------------|-----------------|
| | 2020 | 2019 | 2018 | 2017 | 2016 |
| | (in thousands) | | | | |
| Earnings: | | | | | |
| Income (loss) before income taxes | \$ 7,072 | \$ (1,026) | \$ 11,947 | \$ 10,853 | \$ 5,699 |
| Less: Equity in loss (earnings) of investees | (111) | 1,876 | 1,080 | 1,694 | 1,995 |
| Less: Pre-tax net (income) loss attributable to noncontrolling interest | (1,803) | (1,012) | (1,355) | 87 | 670 |
| Add: Distributions paid by equity investees | — | — | — | — | — |
| Fixed charges and preferred stock dividends, as calculated below | 533 | 358 | 283 | 278 | 287 |
| Total earnings | \$ 5,691 | \$ 196 | \$ 11,955 | \$ 12,912 | \$ 8,651 |
| Computation of fixed charges and preferred stock dividends: | | | | | |
| Interest expense | \$ 222 | \$ 94 | \$ — | \$ — | \$ — |
| Preferred stock dividends ⁽¹⁾ | 177 | 177 | 177 | 177 | 177 |
| Interest component of rent expense ⁽²⁾ | 134 | 87 | 106 | 101 | 110 |
| Total combined fixed charges and preferred stock dividends | \$ 533 | \$ 358 | \$ 283 | \$ 278 | \$ 287 |
| Ratio of earnings to combined fixed charges and preferred stock dividends ⁽³⁾ | 10.68 | 0.55 | 42.24 | 46.45 | 30.14 |
| Deficiency of earnings to combined fixed charges and preferred stock dividends | N/A | N/A | N/A | N/A | N/A |

- (1) Dividends accrue on our outstanding Series A preferred stock at the rate of \$0.20 per annum per share of Series A preferred stock. We have not paid any dividends on preferred stock. 883,000 shares of our preferred stock were issued and outstanding for all of the periods presented.
- (2) Effective January 1, 2019 and onwards, interest is calculated consistent with guidance under ASC 842, where an estimate for the Company's incremental borrowing rate of 4.6% is used to calculate the interest component of rent expense. The borrowing rate is calculated using a weighted average for the interest rate on the Company's revolving line of credit of 4.4% and credit facility with the Bank of China of 4.7%. For the years prior to 2019, represents one-third of total rent expense which we believe is a reasonable estimate of the interest component of rent expense.
- (3) For periods in which there is a deficiency of earnings available to cover combined fixed charges and preferred stock dividends, the ratio information is not applicable.

| Subsidiaries of the registrant* | State or Other Jurisdiction of Incorporation |
|------------------------------------------------------------------|----------------------------------------------|
| Beijing Tongmei Xtal Technology Co., Ltd. | China |
| Nanjing Jin Mei Gallium Co., Ltd. | China |
| Beijing BoYu Semiconductor Vessel Craftwork Technology Co., Ltd. | China |

* As of December 31, 2020. Pursuant to Item 601(b)(21)(ii) of Regulation S-K, the names of other AXT, Inc. subsidiaries are omitted because, considered in the aggregate, they would not constitute a significant subsidiary as of December 31, 2020.

CONSENT OF INDEPENDENT REGISTERED PUBLIC ACCOUNTING FIRM

We hereby consent to the incorporation by reference in the Registration Statements on Form S-8 (Nos. 333-38858, 333-67297, 333-143366, 333-188788, 333-204478 and 333-231744) of AXT, Inc. of our reports dated March 23, 2021 relating to the consolidated financial statements and the effectiveness of internal control over financial reporting as of December 31, 2020, which appear in this Form 10-K.

/s/ BPM LLP

San Jose, California
March 23, 2021

CERTIFICATION PURSUANT TO 18 U.S.C. RULE 13a-14(a)/15d-14(a)

AS ADOPTED PURSUANT TO SECTION 302 OF THE SARBANES-OXLEY ACT OF 2002

I, Morris S. Young, certify that:

