

**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, 2023

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:

Title of each class:

Trading Symbol

Name of each exchange on which registered:

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 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 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. ☒

If securities are registered pursuant to Section 12(b) of the Act, indicate by check mark whether the financial statements of the registrant included in the filing reflect the correction of an error to previously issued financial statements. ☐

Indicate by check mark whether any of those error corrections are restatements that required a recovery analysis of incentive-based compensation received by any of the registrant's executive officers during the relevant recovery period pursuant to §240.10D-1(b). ☐

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

The aggregate market value of the voting stock held by non-affiliates of the registrant, based upon the closing sale price of \$3.44 for the common stock on June 30, 2023 as reported on the Nasdaq Global Select Market, was approximately \$117,469,192. 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, 2024, 44,248,248 shares, \$0.001 par value, of the registrant's common stock were outstanding.

Document Incorporated by Reference

Portions of the registrant's definitive proxy statement relating to our annual meeting of stockholders to be held on May 16, 2024 (the "Proxy Statement") are incorporated by reference into Part III of this Annual Report on Form 10-K where indicated. Such Proxy Statement will be filed with the Securities and Exchange Commission (the "SEC") pursuant to Regulation 14A not later than 120 days after the end of the fiscal year covered by this Annual Report on Form 10-K.

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PART I

This Annual Report on Form 10-K of AXT, Inc. (“AXT”, “the Company”, “we,” “us,” and “our” refer to AXT, Inc. and its consolidated subsidiaries) 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, including the use of InP wafer substrates in artificial intelligence (“AI”) applications, the development and adoption 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 any reduction in our work force, our ability to have new customers qualify substrates from our manufacturing locations in 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 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, geopolitical tensions, export restrictions in China, 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 current COVID-19 vaccines; tariffs and other trade war issues; export restrictions in China; 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 is a worldwide 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 wafer substrate used in broadband and fiber optic applications, 5G infrastructure and data center connectivity. Data centers use InP devices for high-speed optical data transmission. We believe the growth of AI applications will increase the need for high-speed data transfer which may lead to an increase in InP substrate demand from such data centers. Currently, InP substrates are being used in certain consumer products, including proximity sensors in mobile devices, 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, such as light emitting diodes (LEDs) that are used in a wide range of applications including automotive lighting, horticulture, signage, display, sensors and machine vision. Semi-conducting GaAs substrates are also used in making industrial lasers. GaAs wafers could also be used for making vertical cavity surface emitting lasers (VCSELs) for facial recognition and micro-LEDs targeting improved screen technology. Ge substrates are used in applications such as solar cells for space and terrestrial photovoltaic applications.

Our supply chain strategy includes several consolidated raw material companies. 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. A 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. Our substrate product group generated 63%, 79%, and 75% of our consolidated revenue and our raw materials product group generated 37%, 21%, and 25% for 2023, 2022, and 2021, 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
Indium Phosphide (InP) 2", 3", 4"	<ul style="list-style-type: none"> • Data center connectivity using light/lasers • High-speed data transfer in data centers to support AI applications • 5G communications • Fiber optic lasers and detectors • Consumer devices • Passive Optical Networks (PONs) • Silicon photonics • Photonic Integrated circuits (PICs) • Thermo-Photovoltaics (TPV's) • RF amplifier and switching (military wireless & 5G) • Infrared light-emitting diode (LEDs) motion control • Lidar for robotics and autonomous vehicles • Infrared thermal imaging
Gallium Arsenide (GaAs - semi-insulating) 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
Gallium Arsenide (GaAs - semi-conducting) 1", 2", 3", 4", 5", 6", 8"	<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
Germanium (Ge) 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	
6N+ and 7N+ purified gallium	<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)
Boron trioxide (B2O3) Gallium-Magnesium alloy	<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
pyrolytic boron nitride (pBN) crucibles	<ul style="list-style-type: none"> • Used when growing single-crystal compound semiconductor ingots
pBN insulating parts	<ul style="list-style-type: none"> • Used as effusion rings when growing OLED tools • Used in MOCVD reactors • Used when growing epitaxial layers in Molecular Beam Epitaxy (MBE) reactors

All of our substrate products and raw material products are manufactured in the People's Republic of China (PRC or China) by our PRC subsidiaries and PRC joint ventures material companies. The PRC 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. In the event of industry-wide supply shortages we believe our vertically integrated supply chain strategy will be even more advantageous. 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 noncontrolling 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.

In 2015, the Beijing city government announced its decision to move most of its offices into the district where our original manufacturing facility is currently located (the Tongzhou district) and the Beijing city government has moved thousands of government employees into this district. The government has constructed showcase tower buildings and overseen the establishment of new apartment complexes, retail stores and restaurants. A large park, named Green Heart City Park, was built across the street from our facility and Universal Studios has developed an amusement park within a few miles of our facility. To create room and upgrade the district, the city instructed virtually all existing manufacturing companies, including Tongmei, 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 part of our germanium manufacturing line. Our indium phosphide manufacturing line, as well as various administrative and sales functions, remain primarily at our original site.

Begun in 2017, the relocation of our gallium arsenide production lines is now completed. Our PRC subsidiary, Baoding Tongmei Xtal Technology Co., Ltd. ("Baoding Tongmei"), 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 the new manufacturing facility of our PRC subsidiary, ChaoYang Tongmei Xtal Technology Co., Ltd., ("ChaoYang Tongmei"), in Kazuo, a city approximately 250 miles from Beijing. We transferred our wafer processing equipment for gallium arsenide to Baoding Tongmei's new manufacturing facility in Dingxing, a city approximately 75 miles from Beijing. These new facilities enabled us to expand capacity and upgrade some of the equipment. In 2021 and 2022, we added additional equipment, including certain more advanced equipment. We have also invested in additional buildings to complement the initial construction and add capacity as needed. Our PRC subsidiaries also acquired sufficient land to enable them to add facilities, if needed in the future. We believe our success in the relocation and our ability to add capacity in the future gives us competitive advantages. In addition, a new level of technological sophistication in our manufacturing capabilities is enabling us to support the major trends that we believe are likely to drive demand for our products in the years ahead.

New customer qualifications and expanding capacity as needed require us to continue to diligently address the many details that arise at each of our 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 consist of 10 private equity funds, had 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 Investment Agreements”), 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 Annual Report on Form 10-K. The remaining investment of approximately \$1.5 million of new capital was funded in January 2021. The government approved the approximately \$49 million investment in its entirety on January 25, 2021. In exchange for an investment of approximately \$49 million, the Investors received a 7.28% redeemable noncontrolling interest in Tongmei.

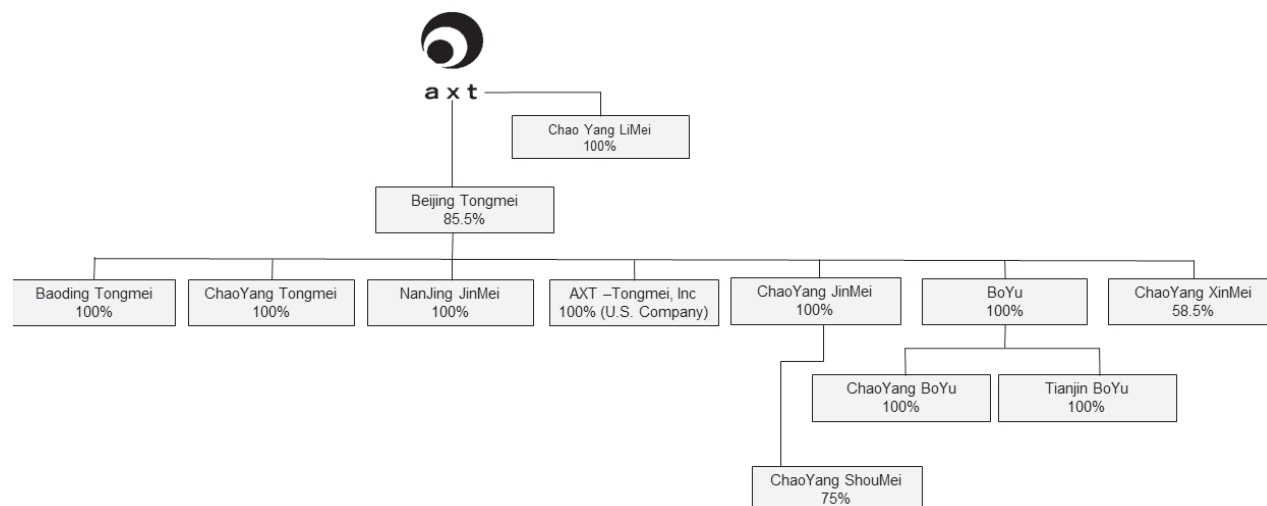
Pursuant to the Capital Investment Agreements with the Investors, each Investor has the right to require AXT to redeem any or all Tongmei shares held by such Investor at the original purchase price paid by such Investor, without interest, in the event the IPO fails to pass the audit of the Shanghai Stock Exchange, is not approved by the Chinese Securities Regulatory Commission (“CSRC”) or Tongmei cancels the IPO application. The aggregate redemption amount is approximately \$49 million, subject to the foreign exchange rate variable at time of redemption.

Tongmei submitted its IPO application to the Shanghai Stock Exchange in December 2021 and it was formally accepted for review on January 10, 2022. The Shanghai Stock Exchange approved the IPO application on July 12, 2022. On August 1, 2022, the CSRC accepted for review Tongmei’s IPO application. The STAR Market IPO remains subject to review and approval by the CSRC and other authorities. The process of going public on the STAR Market includes several periods of review and therefore is a lengthy process. Subject to review and approval by the CSRC and other authorities, Tongmei hopes to accomplish this goal in the coming months. The listing of Tongmei on the STAR Market will not change the status of AXT as a U.S. public company.

An early step in the STAR Market IPO process involved 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 their subsidiaries were assigned to Tongmei in December 2020. As of June 30, 2021, AXT-Tongmei, Inc., a wholly owned subsidiary of AXT, was assigned to Tongmei. The assignment to Tongmei of JinMei and BoYu and their subsidiaries, and AXT-Tongmei, Inc. increased the number of customers and employees attributable to Tongmei as well as increased Tongmei’s consolidated revenue.

We are neither a PRC operating company nor do we conduct our operations in China through the use of variable interest entities (“VIEs”). Recent statements and regulatory actions by China’s government on the use of VIEs and data security or anti-monopoly concerns have not impacted our ability to conduct our business or continue to list our common stock on the Nasdaq Global Select Market.

The following organization chart depicts the consolidated structure as of December 31, 2023.



The businesses of our PRC subsidiaries and PRC joint ventures are subject to complex and rapidly evolving laws and regulations in the PRC, which can change quickly with little advance notice. The PRC government is a single party form of government with virtually unlimited authority and power to intervene in or influence commercial operations in China. In the past, we have experienced such intervention or influence by the PRC government and a change in the rules and regulations in China when we were instructed by the Beijing municipal government to relocate part of our manufacturing facility in Beijing and expect that such intervention or influence or change in the rules and regulations in China could occur in the future.

In the ordinary course of business, our PRC subsidiaries and PRC joint ventures require permits and licenses to operate in the PRC. Such permits and licenses include permits to use hazardous materials in manufacturing operations. From time to time, the PRC government issues new regulations, which may require additional actions on the part of our PRC subsidiaries and PRC joint ventures 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. In the ordinary course of business, our PRC subsidiaries and PRC joint ventures apply for permits as required. Any such intervention or influence or change in the rules and regulations in China could result in a material change in our PRC operations and/or the value of our common stock or cause the value of such securities to significantly decline or be worthless.

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 and we expect the volume to increase. In 2023, 2022 and 2021, we paid approximately \$1.0 million, \$3.3 million and \$1.3 million, respectively, in tariffs. The future impact of tariffs and trade wars is uncertain.

Effective as of August 1, 2023, the PRC government instituted a requirement for export licenses for gallium and germanium-related materials and the derivative products using these materials. Tongmei is required to apply for export licenses for gallium arsenide and germanium wafer substrates and each application must state the end use of the product exported. These regulations have required a new level of administration by Tongmei. In some cases, the PRC government has not issued the requisite licenses and our shipments have been delayed.

We have created a vertically integrated supply chain and transfer cash through our corporate structure in three ways. First, we capitalize our investments in our PRC subsidiaries. We licensed to our PRC subsidiaries intellectual property and received from our PRC subsidiaries royalty payments or one-time fees. Second, we use transfer pricing arrangements to buy from our PRC subsidiaries and PRC joint ventures wafers and raw materials. We review the terms of the transfer pricing arrangements annually with our independent registered public accounting firm. In the past, we sold to our PRC subsidiaries capital equipment that we purchased at the request of our PRC subsidiaries and for which we were reimbursed by the applicable PRC subsidiary. In recent years, Tongmei purchases capital equipment from suppliers in Taiwan, Japan, China, Europe or South Korea. Third, our PRC subsidiaries and PRC joint ventures pay dividends to entities within the Company's corporate structure. For the years ended December 31, 2023, 2022 and 2021, the aggregate dividends paid to the Company, directly or to an intermediate entity within our corporate structure, by our PRC subsidiaries and PRC raw material joint ventures were approximately \$4.3 million, \$2.9 million and \$774,000, respectively. For years ended December 31, 2023 and 2022, the aggregate dividends paid to minority shareholders by our PRC subsidiaries and PRC raw material joint ventures were approximately \$0 and \$0, respectively. In the year ended December 31, 2023, we continued the settlement of amounts owed under our transfer pricing arrangements in the ordinary course of business. We have no current intentions to distribute earnings to our investors under our corporate structure.

The cash generated from one PRC subsidiary is not used to fund another PRC subsidiary's operations. None of our PRC subsidiaries has ever faced difficulties or limitations on its ability to transfer cash between our subsidiaries. We have cash management policies that dictate the amount of such funding.

We are subject to a number of unique legal and operational risks associated with our corporate structure, any of which could result in a material change in our operations and/or the value of our common stock or cause the value of such securities to significantly decline or be worthless. Please carefully read the “Risk Factors” in this Annual Report on Form 10-K in Item 1A below, including Category III, “Risks Related to International Aspects of Our Business”. In particular, the following risk factors address issues associated with our corporate structure:

- Although we are a Delaware corporation and are neither a PRC operating company nor do we conduct our operations in China through the use of VIEs, in the event we inadvertently concluded that we do not require any permissions or approvals from the CSRC or other PRC central government authorities to complete a public offering of securities in the U.S. or applicable laws, regulations, or interpretations change, we may be required to obtain such permissions or approvals to complete such a public offering of securities.
- The PRC central government may intervene in or influence our PRC operations at any time and the rules and regulations in China can change quickly with little advance notice.
- The PRC central government may also exert more control over offerings conducted overseas and/or foreign investment in China-based issuers, which could result in a material change in our operations and/or the value of our common stock.
- Changes in China’s political, social, regulatory or economic environments may affect our financial performance.
- Joint venture raw material companies in China bring certain risks.
- Risks exist in utilizing our new gallium arsenide manufacturing sites efficiently.
- 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.
- Shutdowns or underutilizing our manufacturing facilities may result in declines in our gross margins.
- Enhanced trade tariffs, import restrictions, export restrictions, Chinese regulations or other trade barriers may materially harm our business.
- 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.
- Our international operations are exposed to potential adverse tax consequence in China.
- We derive a significant portion of our revenue from international sales, and our ability to sustain and increase our international sales involves significant risks.
- 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.
- We are subject to foreign exchange gains and losses that may materially impact our statement of operations.
- Although the audit report is prepared by an independent registered public accounting firm that is currently inspected fully by the Public Company Accounting Oversight Board (the “PCAOB”), there is no guarantee that future audit reports will be prepared by an independent registered public accounting firm that is completely inspected by the PCAOB.

Our independent registered public accounting firm is BPM LLP (“BPM”), which is registered with the PCAOB. The Holding Foreign Companies Accountable Act (the “HFCA Act”) requires that the PCAOB determine whether it is unable to inspect or investigate completely registered public accounting firms located in a non-U.S. jurisdiction because of a position taken by one or more authorities in that jurisdiction. On December 16, 2021, the PCAOB issued a report on its determinations that the PCAOB is unable to inspect or investigate completely registered public accounting firms headquartered in the PRC and Hong Kong because of positions taken by PRC authorities in those jurisdictions. BPM is headquartered in the United States and not in the PRC or Hong Kong. As such, BPM is subject to the determinations announced by the PCAOB. Accordingly, the Company does not expect the HFCA Act, the Accelerating Holding Foreign Companies Accountable Act and the related regulations to affect the Company and does not expect to be identified by the Securities and Exchange Commission, or SEC, under the HFCA Act. On December 15, 2022, the PCAOB vacated its 2021 determinations that the positions taken by authorities in the PRC and Hong Kong prevented it from inspecting and investigating completely registered public accounting firms headquartered in those jurisdictions. See “Although the audit report is prepared by an independent registered public accounting firm that is currently inspected fully by the PCAOB,

there is no guarantee that future audit reports will be prepared by an independent registered public accounting firm that is completely inspected by the PCAOB” under the section entitled “Risk Factors” in Item 1A below for further information on risks related to our foreign operations and dependence.

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 chip 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 wafer substrate used in broadband and fiber optic applications, 5G infrastructure and data center connectivity. Data centers use InP devices for high-speed optical data transmission. We believe the growth of AI applications will increase the need for high speed data transfer, which may lead to an increase in InP substrate demand from such data centers. Currently, InP substrates are being used in certain consumer products, including proximity sensors in mobile devices, 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 light emitting diodes (LEDs) that are used for a wide range of applications including automotive lighting, horticulture, signage, display, sensors and machine vision. They are also used in making industrial lasers. GaAs wafers could also be used for making vertical cavity surface emitting lasers (VCSELs) for facial recognition and micro-LEDs targeting improved screen technology. 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:

- ***We believe our InP substrates are best in class.*** We believe our InP substrates have the lowest defect densities and lowest stress and slip lines on the market and are best in class. Our InP substrates enable 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.

Further, we believe we can be the dominant supplier in the emerging 6-inch diameter market. Already, our InP substrates have reached production in at least two well-known consumer products. Also, one of our largest data center upgrade customers works closely with us as a partner. Our advantages increase with larger diameters, which the industry is starting to demand, and we believe our superior technology will converge with new demands from data centers that are driven by AI applications, additional consumer application wins and other data center and 5G/telecom applications.

- ***New facilities, equipment and added capacity.*** We believe we are the only company in our industry to have added significant new facilities, equipment and capacity in recent years. Although current customers and prospective customers previously viewed our relocation process as a risk, we believe our success in managing this process now positions 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.
- ***We believe that we are the only compound semiconductor substrate supplier to have a position in raw materials.*** We believe this provides us with a more reliable supply of, and shorter lead-times for, the raw materials central to our final manufactured products. Customers find this business model attractive. Revenue from the sale of raw materials provides further diversity in our customer base and business model.
- ***Unique access to capital if needed to expand capacity.*** We believe the combination of access to both the U.S. and China capital markets presents a strong position to our customers and gives us an advantage over our competitors.
- ***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. Our primary competitors have their major manufacturing operations in Germany or Japan.
- ***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. The most recent example is the requirement for 8-inch wafers GaAs. 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. We believe the quality of our low EPD wafers 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.
- ***Our team.*** 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 advanced degrees in physics or materials science. We are known in the marketplace to be knowledgeable and responsive.

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. We intend to promote our capabilities as we believe we provide “best in class” InP wafers. On the horizon, AI will use InP for high-speed data transmission. Other applications could include driverless cars, 5G in cell phones and health and well-being biometric wearables.

- **Promote flagship products: 8-inch GaAs and 6-inch InP.** We intend to promote our technological strengths by showcasing our success in developing larger diameter wafers. Our 8-inch GaAs product has crossed several milestones and is now shipping in small quantities. The InP development will initially target a consumer market.
- **Expand our recycling program.** We have successfully deployed InP recycling and have developed a recycling program for GaAs. Recycling can lower our manufacturing costs and it is also good for the environment. Some customers require recycling programs.
- **Showcase our new facilities.** With travel restrictions largely removed, we plan to host more customers that tour our facilities. We had several very positive visits in 2023 and plan to increase the number of visits in 2024.
- **Strengthen our raw materials supply chain.** 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 have identified some new steps that will make our supply chain even stronger.
- **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 revenue volumes.
- **Increase manufacturing efficiencies.** The recent industry-wide inventory corrections and reduced manufacturing volumes impacted our manufacturing efficiencies. We will seek to continue to leverage our China-based manufacturing advantages by increasing efficiencies in our manufacturing methods, systems and processes. We promote the concept and practice of continuous improvement within our company culture.
- **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 and it is a complicated and highly technical process. We do not grow the epitaxial layer. We sell the majority of our substrates to companies that specialize

in applying the epitaxial layer. Our wafers are then used to produce state-of-the-art electronic circuits and opto-electronic devices. The chips are used in a wide variety of 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.

Crystal growth process technology frequently contains steps and procedures that are considered proprietary trade secrets held by the manufacturer, 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 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 GaAs industrial lasers, 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 our 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, 5G infrastructure, metro and data center connectivity, silicon photonics data center upgrades, photonic ICs (PICs), terrestrial solar cell (CPV), lasers, RF amplifiers, infrared motion control and infrared thermal imaging. On the horizon, we believe InP wafers will be used in artificial intelligence hardware architecture for high-speed data transmission. We make semi-insulating GaAs substrates used in making semiconductor chips in applications such as power amplifiers for wireless devices and high-performance transistors. 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 can be used to make micro-LEDs for advanced screen technologies and to create opto-electronic products for 3-D facial recognition 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. Many of our customers require customized specifications, such as special levels of iron or sulfur dopants or a special wafer thickness. We supply InP substrates in two-, three- and four-inch diameters, and are developing six-inch diameter InP substrates. We supply 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. More recently we have successfully developed 8-inch GaAs wafers and are selling them in small quantities.

Raw Materials. Our 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. A third newly formed subsidiary will focus on production and sale of arsenic.

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 eight 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 do not grow the 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. No customer represented more than 10% of our revenue for the years ended December 31, 2023 and 2021 and one customer, Landmark, represented 15% of our revenue for the year ended December 31, 2022. Our top five customers, although not the same five customers for each period, represented 25% of our revenue for the year 2023, 34% of our revenue for 2022 and 26% of our revenue for 2021.

For the year ended December 31, 2023, three customers of our consolidated subsidiaries, in aggregate, accounted for 31% of raw material sales. For the year ended December 31, 2022, three customers of our consolidated subsidiaries, in aggregate, accounted for 29% of raw material sales and for the year ended December 31, 2021, three customers accounted for 28% 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 eight 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 material, 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 manufacturing 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. 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, high-purity arsenic, germanium, germanium dioxide, 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, phosphorus and polishing solutions. We generally purchase our materials through standard purchase orders and not pursuant to long-term supply contracts.

Recycling

We developed a proprietary process technology that enables us to recycle remnants of indium phosphide processing material. The process was introduced into manufacturing in 2022. The process involves capturing certain InP waste materials generated in the manufacturing process. These materials can then be re-processed and cycled back into the normal process procedures. Not only is this beneficial for environmental reasons, it also reduces our total material costs and, ultimately, improves our gross margin. We have also developed a recycling process for gallium arsenide and expect to deploy it when final permits are issued.

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 sales force 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 for 2023 and approximately 86% and 90% of our revenue during each of 2022 and 2021, respectively. The primary markets for sales of our substrate products outside of North America are to customers located in Asia and Western Europe.

Our raw material companies sell specialty raw materials including 4N, 5N, 6N, 7N and 8N gallium, boron oxide, germanium, arsenic, germanium dioxide, and pyrolytic boron nitride crucibles used, for example, in crystal growth processes, epitaxial layer growth in MBE reactors and 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.

Certain micro devices, such as those used in industrial lasers, require GaAs wafers with very low EPD. Low EPD will also be required for GaAs 8-inch diameter wafers applications and InP wafers that will be used in certain high-end applications. Low EPD has been, and will remain, a focus in our research and development efforts.

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. We are also focused on developing 6-inch InP wafer substrates and on increasing yields on the recently developed 8-inch GaAs wafers substrates.