1. I have reviewed this annual report on Form 10-K of AXT, Inc.;
2. Based on my knowledge, this report does not contain any untrue statement of a material fact or omit to state a material fact necessary to make the statements made, in light of the circumstances under which such statements were made, not misleading with respect to the period covered by this report;
3. Based on my knowledge, the financial statements, and other financial information included in this report, fairly present in all material respects, the financial condition, results of operations and cash flows of the registrant as of, and for, the periods presented in this report;
4. The registrant's other certifying officer(s) and I are responsible for establishing and maintaining disclosure controls and procedures (as defined in Exchange Act Rules 13a-15(e) and 15d-15(e)) and internal control over financial reporting (as defined in Exchange Act Rules 13a-15(f) and 15d-15(f)) for the registrant and have:
 - (a) Designed such disclosure controls and procedures, or caused such disclosure controls and procedures to be designed under our supervision, to ensure that material information relating to the registrant, including its consolidated subsidiaries, is made known to us by others within those entities, particularly during the period in which this report is being prepared;
 - (b) Designed such internal control over financial reporting, or caused such internal control over financial reporting to be designed under our supervision, to provide reasonable assurance regarding the reliability of financial reporting and the preparation of financial statements for external purposes in accordance with generally accepted accounting principles;
 - (c) Evaluated the effectiveness of the registrant's disclosure controls and procedures and presented in this report our conclusions about the effectiveness of the disclosure controls and procedures, as of the end of the period covered by this report based on such evaluation; and
 - (d) Disclosed in this report any change in the registrant's internal control over financial reporting that occurred during the registrant's most recent fiscal quarter (the registrant's fourth fiscal quarter in the case of an annual report) that has materially affected, or is reasonably likely to materially affect, the registrant's internal control over financial reporting; and
5. The registrant's other certifying officer(s) and I have disclosed, based on our most recent evaluation of internal control over financial reporting, to the registrant's auditors and the audit committee of the registrant's board of directors (or persons performing the equivalent functions):
 - (a) All significant deficiencies and material weaknesses in the design or operation of internal control over financial reporting which are reasonably likely to adversely affect the registrant's ability to record, process, summarize and report financial information; and
 - (b) Any fraud, whether or not material, that involves management or other employees who have a significant role in the registrant's internal control over financial reporting.

March 23, 2021

/s/ MORRIS S. YOUNG

Morris S. Young
Chief Executive Officer
(Principal Executive Officer)

**CERTIFICATION PURSUANT TO 18 U.S.C. RULE 13a-14(a)/15d-14(a)
AS ADOPTED PURSUANT TO SECTION 302 OF THE SARBANES-OXLEY ACT OF 2002**

I, Gary L. Fischer, certify that:

1. I have reviewed this annual report on Form 10-K of AXT, Inc.;
2. Based on my knowledge, this report does not contain any untrue statement of a material fact or omit to state a material fact necessary to make the statements made, in light of the circumstances under which such statements were made, not misleading with respect to the period covered by this report;
3. Based on my knowledge, the financial statements, and other financial information included in this report, fairly present in all material respects, the financial condition, results of operations and cash flows of the registrant as of, and for, the periods presented in this report;
4. The registrant's other certifying officer(s) and I are responsible for establishing and maintaining disclosure controls and procedures (as defined in Exchange Act Rules 13a-15(e) and 15d-15(e)) and internal control over financial reporting (as defined in Exchange Act Rules 13a-15(f) and 15d-15(f)) for the registrant and have:
 - (a) Designed such disclosure controls and procedures, or caused such disclosure controls and procedures to be designed under our supervision, to ensure that material information relating to the registrant, including its consolidated subsidiaries, is made known to us by others within those entities, particularly during the period in which this report is being prepared;
 - (b) Designed such internal control over financial reporting, or caused such internal control over financial reporting to be designed under our supervision, to provide reasonable assurance regarding the reliability of financial reporting and the preparation of financial statements for external purposes in accordance with generally accepted accounting principles;
 - (c) Evaluated the effectiveness of the registrant's disclosure controls and procedures and presented in this report our conclusions about the effectiveness of the disclosure controls and procedures, as of the end of the period covered by this report based on such evaluation; and
 - (d) Disclosed in this report any change in the registrant's internal control over financial reporting that occurred during the registrant's most recent fiscal quarter (the registrant's fourth fiscal quarter in the case of an annual report) that has materially affected, or is reasonably likely to materially affect, the registrant's internal control over financial reporting; and
5. The registrant's other certifying officer(s) and I have disclosed, based on our most recent evaluation of internal control over financial reporting, to the registrant's auditors and the audit committee of the registrant's board of directors (or persons performing the equivalent functions):
 - (a) All significant deficiencies and material weaknesses in the design or operation of internal control over financial reporting which are reasonably likely to adversely affect the registrant's ability to record, process, summarize and report financial information; and
 - (b) Any fraud, whether or not material, that involves management or other employees who have a significant role in the registrant's internal control over financial reporting.

March 23, 2021

/s/ GARY L. FISCHER

Gary L. Fischer
*Chief Financial Officer and Corporate Secretary
(Principal Financial Officer and
Principal Accounting Officer)*