As a manufacturing company, we must constantly improve our manufacturing processes to remain competitive, and our research and development programs must be integrated into our manufacturing lines. All of our research and development is conducted at our manufacturing facilities and the process technology developed by the China teams over the last 20 years enables us to remain competitive and to provide high-quality wafer substrates to our customers. Our China research and development teams must continue to stay close to the manufacturing sites and develop new process steps, features and benefits. We believe our teams are fully capable of moving the process technology forward.

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 \$12.1 million in 2023, compared with \$13.9 million in 2022 and \$10.3 million in 2021. 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;
- low EPD;
- 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. Our wafers cannot be used to make chips until the epitaxial layers are grown. 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, then 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"), Freiberger Compound Materials ("Freiberger"), Umicore, China Crystal Technology Corp. ("CCTC") and Vital Materials. 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 the proprietary process technology secrets developed by teams in China 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 in China 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 138 patents that relate to our VGF products and processes; 110 in China, 11 in the United States, 8 in Japan, 4 in Taiwan, 3 in the European Union, and 2 in Germany. Patents have a protected life of 20 years (or 10 years for utility model patents in China) from their filing dates. Our patents have expiration dates ranging from 2024 to 2038. In some cases we may consider filing divisional, continuation or continuation-in-part of the existing patents for additional claims. We have several patent applications pending in China, United States, and rest of the world. Furthermore, in aggregate, our consolidated raw material companies have been issued 112 patents in China, including 35 patents issued to JinMei, 66 patents issued to BoYu and 11 patents issued to ChaoYang XinMei High Purity Semiconductor Materials Co., Ltd. (“ChaoYang XinMei”).

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 works to improve the environment. 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, which may increase our capital expenditures 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, 2023, AXT and Tongmei had 999 employees, which consisted of 24 employees in our headquarters in Fremont, California, one sales professional in France and 974 employees in our factories in China. In addition, our consolidated raw material companies had, in total, 457 employees. In aggregate, we and our consolidated raw material companies had 1,456 employees, of whom 1,044 were principally engaged in manufacturing, 177 in sales and administration and 235 in research and development. Of these 1,456 employees, 24, consisting of sales and marketing, accounting and finance, administration and corporate executives were located in the United States, one in France and 1,431 in China. Our employees in China are citizens of China, have families and pay taxes in China. We believe these factors are viewed favorably by government agencies 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, 2023, 1,191 employees in China, including employees of our 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 to our 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 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. Risks Related to Our Business and Operations;
- 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

- We are subject to a number of unique legal and operational risks associated with our corporate structure.
- The PRC central government may intervene in or influence our PRC operations at any time and the rules and regulations in China can change quickly with little advance notice.
- Although the audit report included in this Annual Report is prepared by an independent registered public accounting firm who is currently inspected fully by the Public Company Accounting Oversight Board (the “PCAOB”), there is no guarantee that future audit reports will be prepared by an independent registered public accounting firm that is completely inspected by the PCAOB.
- 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 current vaccines and resistance by some to be vaccinated could prolong COVID-19.
- Global economic and political conditions, including trade tariffs, import-export restrictions, and other restrictions, 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.
- 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. Shutdowns or underutilizing our manufacturing facilities may result in declines in our gross margins.
- Enhanced trade tariffs, import restrictions, export restrictions, Chinese regulations or other trade barriers may materially harm our business.
- 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.
- Our international operations are exposed to potential adverse tax consequence in China.
- Our gross margin has fluctuated historically and may decline or increase 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 the IPO fails to pass the audit of the Shanghai Stock Exchange, is not approved by the CSRC or Tongmei cancels the IPO application. 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 inventory, 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 consolidated statements of operations. Because we are a global company we are exposed to changes and swings in foreign exchange, particularly when currencies experience periods of volatility.
- Joint venture raw material companies in China bring certain risks.
- We derive a significant portion of our revenue from international sales, and our ability to sustain and increase our international sales involves significant risks.

II. Risks Related to Our Business and Operations

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.

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. For example, in the third quarter of 2022 our gross margin was 42.0% but it dropped to 10.7% in the third quarter of 2023 as a result of several of these factors.

Our raw material companies experience selling price volatility and purchase price volatility in acquiring base materials. We consolidate the results of two of these raw material companies, and 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, 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 Tongmei, 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 September 30, 2023, our revenue dropped to \$17.4 million and our gross margin was only 10.7%.

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 China 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.

Global economic and political conditions, including trade tariffs, import-export restrictions, and other 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 from China. 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 ended December 31, 2023, 2022 and 2021 we paid approximately \$1.0 million, \$3.3 million and \$1.3 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. These factors could negatively impact our sales 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 and U.S. financial system may cause our customers to postpone deliveries. The COVID-19 virus remains an additional cause of uncertainty. Additionally, U.S. bank failures may affect our customers. 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. For example, global business conditions deteriorated in the second half of 2022. In the second quarter of 2022, our revenue totaled \$39.5 million. In the fourth quarter of 2022, our revenue declined to \$26.8 million and in the third quarter of 2023, our revenue further declined to \$17.4 million. 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.

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

The spread of COVID-19 impacted our operations and financial performance. The outbreak of COVID 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. In December 2022, the PRC government ended its zero-COVID policy. If there is a renewed surge of the COVID-19 pandemic in cities in which our PRC subsidiaries and PRC joint ventures are located, the Chinese government may require these 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. were disrupted and this impacted our efficiency. In the future, 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.

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 industrial lasers and LED lighting. These applications require very low defect densities, also called 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.

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 tightened control over hazardous chemicals and other hazardous materials. 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 materials or a company's failure to meet the ever-tightening standards for control of hazardous chemicals or hazardous materials 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.

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.

Unforeseen manufacturing issues and restrictions at the new manufacturing sites could occur.

In 2015, the Beijing city government announced its decision to move most of its offices to the Tongzhou district where our original manufacturing facility is currently located. The Beijing city government has moved thousands of government employees into this district. To create room and upgrade the district, the government instructed virtually all existing manufacturing companies, including Tongmei, to relocate all or some of their manufacturing lines. We were instructed to move our gallium arsenide manufacturing lines out of the area.

Although the relocation is completed and we are in volume production at the new sites, unforeseen manufacturing issues and restrictions at the new sites could 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 each of our 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.

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 Tongmei, 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 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.

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, including certain consumer applications, which utilize our products. For example, we have developed an 8-inch gallium arsenide wafer targeting an application in a consumer product. Our customer recently informed us that its end-user customer has cancelled its project. Production of the intended product was scheduled to begin in 2025. While there may be other end users, this particular cancellation is the loss of a potentially high-volume sales opportunity. Other factors affecting the ability of the manufacturers downstream in our supply chain to introduce and market their products successfully, include:

- 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. More recently, global business conditions deteriorated, beginning in the second half of 2022. In general, many companies purchased more inventory than needed, in part due to fears of shortages resulting from COVID. In the second quarter of 2022, our revenue totaled \$39.5 million. In the fourth quarter of 2022 our revenue declined to \$26.8 million, in the second quarter of 2023, our revenue declined to \$18.6 million and in the third quarter of 2023, our revenue further declined to \$17.4 million. We expect similar cycles of strong demand followed by lower demand will occur for various InP, GaAs or Ge substrates in the future.

Our financial performance can be hurt if there are unfavorable financial results in any of our raw material companies.

The raw material companies in our vertically integrated supply chain have historically made a positive contribution to our financial performance. However, if there are unfavorable changes in revenue, average selling prices, gross margins or operating expenses in one or more of the consolidated companies, then this can result in a negative impact on our consolidated revenue, gross margin and profitability. If the companies are accounted for under the equity method, then these changes can result in a reduction in Equity in Income of Unconsolidated Joint Venture Companies. In 2023 and 2022, the companies accounted for under the equity method of accounting contributed a gain of \$1.9 million and \$6.0 million, respectively, to our consolidated financial statements. In 2023, the total includes impairment charges of \$1.9 million. The last time the companies accounted for under the equity method of accounting contributed a loss was 2019 with a loss of \$1.9 million.

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, Freiberger, Umicore, Vital 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. 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 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 the 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 may 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 improve our processes, 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.

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

From time to time, sales to one or more of our tier one 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.

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 may 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 2019, we incurred an impairment charge of \$1.1 million for a germanium materials company in China in which we had a 25% ownership interest, writing down our investment to zero value. During the second quarter of 2023, one of our equity investments assessed one of its equity investments was fully impaired, leading to a \$754,000 impairment charge in our financial results for the second quarter of 2023. In the fourth quarter of 2023, we divested another equity investment, incurring a net impairment charge of \$1.1 million. A significant decline in the selling prices of raw materials began in 2015 and weakened some of these companies and their losses negatively impacted our financial results for several years. Further, the increasing concern and restrictions in China of hazardous chemicals and other hazardous materials 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.

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 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 wastewater 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.

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 qualification 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 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.

A recent example of a cyclical downcycle took shape in the second half of 2022 and has continued into 2024. Early in its history, COVID began to impact supply chains resulting in shortages. As a result, in 2021 and into 2022 almost all companies purchased more inventory than they needed as a safety precaution. In the second half of 2022 companies began to realize they were holding too much inventory and entered into the "inventory correction" period. Our consolidated revenue had reached \$39.7 million in the first quarter of 2022. In the third quarter of 2023, our revenue had declined to \$17.4 million.

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. This is an ongoing iterative research and development process performed by our China team in collaboration with our manufacturing managers. 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 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. We have 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 the 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. Alternatively, a sudden decline in demand could result in holding too much inventory which occurred in the second half of 2022. 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 Tongmei, 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 Tongmei, 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 may 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.

Although we are a Delaware corporation and are neither a PRC operating company nor do we conduct our operations in China through the use of VIEs, in the event we inadvertently concluded that we do not require any permissions or approvals from the CSRC or other PRC central government authorities to complete a public offering of securities in the U.S. or applicable laws, regulations, or interpretations change, we may be required to obtain such permissions or approvals to complete such a public offering of securities.

We are a Delaware corporation and are neither a PRC operating company nor do we conduct our operations in China through the use of VIEs. All of our products are manufactured in the PRC by our PRC subsidiaries and PRC joint ventures. We believe that we do not require any permissions or approvals from the CSRC or other PRC central government authorities to complete a public offering of securities in the U.S. because we are a Delaware corporation with our principal corporate office in Fremont, California and the PRC laws and regulations that govern the listing of securities on a U.S. securities exchange apply to PRC companies. However, in the event that we inadvertently concluded that such permission or approvals are not required or applicable laws, regulations, or interpretations change and we are required to obtain such permissions or approvals in the future and we fail to obtain such permissions or approvals, then we may not be able to complete a public offering of securities in the U.S. We may also be pressured to delist our securities, which would force the holders to sell these securities and could result in a material adverse effect on the value of these securities. We may face sanctions by the CSRC or other PRC central government authorities or pressure from the PRC government in various business matters for failure to obtain such permissions or approvals. These sanctions or pressure may include fines and penalties on our operations in China, limitations on our operating privileges in China, delays in or restrictions on the repatriation of the proceeds from a public offering of securities in the U.S. into the PRC, restrictions on or prohibition of the payments or remittance of dividends by our subsidiaries in China, or other actions that could have a material and adverse effect on our business, financial condition, results of operations, reputation and prospects, as well as the trading price of our common stock.

The PRC central government may intervene in or influence our PRC operations at any time and the rules and regulations in China can change quickly with little advance notice.

The businesses of our PRC subsidiaries and PRC joint ventures are subject to complex and rapidly evolving laws and regulations in the PRC, which can change quickly with little advance notice. The PRC central government is a single party form of government with virtually unlimited authority and power to intervene in or influence commercial operations in China. In the past, we have experienced such intervention or influence by the PRC central government and a change in the rules and regulations in China when we were instructed by the Beijing municipal government to relocate our gallium arsenide manufacturing facility in Beijing and expect that such intervention or influence or change in the rules and regulations in China could occur in the future.

In the ordinary course of business, our PRC subsidiaries and PRC joint ventures require permits and licenses to operate in the PRC. Such permits and licenses include permits to use hazardous materials in manufacturing operations. From time to time, the PRC government issues new regulations, which may require additional actions on the part of our PRC subsidiaries and PRC joint ventures 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. Any such intervention or influence or change in the rules and regulations in China could result in a material change in our PRC operations and/or the value of our common stock.

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

On July 3, 2023, China adopted new export control regulations on gallium- and germanium-related materials and the derivative products using these materials, effective as of August 1, 2023, which require Tongmei to proceed to immediately seek permits from the applicable Chinese authorities to export gallium arsenide and germanium substrates. Indium phosphide substrates are not included in the new export control regulations, and, therefore, exports of indium phosphide will not require export approvals as part of these regulations. While Tongmei has received its initial China export permits to resume shipping gallium arsenide and germanium substrates to certain customers, there can be no assurances that Tongmei will continue to receive China export permits to resume shipping gallium arsenide and germanium substrates to other customers or that China will not adopt additional export control regulations that affect our business, financial condition and results of operations.

All of our wafer substrates are manufactured in China and in the years 2023, 2022 and 2021, approximately 10%, 14% and 10% of our revenue, respectively, were 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 from China. 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 2023, 2022 and 2021, we paid approximately \$1.0 million, \$3.3 million and \$1.3 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 maintain or 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 losses of customers and revenue or decreased gross margins, due to changes in tariffs, import or export restrictions, further trade barriers, or unexpected changes in regulatory requirements. In addition, 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.

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

The spread of COVID-19 impacted our operations and financial performance. The outbreak of COVID 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. In December 2022, the PRC government ended its zero-COVID policy. If there is a renewed surge of the COVID-19 pandemic in cities in which our PRC subsidiaries and PRC joint ventures are located, the Chinese government may require these 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. were disrupted and this impacted our efficiency. In the future, 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.

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 China 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 may 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.

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 and U.S. financial system, 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, high levels of inflation, high interest rates, the Russian invasion of Ukraine, the Middle East conflict, the Red Sea shipping disruptions, Brexit, heightened tensions between the U.S. and China, and U.S. bank failures in 2023, among other factors, 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:

- inventory corrections;
- 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.

A recent example of economic volatility took shape in the second half of 2022 and has continued into 2024. Early in its history, COVID began to impact supply chains resulting in shortages. As a result, in 2021 and into 2022 almost all companies purchased more inventory than needed as a safety net. In the second half of 2022 companies began to realize they had too much inventory and entered into the “inventory correction” period. Our consolidated revenue had reached \$39.7 million in the first quarter of 2022. In the third quarter of 2023 our revenue had declined to \$17.4 million. 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.

The PRC central government may also exert more control over offerings conducted overseas and/or foreign investment in China-based issuers, which could result in a material change in our operations and/or the value of our common stock.

The PRC central government may also exert more control over offerings conducted overseas and/or foreign investment in China-based issuers, which could result in a material change in our operations and/or the value of our common stock. The PRC central government may also seek to significantly limit or completely hinder our ability to offer or continue to offer our securities to investors and cause the value of such securities to significantly decline or be worthless.

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.

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

We manufacture our substrates in China and, in the twelve months ended December 31, 2023, 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.

Dividends from within our corporate structure are subject to PRC withholding tax and SAFE approval.

Occasionally, one of our PRC subsidiaries or PRC raw material joint ventures declares and pays a dividend. These dividends generally occur when the PRC joint venture declares a dividend for all of its shareholders. We have no current intentions to distribute to our investors earnings under our corporate structure. Dividends paid to the Company are subject to a 10% PRC withholding tax. The Company is required to obtain approval from SAFE to transfer funds in or out of the PRC. SAFE requires a valid agreement to approve the transfers, which are processed through a bank. Other than PRC foreign exchange restrictions, the Company is not subject to any PRC restrictions and limitations on its ability to distribute earnings from its businesses. If SAFE approval is denied the dividend payable to the Company would be owed but would not be paid.

Our PRC subsidiaries and PRC joint ventures are subject to data security oversight.

Our PRC subsidiaries and PRC joint ventures are subject to oversight by the Cyberspace Administration of China (the "CAC") regarding data security. Except for routine personal information necessary to process payroll and other benefits and emergency contact information, our PRC subsidiaries and PRC joint ventures do not collect or maintain personal information. All of our products are manufactured in the PRC by our PRC subsidiaries and PRC joint ventures. Although we are neither a PRC operating company nor do we conduct our operations in China through the use of VIEs, cybersecurity is increasingly a focus of the central government and the CAC could require AXT to comply with PRC cybersecurity regulations, which could cause us to make changes to our operations that could materially harm our business, financial condition and results of operations.

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 import and 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 may materially impact our consolidated statements of operations.

We are subject to foreign exchange gains and losses that may materially impact our consolidated statements of operations. For example, in 2023 and 2022, we incurred foreign exchange gains of \$169,000 and \$1.6 million, respectively and in 2021, we incurred a foreign exchange loss of \$434,000.

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 historically mitigated the gains and losses caused by fluctuations in the exchange rates.

Joint venture raw material companies in China bring certain risks.

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

- import and export restrictions;
- unexpected changes in regulatory requirements that may limit our ability to manufacture, export the products of these companies, 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;
- new or changing laws and policies affecting economic liberalization, foreign investment, currency convertibility or exchange rates, taxation or employment;
- new or changing PRC regulations and policies regarding data security and oversight by the CAC of our consolidated subsidiaries and all of our joint venture raw material companies; and
- nationalization of foreign-owned assets, including intellectual property.

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. 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.

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.

Although the audit report is prepared by an independent registered public accounting firm who is currently inspected fully by the PCAOB, there is no guarantee that future audit reports will be prepared by an independent registered public accounting firm that is completely inspected by the PCAOB.

Our independent registered public accounting firm, BPM, is registered with the PCAOB and is subject to regular inspections by the PCAOB to assess its compliance with the applicable professional standards. Although we have operations in China, a jurisdiction where the PCAOB was, until recently, unable to conduct inspections without the approval of the Chinese government authorities, our independent registered public accounting firm is currently inspected fully by the PCAOB.

Inspections of other independent registered public accounting firms conducted by the PCAOB outside China have at times identified deficiencies in those independent registered public accounting firms' audit procedures and quality control procedures, which may be addressed as part of the inspection process to improve future audit quality. The lack of PCAOB inspections of audit work undertaken in China prevented the PCAOB from regularly evaluating independent registered public accounting firms' audits and their quality control procedures. As a result, to the extent that any component of our independent registered public accounting firm's work papers is or becomes located in China, such work papers may not be subject to inspection by the PCAOB. As a result, investors would be deprived of such PCAOB inspections, which could result in limitations or restrictions to our access of the U.S. capital markets.

As part of a continued regulatory focus in the United States on access to audit and other information currently protected by national law, in particular PRC laws, in June 2019, a bipartisan group of lawmakers introduced bills in both houses of the U.S. Congress which, if passed, would require the SEC to maintain a list of issuers for which PCAOB is not able to inspect or investigate the audit work performed by a non-U.S. independent registered public accounting firm completely. The proposed Ensuring Quality Information and Transparency for Abroad-Based Listings on our Exchanges Act prescribes increased disclosure requirements for these issuers and, beginning in 2025, the delisting from U.S. national securities exchanges such as the Nasdaq Global Select Market of issuers included on the SEC's list for three consecutive years. It is unclear if this proposed legislation will be enacted. Furthermore, there have been recent deliberations within the U.S. government regarding potentially limiting or restricting companies based in China from accessing U.S. capital markets. On May 20, 2020, the U.S. Senate passed the HFCA Act, which includes requirements for the SEC to identify issuers whose audit work is performed by independent registered public accounting firms that the PCAOB is unable to inspect or investigate completely because of a restriction imposed by a non-U.S. authority in the independent registered public accounting firms' local jurisdiction. The U.S. House of Representatives passed the HFCA Act on December 2, 2020, and the HFCA Act was signed into law on December 18, 2020. Additionally, in July 2020, the U.S. President's Working Group on Financial Markets issued recommendations for actions that can be taken by the executive branch, the SEC, the PCAOB or other federal agencies and department with respect to Chinese companies listed on U.S. stock exchanges and their independent registered public accounting firms, in an effort to protect investors in the United States. In response, on November 23, 2020, the SEC issued guidance highlighting certain risks (and their implications to U.S. investors) associated with investments in issuers based in China and summarizing enhanced disclosures the SEC recommends issuers based in China make regarding such risks. On March 18, 2021, the SEC adopted interim final rules to implement the HFCA Act, which requires the SEC to identify certain issuers that filed annual reports with audit reports issued by registered public accounting firms located in foreign jurisdictions and that the PCAOB is unable to inspect or investigate completely because of a position taken by an authority in those jurisdictions (the "Commission-Identified Issuers"). Specifically, the SEC implemented the submission and disclosure requirements of the HFCA Act. On December 2, 2021, the SEC issued amendments to finalize the interim final rules. Further, the SEC established procedures to identify Commission-Identified Issuers and prohibit the trading of the securities of Commission-Identified Issuers as required by the HFCA Act. We will be required to comply with these rules if the SEC identifies us as a Commission-Identified Issuer. Under the HFCA Act, our securities may be prohibited from trading on the Nasdaq Global Select Market or other U.S. stock exchanges if we are determined to be a Commission-Identified

Issuer for three consecutive years, and this ultimately could result in our common stock being delisted. Furthermore, on June 22, 2021, the U.S. Senate passed the Accelerating Holding Foreign Companies Accountable Act, which, if enacted, would amend the HFCA Act and require the SEC to prohibit an issuer's securities from trading on any U.S. stock exchanges if the issuer is determined to be a Commission-Identified Issuer for two consecutive years instead of three. On December 15, 2021, the Accelerating Holding Foreign Companies Accountable Act was introduced to the U.S. House of Representatives. On September 22, 2021, the PCAOB adopted a final rule implementing the HFCA Act, which provides a framework for the PCAOB to use when determining, as contemplated under the HFCA Act, whether the PCAOB is unable to inspect or investigate completely independent registered public accounting firms located in a non-U.S. jurisdiction because of a position taken by one or more authorities in that jurisdiction and was approved by the SEC on November 5, 2021. On December 16, 2021, the PCAOB issued a report on its determinations that the PCAOB is unable to inspect or investigate completely registered public accounting firms headquartered in the PRC and Hong Kong because of positions taken by PRC authorities in those jurisdictions.

Beginning in March 2022, the SEC listed companies on either its conclusive list of issuers identified under the HFCA Act or its provisional list of issuers identified under the HFCA Act. Companies listed on the SEC's conclusive list of issuers identified under the HFCA Act are determined to be Commission-Identified Issuers. The SEC did not list AXT, Inc. on either its conclusive list of issuers identified under the HFCA Act or its provisional list of issuers identified under the HFCA Act.

On December 15, 2022, the PCAOB vacated its 2021 determinations that the positions taken by authorities in the PRC and Hong Kong prevented it from inspecting and investigating completely registered public accounting firms headquartered in those jurisdictions. As a result, the SEC will not provisionally or conclusively identify an issuer as a Commission-Identified Issuer if it files an annual report with an audit report issued by a registered public accounting firm headquartered in either jurisdiction on or after December 15, 2022, until such time as the PCAOB issues a new determination. The SEC will continue to include any Commission-Identified Issuer on the provisional or conclusive list if they filed an annual report with an audit report issued by a registered public accounting firm headquartered in mainland China and Hong Kong prior to the PCAOB's decision to vacate its 2021 determinations.

While an agreement has been reached among the CSRC, the SEC and the PCAOB regarding the inspection of PCAOB-independent registered public accounting firms in China, there can be no assurance that we will be able to comply with requirements imposed by U.S. regulators. If the PRC authorities do not fully perform their obligations under the agreement with the PCAOB in the future, or if authorities in the PRC otherwise take positions that render the PCAOB unable to inspect or investigate completely registered public accounting firms headquartered in the PRC and Hong Kong, the PCAOB will make determinations under the HFCA Act. Delisting of our common stock would force holders of our common stock to sell their shares. The market price of our common stock could be adversely affected as a result of anticipated negative impacts of these executive or legislative actions upon, as well as negative investor sentiment towards, companies with operations in China that are listed in the United States, regardless of whether these executive or legislative actions are implemented and regardless of our actual operating performance.

IV. 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 the IPO fails to pass the audit of the Shanghai Stock Exchange, is not approved by the CSRC or Tongmei cancels the IPO application. The aggregate redemption amount is approximately \$49 million.

Tongmei submitted its IPO application to the Shanghai Stock Exchange and it was formally accepted for review on January 10, 2022. The Shanghai Stock Exchange approved the IPO application on July 12, 2022. On August 1, 2022, the CSRC accepted for review Tongmei's IPO application. The STAR Market IPO remains subject to review and approval by the CSRC and other authorities. The process of going public on the STAR Market includes several periods of review and, therefore, is a lengthy process. Subject to review and approval by the CSRC and other authorities, Tongmei expects to accomplish this goal in the coming months. The listing of Tongmei on the 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 in 2024 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:

- inventory corrections within the technology sector;
- 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 of Directors to elect a director to fill a space created by a board vacancy or the expansion of the board;
- the ability of our Board of Directors to alter our amended and restated bylaws; and
- the requirement that only our Board of Directors 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:

- 66²/₃% 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, 2023, we had U.S. federal net operating loss carryforwards of approximately \$40.2 million. We have net operating loss carryforwards of approximately \$115,000, primarily in the state of California, as of December 31, 2023. We do not expect to utilize the loss carryforwards in the next several years unless Tongmei pays a dividend. 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 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. 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 may 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 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 1C. *Cybersecurity*

Risk Management and Strategy

We have established policies and processes for assessing, identifying, and managing material risks from cybersecurity threats, and have integrated these processes into our overall risk management systems and processes. We routinely assess material risks from cybersecurity threats, including any potential unauthorized occurrence on or

conducted through our information systems that may result in adverse effects on the confidentiality, integrity, or availability of our information systems or any information residing therein.

We conduct periodic risk assessments to identify cybersecurity threats, as well as assessments in the event of a material change in our business practices that may affect information systems that are vulnerable to such cybersecurity threats. These risk assessments include identification of reasonably foreseeable internal and external risks, the likelihood and potential damage that could result from such risks, and the sufficiency of existing policies, procedures, systems, and safeguards in place to manage such risks.

Following these risk assessments, we re-design, implement, and maintain reasonable safeguards to minimize identified risks; reasonably address any identified gaps in existing safeguards; and regularly monitor the effectiveness of our safeguards. We devote significant resources and designate high-level personnel, including our Chief Financial Officer, VP of Finance, and Controller to manage the risk assessment and mitigation process.

As part of our overall risk management system, we monitor and test our safeguards and train our employees on these safeguards, in collaboration with finance, IT, and management. Personnel at all levels and departments are made aware of our cybersecurity policies through trainings and email notifications.

We engage assessors, consultants, auditors, or other third parties in connection with our risk assessment processes. These service providers assist us to design and implement our cybersecurity policies and procedures, as well as to monitor and test and audit our safeguards. We maintain policies and processes to assess and manage risks relating to third-party service providers, based on the nature of the engagement with the third party and on the information and systems to which the third party will have access. We maintain policies to conduct due diligence before onboarding new service providers and maintain ongoing evaluations to ensure compliance with our security standards.

For additional information regarding whether any risks from cybersecurity threats have materially affected or are reasonably likely to materially affect the Company, including our business strategy, results of operations, or financial condition, please refer to Item 1A, “Risk Factors,” in this Annual Report on Form 10-K, including the risk factor entitled “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.”

Governance

One of the key functions of our Board of Directors is informed oversight of our risk management process, including risks from cybersecurity threats. Our Board of Directors is responsible for monitoring and assessing strategic risk exposure, and our executive officers are responsible for the day-to-day management of the material risks we face. Our Board of Directors administers its cybersecurity risk oversight function directly as a whole, as well as through the Audit Committee. The chair of our Audit Committee has experience in assessing and managing cybersecurity risk.

Our management committee on cybersecurity, which includes our Chief Financial Officer and members from finance and IT, is primarily responsible to assess and manage our material risks from cybersecurity threats. Our Chief Financial Officer has had supervisory responsibilities over IT for over 30 years and personally engages our employees in training for cybersecurity. Our lead IT Senior System Engineer has over 20 years of direct IT employment and is a Microsoft Certified System Engineer, a Cisco Certified Network Associate and a Sun Certified System Administrator. One of our Controllers has over 15 years of Sarbanes Oxley compliance training and auditing, including auditing compliance regarding IT. Our VP Finance and Corporate Controller has over 20 years as an employee of AXT and has a thorough understanding of our specific IT systems.

Our management committee on cybersecurity oversees our cybersecurity policies and processes, including those described in “Risk Management and Strategy” above. The processes by which our management committee on cybersecurity is informed about and monitors the prevention, detection, mitigation, and remediation of cybersecurity incidents include regular communication and reporting from our IT manager, alerts and warnings through the use of technological tools and software and the results of cybersecurity systems testing from a third-party consultant.

Our Chief Financial Officer provides briefings to our Board of Directors and the Audit Committee regarding the Company's cybersecurity risks and activities, including cybersecurity systems testing, activities of third parties, and the like.

Item 2. *Properties*

Our principal properties as of March 12, 2024 are as follows:

Location	Square Feet	Principal Use	Ownership
Fremont, CA	19,467	Administration	Operating lease, expires November 2028
Beijing, China	141,524	Production and Administration	Owned by AXT / Tongmei
DingXing, China . .	193,621	Production	Owned by AXT / Tongmei
Kazuo, China	528,390	Production	Owned by AXT / Tongmei
Kazuo, China	75,703	Production and Administration	Owned by Beijing BoYu Semiconductor Vessel Craftwork Technology Co., Ltd.*
Tianjin, China	146,012	Production and Administration	Owned by Beijing BoYu Semiconductor Vessel Craftwork Technology Co., Ltd., *
Kazuo, China	190,597	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 operations.

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>
2023		
First Quarter	\$ 6.57	\$ 3.48
Second Quarter	\$ 4.04	\$ 2.47
Third Quarter	\$ 3.63	\$ 2.20
Fourth Quarter	\$ 2.75	\$ 1.89
2022		
First Quarter	\$ 9.30	\$ 6.20
Second Quarter	\$ 7.10	\$ 4.97
Third Quarter	\$ 9.94	\$ 5.57
Fourth Quarter	\$ 7.12	\$ 4.17

As of March 4, 2024, there were 206 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, 2023 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 2023, 2022 and 2021 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.

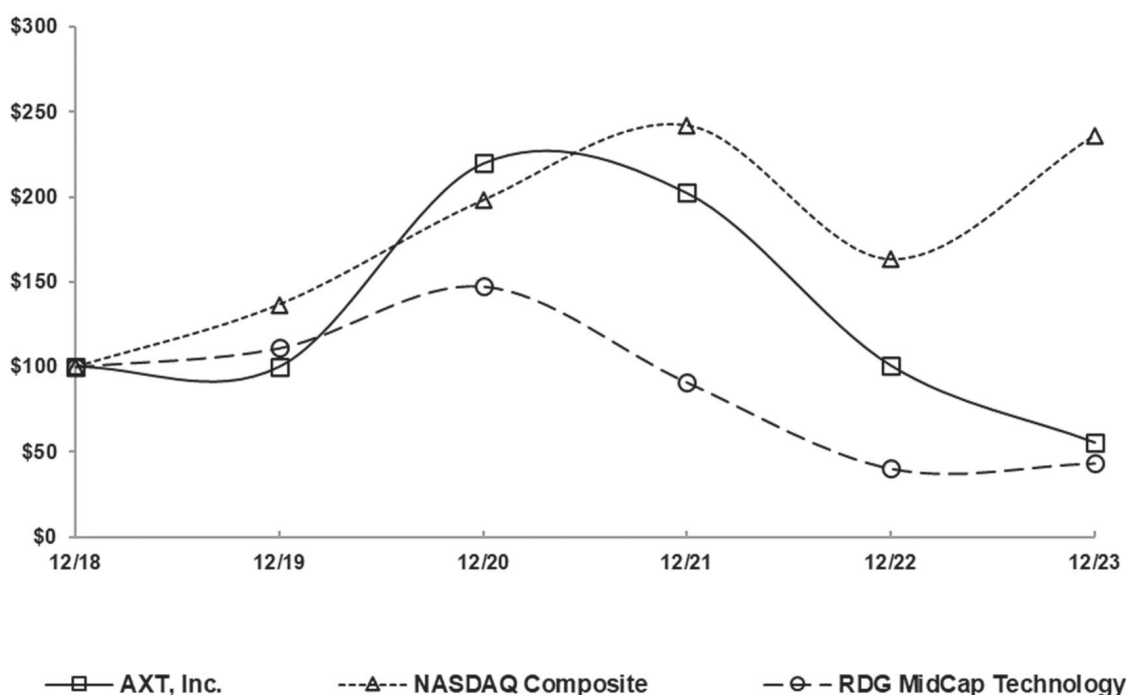
Comparison of Stockholder Return

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 RDG MidCap Technology Index for the period commencing December 31, 2018 and ending December 31, 2023.

Pursuant to SEC rules, our performance graph must include both a broad market equity index and a published industry or line-of-business index (or a self-constructed peer index) in addition to our common stock. The rules also require that if a registrant selects a different index from an index used for the immediately preceding fiscal year, it must (i) explain the reason for the change and (ii) compare the registrant's total return with that of both the newly selected index and the index used in the immediately preceding fiscal year. With respect to the published industry index, in prior years, we used the Nasdaq Electronic Components Index; however, that index was discontinued in 2023. Accordingly, we have used the RDG MidCap Technology Index as a replacement for the discontinued index and because the Nasdaq Electronic Components Index was discontinued, we are unable to compare our cumulative total return with that index.

COMPARISON OF 5 YEAR CUMULATIVE TOTAL RETURN*

Among AXT, Inc., the NASDAQ Composite Index
and the RDG MidCap Technology Index



*\$100 invested on 12/31/18 in stock or index, including reinvestment of dividends.
Fiscal year ending December 31.

	<u>12/18</u>	<u>12/19</u>	<u>12/20</u>	<u>12/21</u>	<u>12/22</u>	<u>12/23</u>
AXT, Inc.	100	100.00	220.00	202.53	100.69	55.17
NASDAQ Composite.	100	136.69	198.10	242.03	163.28	236.17
RDG MidCap Technology	100	111.18	147.60	90.97	40.12	43.24

Recent Sales of Unregistered Securities

Not applicable.

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 2023 or 2022 under this program. As of December 31, 2023 and 2022, approximately \$2.7 million remained available for future repurchases under this program, respectively.

Item 6. Reserved

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 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 Annual Report on 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 Credit Losses

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 credit losses. We measure the expected credit losses on a collective (pool) basis when similar delinquency status exist. 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.

In accordance with ASC 326-20's current expected credit loss impairment model, 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 reasonable and supportable forecasts of future economic conditions. Uncollectible receivables are recorded as provision for credit losses 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, 2023 and 2022, our accounts receivable, net balance was \$19.3 million and \$29.3 million, respectively, which was net of an allowance for credit losses of \$579,000 and \$307,000 as of December 31, 2023 and 2022, respectively. During 2023, we increased the allowance for credit losses by \$272,000. During 2022, we increased the allowance for credit losses by \$177,000. If actual uncollectible accounts differ substantially from our estimates, revisions to the estimated allowance for credit losses 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, 2023 and 2022, accrued product warranties totaled \$703,000 and \$669,000, respectively. The increase in accrued product warranties is primarily attributable to increased claims for quality issues experienced by customers. If actual warranty costs or pending new claims differ substantially from our estimates, revisions to the estimated warranty liability would be required, which could have a material impact on our financial condition and results of operations for future periods.

Inventory Valuation

Inventories are stated at the lower of cost (approximated by standard cost) or 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, 2023 and 2022, we had an inventory reserve of \$21.9 million and \$24.7 million, respectively, for excess and obsolete inventory and \$78,000 and \$47,000, 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 Accounting Standards Codification (“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 PRC joint venture raw material companies are classified as other assets and accounted for under either the equity or fair value 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 year ended December 31, 2023, one of our PRC joint venture raw material companies assessed one of its equity investments was fully impaired. For the year ended December 31, 2023, we also divested our equity investment in a PRC joint venture. The impairment and divestiture resulted in a total of \$1.9 million in impairment charges in our financial results. For the years ended December 31, 2022 and 2021, we had no impairment charges.

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, 2023 and 2022, 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, 2023 and 2022.

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.

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. Our two raw material companies sell, among other items, purified gallium and pBN crucibles.

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 decreased in 2023 from \$141.1 million in 2022 to \$75.8 million in 2023 a decrease of 46.3%. Our annual revenue increased in 2022 from \$137.4 million in 2021 to \$141.1 million in 2022 an increase of 2.7%. Our annual revenue increased in 2021 from \$95.4 million in 2020 to \$137.4 million in 2021 an increase of 44.1%. In 2023, our gross margin decreased from 36.9% of total revenue in 2022 to 17.6% of total revenue in 2023. In 2022, our

gross margin increased from 34.5% of total revenue in 2021 to 36.9% of total revenue in 2022. In 2021, our gross margin increased from 31.7% of total revenue in 2020 to 34.5% of total revenue in 2021.

We believe we are now beginning to see a recovery in our markets. We are seeing increased orders. The gallium arsenide market, which was the first of our markets to go into a correction, appears to have largely worked through excess inventory.

Revenue

	Years Ended Dec. 31			2022 to 2023		2021 to 2022	
	2023	2022	2021	Increase (Decrease)	% Change	Increase (Decrease)	% Change
Product Type:							
Substrates	\$ 47,466	\$ 111,094	\$ 103,026	\$ (63,628)	(57.3)%	\$ 8,068	7.8 %
Raw materials and other	28,329	30,024	34,367	(1,695)	(5.6)%	(4,343)	(12.6)%
Total revenue	<u>\$ 75,795</u>	<u>\$ 141,118</u>	<u>\$ 137,393</u>	<u>\$ (65,323)</u>	(46.3)%	<u>\$ 3,725</u>	2.7 %

Revenue decreased \$65.3 million, or 46.3%, in 2023 from \$141.1 million in 2022. The \$63.6 million decrease in wafer substrate sales was the result of lower demand for InP wafer substrates for 5G applications, data center upgrades (silicon photonics) and consumer related applications, lower demand for our GaAs wafer substrates as the result of decreased demand for LED products, industrial lasers and other applications requiring low defect densities in the wafer substrate and lower demand for our Ge wafer substrates from our customers in China. The \$1.7 million raw materials revenue decrease as compared to the same period in 2022 was primarily the result of decreased revenue from pBN crucibles and pBN-based OLED manufacturing tools sold by BoYu, one of our consolidated raw material companies, partially offset by increased sales of purified gallium.

Revenue increased \$3.7 million, or 2.7%, in 2022 from \$137.4 million in 2021. The \$8.1 million increase in wafer substrate sales was the result of strong demand for InP wafer substrates for 5G applications, data center upgrades (silicon photonics) and consumer related applications, partially offset by lower demand for our GaAs wafer substrates as the result of decreased demand for LED products, industrial lasers and other applications requiring low defect densities in the wafer substrate and lower demand for our Ge wafer substrates from our customers in China. The \$4.3 million raw materials revenue decrease as compared to the same period in 2021 was primarily the result of decreased revenue from sales of purified gallium and unfavorable pricing, partially offset by increased demand for pBN crucibles and pBN-based OLED manufacturing tools sold by BoYu, one of our consolidated raw material companies.

Revenue by Geographic Region

	Year Ended Dec. 31,			2022 to 2023		2021 to 2022	
	2023	2022	2021	Increase (Decrease)	% Change	Increase (Decrease)	% Change
	(\$ in thousands)						
China	\$39,778	\$ 55,414	\$ 67,394	\$ (15,636)	(28.2)%	\$ (11,980)	(17.8)%
% of total revenue	53 %	39 %	49 %				
Taiwan	8,651	28,780	16,841	(20,129)	(69.9)%	11,939	70.9 %
% of total revenue	11 %	21 %	12 %				
Japan	4,641	11,724	10,112	(7,083)	(60.4)%	1,612	15.9 %
% of total revenue	6 %	8 %	7 %				
Asia Pacific (excluding China, Taiwan and Japan)	3,814	4,188	7,540	(374)	(8.9)%	(3,352)	(44.5)%
% of total revenue	5 %	3 %	6 %				
Europe (primarily Germany)	12,315	20,592	23,069	(8,277)	(40.2)%	(2,477)	(10.7)%
% of total revenue	16 %	15 %	17 %				
North America (primarily the United States)	6,596	20,420	12,437	(13,824)	(67.7)%	7,983	64.2 %
% of total revenue	9 %	14 %	9 %				
Total revenue	<u>\$75,795</u>	<u>\$ 141,118</u>	<u>\$ 137,393</u>	<u>\$ (65,323)</u>	(46.3)%	<u>\$ 3,725</u>	2.7 %

Sales to customers located outside of North America represented approximately 90%, 86% and 90% of our revenue during 2023, 2022 and 2021, respectively.

Revenue from customers in China decreased in 2023 by 28.2%, primarily due to lower demand for Ge and InP wafer substrates and GaAs wafer substrates used in wireless and LED applications and pBN crucibles sold by one of our consolidated subsidiaries, partially offset by increased demand for refined gallium. Revenue from customers in Taiwan decreased in 2023 by 69.9%, primarily due to lower demand for InP wafer substrates and GaAs wafer substrates used in wireless applications, partially offset by increased demand for Ge wafer substrates. Revenue from customers in Japan decreased in 2023 by 60.4% as a result of lower demand for InP and Ge wafer substrates, GaAs wafer substrates used in LED and wireless applications, pBN crucibles sold by one of our consolidated subsidiaries and refined gallium. Revenue from customers in Asia Pacific decreased by 8.9% as a result of decreased demand for GaAs wafer substrates used in wireless applications and refined gallium, partially offset by increased demand for InP wafer substrates and pBN crucibles sold by one of our consolidated subsidiaries. Revenue from customers in Europe decreased in 2023 by 40.2%, primarily due to lower demand for GaAs wafer substrates used in LED and wireless applications, InP and Ge wafer substrates and pBN crucibles sold by one of our consolidated subsidiaries. Revenue from customers in North America decreased in 2023 by 67.7% primarily due to lower demand for InP wafer substrates and GaAs wafer substrates used in LED and wireless applications, partially offset by increased demand for pBN crucibles sold by one of our consolidated subsidiaries.

Revenue from customers in China decreased in 2022 by 17.8%, primarily due to lower demand for refined gallium and pBN crucibles sold by our consolidated subsidiaries. In addition, revenue from InP and Ge wafer substrates decreased, partially offset by increased demand for GaAs wafer substrates. Revenue from customers in Taiwan increased in 2022 by 70.9%, primarily due to an increase in demand for InP wafer substrates, partially offset by a decline in wireless applications using GaAs wafer substrates. Revenue from customers in Japan increased in 2022 by 15.9% as a result of increased demand for refined gallium and pBN crucibles sold by our consolidated subsidiaries, partially offset by lower demand for GaAs wafer substrates used in wireless applications. Revenue from customers in Asia Pacific decreased by 44.5% as a result of decreased demand for GaAs used in wireless applications, InP wafer substrates and pBN crucibles sold by one of our consolidated subsidiaries. Revenue from customers in Europe decreased in 2022 by 10.7%, primarily due to lower demand for GaAs wafer substrates used in LED applications, Ge wafer substrates and pBN crucibles sold by one of our consolidated subsidiaries, partially offset by increased demand for InP wafer substrates. Revenue from customers in North America increased by 64.2% primarily due to increased demand for our

InP wafer substrates and pBN crucibles sold by one of our consolidated subsidiaries, partially offset by lower demand for our GaAs and Ge wafer substrates.

Gross Margin

	Year Ended Dec. 31,			2022 to 2023		2021 to 2022	
	2023	2022	2021	Increase (Decrease)	% Change	Increase (Decrease)	% Change
	(\$ in thousands)						
Gross profit	\$ 13,318	\$ 52,121	\$ 47,414	\$ (38,803)	(74.4)%	\$ 4,707	9.9 %
Gross Profit %	17.6 %	36.9 %	34.5 %				

Gross profit decreased \$38.8 million in 2023 as compared to 2022. Gross margin in 2023 was 17.6% as compared to 36.9% in 2022. The decrease in gross profit is attributed to lower revenue resulting in fixed costs being spread over less units and an unfavorable change in product mix.

Gross profit increased \$4.7 million in 2022 as compared to 2021. Gross margin in 2022 was 36.9% as compared to 34.5% in 2021. 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.

Selling, General and Administrative Expenses

	Years Ended Dec. 31			2022 to 2023		2021 to 2022	
	2023	2022	2021	Increase (Decrease)	% Change	Increase (Decrease)	% Change
	(\$ in thousands)						
Selling, general and administrative expenses	\$ 22,806	\$ 25,654	\$ 24,189	\$ (2,848)	(11.1)%	\$ 1,465	6.1 %
% of total revenue	30.1 %	18.2 %	17.6 %				

Selling, general and administrative expenses decreased \$2.8 million, or 11.1%, to \$22.8 million for 2023 compared to \$25.7 million for 2022. The lower selling, general and administrative expenses were primarily from lower personnel-related expenses, stock compensation expenses and outside commissions, partially offset by higher professional service expenses and D&O insurance costs.

Selling, general and administrative expenses increased \$1.5 million, or 6.1%, to \$25.7 million for 2022 compared to \$24.2 million for 2021. The higher selling, general and administrative expenses were primarily from higher personnel-related expenses, professional services, stock compensation expenses, and bad debt expense, partially offset by lower license and fees and outside commissions.

Research and Development Expenses

	Years Ended Dec. 31			2022 to 2023		2021 to 2022	
	2023	2022	2021	Increase (Decrease)	% Change	Increase (Decrease)	% Change
	(\$ in thousands)						
Research and development	\$ 12,081	\$ 13,913	\$ 10,328	\$ (1,832)	(13.2) %	\$ 3,585	34.7 %
% of total revenue	15.9 %	9.9 %	7.5 %				

Research and development expenses decreased \$1.8 million, or 13.2%, to \$12.1 million in 2023 from \$13.9 million in 2022. The decrease in research and development expenses in 2023 was primarily due to lower personnel-related expenses and development expenses for 8-inch GaAs and 6-inch InP wafer substrates and the development of new features for certain of our GaAs and InP wafer substrates and new product testing.

Research and development expenses increased \$3.6 million, or 34.7%, to \$13.9 million in 2022 from \$10.3 million in 2021. The increase in research and development expenses in 2022 was primarily due to higher development expenses for 8-inch GaAs and 6-inch InP wafer substrates, the development of new features for certain of our GaAs and InP wafer substrates and new product testing and personnel-related expenses.

Interest Expense, Net

	Years Ended Dec. 31			2022 to 2023		2021 to 2022	
	2023	2022	2021	Increase (Decrease)	% Change	Increase (Decrease)	% Change
	(\$ in thousands)						
Interest expense, net	\$ 1,527	\$ 1,071	\$ 213	\$ 456	42.6 %	\$ 858	402.8 %
% of total revenue	2.0 %	0.8 %	0.2 %				

Interest expense, net increased in 2023 as compared to the same period in 2022, primarily due to lower investment balances in 2023 and increased borrowings in 2023. Interest expense, net increased in 2022 as compared to the same period in 2021, primarily due to lower investment balances in 2022 and increased borrowings in 2022.

Equity in Income of Unconsolidated Joint Venture Companies

	Years Ended Dec. 31			2022 to 2023		2021 to 2022	
	2023	2022	2021	Increase (Decrease)	% Change	Increase (Decrease)	% Change
	(\$ in thousands)						
Equity in income of unconsolidated joint ventures . .	\$ 1,884	\$ 5,957	\$ 4,409	\$ (4,073)	(68.4)%	\$ 1,548	35.1 %
% of total revenue	2.5 %	4.2 %	3.2 %				

Equity in income 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 of unconsolidated joint ventures decreased \$4.1 million to an income of \$1.9 million in 2023 from an income of \$6.0 million in 2022 as our unconsolidated joint ventures reported worse performance in 2023 as compared to 2022. The decreased income in 2023 includes total impairment charges of \$1.9 million on two of our equity investments.

Equity in income of unconsolidated joint ventures increased \$1.5 million to an income of \$6.0 million in 2022 from an income of \$4.4 million in 2021 as our unconsolidated joint ventures reported better performance in 2022 as compared to 2021.

Other Income, Net

	Years Ended Dec. 31			2022 to 2023		2021 to 2022	
	2023	2022	2021	Increase (Decrease)	% Change	Increase (Decrease)	% Change
	(\$ in thousands)						
Other income, net	\$ 2,179	\$ 3,487	\$ 509	\$ (1,308)	(37.5)%	\$ 2,978	585.1 %
% of total revenue	2.9 %	2.5 %	0.4 %				

Other income, net decreased \$1.3 million to an income of \$2.2 million for 2023 as compared to an income of \$3.5 million in 2022, primarily due to foreign exchange gains of \$0.2 million in 2023 compared to foreign exchange gains of \$1.6 million in 2022 and compensation received from the China government by one of our consolidated subsidiaries for relocating its facilities to Kazuo in 2022.

Other income, net increased \$3.0 million to an income of \$3.5 million for 2022 as compared to an income of \$0.5 million in 2021, primarily due to foreign exchange gains of \$1.6 million in 2022 compared to foreign exchange

losses of \$434,000 in 2021 and compensation received from the China government by one of our consolidated subsidiaries for relocating its facilities to Kazuo in 2022 as compared to 2021.

Provision for Income Taxes

	Years Ended Dec. 31			2022 to 2023		2021 to 2022	
	2023	2022	2021	Increase (Decrease)	% Change	Increase (Decrease)	% Change
	(\$ in thousands)						
Provision for income taxes	\$ 160	\$ 2,185	\$ 1,093	\$ (2,025)	(92.7)%	\$ 1,092	99.9 %
% of total revenue	0.2 %	1.5 %	0.8 %				

Provision for income taxes for 2023 and 2022 were \$0.2 million and \$2.2 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 AXT 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. We did not incur any federal income tax liability for AXT-Tongmei in 2023, due to its financial loss. 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, we recorded a valuation allowance against our net deferred tax assets of \$17.5 million and \$11.9 million for the years 2023 and 2022, respectively.

Net (Income) loss Attributable to Noncontrolling Interests and Redeemable Noncontrolling Interests

	Years Ended Dec. 31			2022 to 2023		2021 to 2022	
	2023	2022	2021	Increase (Decrease)	% Change	Increase (Decrease)	% Change
	(\$ in thousands)						
Net (income) loss attributable to noncontrolling interests and redeemable noncontrolling interests	\$ 1,312	\$ (2,931)	\$ (1,934)	\$ (4,243)	(144.8)%	\$ 997	51.6 %
% of total revenue	1.7 %	(2.1)%	(1.4)%				

The decrease in noncontrolling interests and redeemable noncontrolling interests' share of income to a loss for 2023 as compared to 2022 was primarily due to losses at four of our consolidated subsidiaries in China, partially offset by a profit from our other consolidated subsidiary in China.

The increase in noncontrolling interests and redeemable noncontrolling interests' share of income for 2022 as compared to 2021 was primarily due to the structural changes of the legal entities in China (see Note 1 to our consolidated financial statements) and to a lesser degree, losses generated by our consolidated subsidiary, ChaoYang XinMei.

Liquidity and Capital Resources

	Year Ended December 31,		
	2023	2022	2021
	(\$ in thousands)		
Net cash provided by (used in):			
Operating activities	\$ 3,403	\$ (8,765)	\$ (3,305)
Investing activities	(2,604)	(25,223)	(38,810)
Financing activities	8,613	38,031	5,725
Effect of exchange rate changes	(646)	542	551
Net change in cash, restricted cash and cash equivalents	8,766	4,585	(35,839)
Cash, restricted cash and cash equivalents—beginning year	41,348	36,763	72,602
Cash, restricted cash and cash equivalents—end of year	50,114	41,348	36,763
Short and long-term investments—end of year	2,140	11,457	14,995
Total cash, restricted cash, cash equivalents and short-term and long-term investments	\$ 52,254	\$ 52,805	\$ 51,758

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, 2023, we and our consolidated joint ventures held approximately \$42.0 million in cash and investments in bank accounts outside the United States.

Total cash, restricted cash and cash equivalents, short-term and long-term investments decreased by \$0.6 million in 2023. As of December 31, 2023, our principal source of liquidity was \$52.3 million, which consisted of cash, restricted cash and cash equivalents of \$50.1 million and short-term investments of \$2.1 million. In 2023, cash, restricted cash and cash equivalents increased by \$8.8 million and short-term investments decreased by \$9.3 million. The increase in cash, restricted cash and cash equivalents of \$8.8 million in 2023 was primarily due to net cash provided by operating activities of \$3.4 million and financing activities of \$8.6 million, partially offset by net cash used in investing activities of \$2.6 million and the effect of exchange rate changes of \$0.6 million.

Total cash, restricted cash and cash equivalents, short-term and long-term investments increased by \$1.0 million in 2022. As of December 31, 2022, our principal source of liquidity was \$52.8 million, which consisted of cash, restricted cash and cash equivalents of \$41.3 million and short-term and long-term investments of \$11.5 million. In 2022, cash, restricted cash and cash equivalents increased by \$4.6 million and short-term and long-term investments decreased by \$3.5 million. The increase in cash, restricted cash and cash equivalents of \$4.6 million in 2022 was primarily due to net cash provided by financing activities of \$38.0 million and the effect of exchange rate changes of \$0.5 million, partially offset by net cash used in investing activities of \$25.2 million and operating activities of \$8.8 million.

Net cash provided by operating activities of \$3.4 million for 2023 was primarily comprised of net change in operating assets and liabilities of \$7.0 million, adjustment of non-cash items of depreciation and amortization of \$8.7 million, return of equity method investments (dividends) of \$4.3 million, stock-based compensation of \$3.5 million, deferred tax assets of \$0.6 million, provision for credit losses of \$0.3 million and loss on sale of equity investment of \$0.2 million, offset in part by our net loss of \$19.2 million and income from equity method investments of \$2.1 million. The \$7.0 million net change in operating assets and liabilities primarily resulted from a decrease in accounts receivable of \$9.3 million, a \$1.1 million decrease in inventories and a \$0.4 million decrease in other assets, offset in part by a \$1.9 million decrease in accrued liabilities, a \$1.0 million decrease in other long-term liabilities, including royalties, a \$0.7 million increase in prepaid expenses and other current assets, and a decrease in accounts payable of \$0.2 million.

Net cash used in operating activities of \$8.8 million for 2022 was primarily comprised of net change in operating assets and liabilities of \$35.2 million, gain on equity method investments of \$6.0 million offset in part by our net income of \$18.7 million, adjustment of non-cash items of depreciation and amortization of \$8.1 million, stock-based compensation of \$4.0 million, return of equity method investments (dividends) of \$1.6 million, and amortization of

marketable securities premium of \$0.1 million. The \$35.2 million net change in operating assets and liabilities primarily resulted from a \$31.4 million increase in inventories, a \$5.5 million decrease in accounts payable, a \$3.5 million increase in prepaid expenses and other current assets, a \$2.1 million decrease in accrued liabilities, and a \$0.5 million increase in other assets offset in part by a \$4.5 million decrease in accounts receivable and a \$3.3 million increase in other long-term liabilities, including royalties.

Net cash used in operating activities of \$3.3 million for 2021 was primarily comprised of net change in operating assets and liabilities of \$30.3 million and gain on equity method investments of \$4.4 million, offset in part by our net income of \$16.5 million, adjustment of non-cash items of depreciation and amortization of \$7.1 million, stock-based compensation of \$4.5 million, deferred tax assets of \$2.3 million, return of equity method investments (dividends) of \$0.8 million and amortization of marketable securities premium of \$0.1 million. The \$30.3 million net change in operating assets and liabilities primarily resulted from a \$12.4 million increase in inventories, a \$9.7 million increase in accounts receivable, a \$6.3 million increase in other assets, a \$3.4 million decrease in accrued liabilities, a \$1.2 million decrease in other long-term liabilities, including royalties, and a \$0.8 million increase in prepaid expenses and other current assets, offset in part by a \$3.6 million increase in accounts payable.

Net cash used in investing activities of \$2.6 million for 2023 was primarily due to property, plant and equipment of \$10.5 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 investments in non-marketable equity investments of \$2.5 million, which were partially offset by proceeds from maturities and sales of available-for-sale debt securities of \$9.6 million and proceeds from sales of equity securities of \$0.8 million.

Net cash used in investing activities of \$25.2 million for 2022 was primarily due to property, plant and equipment of \$28.5 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 \$2.2 million, which were partially offset by proceeds from maturities and sales of available-for-sale debt securities of \$5.4 million.

Net cash used in investing activities of \$38.8 million for 2021 was primarily due to property, plant and equipment of \$29.6 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 \$9.6 million, which were partially offset by proceeds from maturities and sales of available-for-sale debt securities of \$0.5 million.

Net cash provided by financing activities was \$8.6 million for 2023 which mainly consisted of the proceeds of \$56.5 million from short-term loans in China, \$0.7 million from the capital increase in subsidiary shares from noncontrolling interest, and \$0.6 million from a long-term loan in China, which were partially offset by payments on short-term loans of \$49.2 million.

Net cash provided by financing activities was \$38.0 million for 2022 which mainly consisted of the proceeds of \$53.1 million from short-term loans in China, \$2.2 million from the capital increase in subsidiary shares from noncontrolling interest, and \$0.5 million from the exercise of common stock options, which were partially offset by payments on short-term loans of \$17.8 million.

Net cash provided by financing activities was \$5.7 million for 2021 which mainly consisted of the proceeds of \$20.5 million from short-term loans in China, \$1.8 million from short-term loan from noncontrolling interest, \$1.7 million from the exercise of common stock options, \$1.3 million from the formation of new subsidiary with noncontrolling interests and \$0.5 million from sale of Tongmei shares to noncontrolling interests, which were partially offset by payments on short-term loans of \$19.1 million and \$1.1 million of issuance costs in connection with issuance of Tongmei common stock to redeemable noncontrolling interests.

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 2023, 2022 and 2021 under this program. As of December 31, 2023, 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.

Occasionally, one of our PRC subsidiaries or PRC raw material joint ventures declares and pays a dividend. These dividends generally occur when the PRC joint venture declares a dividend for all of its shareholders. Dividends paid to the Company are subject to a 10% PRC withholding tax. The Company is required to obtain approval from SAFE to transfer funds in or out of the PRC. SAFE requires a valid agreement to approve the transfers, which are processed through a bank. Other than PRC foreign exchange restrictions, the Company is not subject to any PRC restrictions and limitations on its ability to distribute earnings from its businesses, including its PRC subsidiaries and PRC joint ventures, to the Company and its investors as well as the ability to settle amounts owed by the Company to its PRC subsidiaries and PRC joint ventures. If SAFE approval is denied the dividend payable to the Company would be owed but would not be paid.

For the years ended December 31, 2023, 2022 and 2021, the aggregate dividends paid to us, directly or to an intermediate entity within our corporate structure, by our PRC subsidiaries and PRC raw material joint ventures were approximately \$4.3 million, \$2.9 million and \$774,000, respectively. In June 2021, we received a dividend of \$774,000, from one of our equity investments, Xiaoyi XingAn Gallium Co., Ltd. (“Xiaoyi XingAn”). In June 2022, July 2022 and August 2022, we received a dividend of \$1.3 million from BoYu, \$1.5 million from Xiaoyi XingAn and \$0.1 million from one of our equity investments, JiYa Semiconductor Material Co. Ltd. (“JiYa”), respectively. In April 2023 and November 2023, Xiaoyi XingAn distributed a dividend of \$1.8 million, and JiYa distributed dividends of \$2.0 million and \$0.5 million, respectively. For the years ended December 31, 2023 and 2022, there were no dividends paid to minority shareholders by our PRC subsidiaries or PRC raw material joint ventures.

We have no current intentions to distribute to our investors earnings under our corporate structure. We settle amounts owed under our transfer pricing arrangements in the ordinary course of business.

The cash generated from one PRC subsidiary is not used to fund another PRC subsidiary’s operations. None of our PRC subsidiaries has ever faced difficulties or limitations on its ability to transfer cash between our subsidiaries. AXT has cash management policies that dictate the amount of such funding.

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 the IPO fails to pass the audit of the Shanghai Stock Exchange, is not approved by the CSRC or Tongmei cancels the IPO application. The aggregate redemption amount is approximately \$49 million.

Tongmei submitted its IPO application to the Shanghai Stock Exchange, and it was formally accepted for review on January 10, 2022. The Shanghai Stock Exchange approved the IPO application on July 12, 2022. On August 1, 2022, the CSRC accepted for review Tongmei’s IPO application. The STAR Market IPO remains subject to review and approval by the CSRC and other authorities. The process of going public on the STAR Market includes several

periods of review and, therefore, is a lengthy process. Subject to review and approval by the CSRC and other authorities, Tongmei hopes to accomplish this goal in the coming months. The listing of Tongmei on the STAR Market will not change the status of AXT as a U.S. public company.

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 July 27, 2021, 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, debt securities, depositary shares, warrants, subscription rights, purchase contracts and/or units in one or more offerings and in any combination. A prospectus supplement, which we will provide each time we offer securities, will describe the specific amounts, prices and terms of the securities we determine to offer. We currently expect to use the net proceeds from the sale of securities under the shelf registration statement for working capital, capital expenditures and other general corporate purposes. We may also use a portion of the net proceeds to acquire, license or invest in complementary products, technologies or businesses. On May 17, 2022, the SEC declared the registration statement effective.

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

Our bank loans and credit facilities typically have a term of 12 months or less and are included in “Bank loan” in our consolidated balance sheets. The following table represents bank loans as of December 31, 2023 and 2022 (in thousands, except interest rate data):

Subsidiary	Bank	Loan Detail	Interest Rate	Start Date	Due Date	December 31,	
						2022	2023
Tongmei	Bank of China (1)	\$ 2,108	2.7 %	September-22	March-23	\$ 2,175	\$ -
		3,935	4.6 %	January-22	January-23	4,059	-
		1,405	4.2 %	April-22	April-23	1,450	-
		1,848	3.5 %	January-23	January-24	-	1,795
	Bank of China (5)	2,184	2.8 %	March-23	March-24	-	2,118
		376	2.7 %	September-23	September-24	-	386
		876	3.5 %	November-23	November-24	-	876
		1,003	3.5 %	November-23	November-24	-	1,003
	Bank of China (3)	2,911	3.5 %	January-23	January-24	-	2,825
	Bank of Communications (2)	1,405	3.3 %	January-22	January-23	1,450	-
		1,405	3.3 %	January-22	January-23	1,450	-
	Bank of Communications (5)	1,450	3.3 %	December-22	December-23	1,450	-
		1,455	3.3 %	January-23	January-24	-	1,414
		1,380	3.8 %	May-23	May-24	-	1,414
		1,373	3.8 %	July-23	May-24	-	1,414
	China Merchants Bank (5)	4,367	3.7 %	January-23	January-24	-	4,235
	Bank of Beijing (4)	3,192	4.2 %	May-22	May-23	3,292	-
		2,290	4.2 %	January-23	January-24	-	2,220
		3,541	3.2 %	June-23	May-24	-	3,626
		1,380	3.2 %	June-23	February-24	-	1,414
	Industrial Bank (5)	1,414	3.0 %	December-23	December-24	-	1,414
		5,621	4.4 %	June-22	June-23	5,798	-
		2,811	4.4 %	September-22	September-23	2,900	-
		2,757	4.3 %	June-23	June-24	-	2,825
	NingBo Bank (5)	2,744	4.3 %	July-23	July-24	-	2,825
		2,744	4.3 %	September-23	September-24	-	2,825
		1,405	4.8 %	June-22	June-23	1,450	-
		1,405	4.8 %	August-22	August-23	1,450	-
		1,405	4.8 %	September-22	September-23	1,450	-
		1,406	4.5 %	November-22	November-23	1,450	-
		2,900	4.5 %	December-22	December-23	2,900	-
		2,744	4.2 %	August-23	September-24	-	2,820
	Industrial and Commercial Bank of China (5)	1,271	4.3 %	November-23	November-24	-	1,271
		2,825	4.3 %	December-23	December-24	-	2,825
		5,621	3.2 %	September-22	July-23	5,800	-
		2,744	3.3 %	September-23	September-24	-	2,825
	NanJing Bank (5)	2,811	4.3 %	September-22	September-23	2,899	-
		1,265	4.3 %	November-22	November-23	1,305	-
		2,752	3.8 %	October-23	October-24	-	2,752
		1,450	2.8 %	December-22	December-23	1,450	-
BoYu	Industrial and Commercial Bank of China (6)	1,414	2.7 %	December-23	December-24	-	1,414
		1,204	2.4 %	January-23	January-24	-	849
	Bank of China (5)	703	4.8 %	September-22	March-23	725	-
		1,406	3.6 %	November-22	May-23	1,450	-
	NingBo Bank (5)	725	4.8 %	December-22	June-23	725	-
		1,414	3.3 %	November-23	May-24	-	1,414
	Industrial Bank (5)	688	3.6 %	September-23	September-24	-	708
	Bank of Communications (5)	1,414	3.0 %	November-23	May-24	-	1,414
	Loan Balance					\$ 47,078	\$ 52,921

Collateral for the above bank loans and line of credit

- (1) Baoding Tongmei's land use rights and all of its buildings located at its facility in Dingxing, China.
- (2) ChaoYang Tongmei's land use rights and all of its buildings located at its facility in Kazuo, China.
- (3) ChaoYang LiMei time deposit.
- (4) AXT time deposit.
- (5) Not collateralized.
- (6) BoYu's land use rights and its building located at its facility in Tianjin, China. In addition, the December 2023 loan attracts a guarantee fee amounting to 0.7% of the loan amount.

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 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 our facility in Fremont, California with approximately 19,467 square feet, which was scheduled to expire 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. Furthermore, in September 2023, we entered into another agreement to extend the lease for an additional five years, commencing December 2023. There are no variable lease payments, residual value guarantees or any restrictions or covenants imposed by the facility lease. The remainder 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. 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 \$510,000, \$458,000 and \$431,000 for the years ended December 31, 2023, 2022 and 2021, respectively, primarily related to our Fremont facility. Total rent expenses under these operating leases charged to cost of revenue were approximately \$285,000, \$303,000 and \$296,000 for the years ended December 31, 2023, 2022 and 2021, respectively, primarily related to the nitrogen system at our facility in Dingxing.

In 2020, we and a competitor entered into 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 years ended December 31, 2023 and 2022, the royalty expense under the Cross License Agreement was not considered material to our consolidated financial statements.

In December 2023, one of our consolidated subsidiaries, ChaoYang XinMei secured a loan of approximately \$2.1 million from an unrelated financing company. According to the agreement, ChaoYang XinMei temporarily transferred ownership of its production line and related equipment to the financing company, while retaining the right to use the property for production. At the end of the 30-month contractual period, ChaoYang XinMei holds the option to repurchase the production line and related equipment for \$14.00. As of December 31, 2023, \$2.1 million associated with this financing arrangement is included in Other long-term liabilities in our consolidated balance sheets.

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, 2023, we do not have any outstanding purchase orders that will incur a penalty if canceled by the Company.

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. During 2023 and 2022, we recorded a foreign exchange gain of \$0.2 million and \$1.6 million, respectively, and during 2021 we recorded a net foreign exchange loss of \$0.4 million, included as part of other income, net in our consolidated statements of operations. 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, 2023 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, 2023	Current Interest Rate	Projected Annual Interest Income	Proforma 10% Interest Rate Decline Income	Proforma 10% Interest Rate Increase Income
Cash, cash equivalents and restricted cash	\$ 50,114	0.54 %	\$ 271	\$ 244	\$ 298
Investments in marketable debt securities	2,140	3.29 %	70	63	77
			<u>\$ 341</u>	<u>\$ 307</u>	<u>\$ 375</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. No customer accounted for more than 10% of our accounts receivable as of December 31, 2023 and two customers accounted for more than 10% of our accounts receivable as of December 31, 2022.

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 fair value method, depending on whether we have the ability to exercise significant influence over their operations or financial decisions. We monitor our investments for impairment and record reductions in carrying value when events or changes in circumstances indicate that the carrying value may not be recoverable. Reasons for other than temporary declines in value include whether the related company would have insufficient cash flow to operate for the next twelve months, significant changes in the operating performance and changes in market conditions. Our minority investment under the fair value method as of December 31, 2023 and 2022 totaled \$0.6 million and \$0 million, respectively (see Note 6). Our minority investments under the equity method as of December 31, 2023 and 2022 totaled \$12.5 million and \$14.6 million, respectively.

Inflation Risk

While the historical impact of inflation is difficult to accurately measure due to the imprecise nature of the estimates required, we do not believe the effects of inflation on our consolidated results of operations and financial condition have been material. However, there can be no assurance that our consolidated results of operations and

financial condition will not be materially impacted by inflation in the future, including by heightened levels of inflation currently experienced globally. Nonetheless, if our costs were to become subject to significant inflationary pressures, we may not be able to fully offset such higher costs. Our inability or failure to do so could harm our business, consolidated results of operations or financial condition.

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 71, and are 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, 2023 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, 2023. The Company's internal control over financial reporting as of December 31, 2023 has been audited by BPM, the independent registered public accounting firm who also audited the Company's financial statements. BPM has issued a report on the effectiveness of the Company's internal control over financial reporting as of December 31, 2023, which can be found in this Annual Report on Form 10-K.

Changes in Internal Control over Financial Reporting

There was no change in our internal control over financial reporting during our fourth quarter of fiscal 2023 that has materially affected, or is reasonably likely to materially affect, AXT's internal control over financial reporting.

Item 9B. *Other Information*

None.

Item 9C. *Disclosure Regarding Foreign Jurisdictions that Prevent Inspections*

Not Applicable.

Report of Independent Registered Public Accounting Firm

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

Opinion on Internal Control Over Financial Reporting

We have audited the internal control over financial reporting of AXT, Inc. (a Delaware corporation) and its subsidiaries (the “Company”) as of December 31, 2023, based on criteria established in 2013 Internal Control—Integrated Framework issued by the Committee of Sponsoring Organizations of the Treadway Commission (COSO). In our opinion, the Company maintained, in all material respects, effective internal control over financial reporting as of December 31, 2023, based on criteria established in 2013 Internal Control—Integrated Framework issued by COSO.

We also have audited, in accordance with the standards of the Public Company Accounting Oversight Board (United States) (“PCAOB”), the consolidated balance sheets as of December 31, 2023 and 2022 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, 2023, and the related notes (collectively referred to as the “consolidated financial statements”) of the Company and our report dated March 15, 2024 expressed an unqualified opinion on those consolidated financial statements.

Basis for Opinion

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

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

Definition and Limitations of Internal Control Over Financial Reporting

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

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

/s/ BPM LLP

San Jose, California

March 15, 2024

PART III

The SEC allows us to include information required in this Annual Report on Form 10-K by referring to other documents or reports we have already filed or will soon be filing. This is called “Incorporation by Reference.” The Proxy Statement will be filed with the SEC pursuant to Regulation 14A not later than 120 days after the end of the fiscal year covered by this Annual Report on Form 10-K, 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 will be included in the Proxy Statement and is incorporated by reference into this Annual Report on Form 10-K.

Item 11. *Executive Compensation*

The information required by this item will be included in the Proxy Statement and is incorporated by reference into this Annual Report on Form 10-K.

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

The information required by this item will be included in the Proxy Statement and is incorporated by reference into this Annual Report on Form 10-K.

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

The information required by this item will be included in the Proxy Statement and is incorporated by reference into this Annual Report on Form 10-K.

Item 14. *Principal Accountant Fees and Services*

The information required by this item will be included in the Proxy Statement and is incorporated by reference into this Annual Report on Form 10-K.

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 Annual Report on Form 10-K. The exhibits listed in the accompanying Index to Exhibits are filed as part of, or incorporated by reference into, this Annual 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, 2023, and 2022, 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, 2023, 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, 2023, and 2022, and the results of its operations and its cash flows for each of the three years in the period ended December 31, 2023, in conformity with accounting principles generally accepted in the United States of America.

We also have audited, in accordance with the standards of the Public Company Accounting Oversight Board (United States) (“PCAOB”), the Company’s internal control over financial reporting as of December 31, 2023, based on criteria established in Internal Control—Integrated Framework (2013) issued by the Committee of Sponsoring Organizations of the Treadway Commission (COSO), and our report dated March 15, 2024, expressed an unqualified opinion thereon.

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 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.

Our audits included performing procedures to assess the risks of material misstatement of the financial statements, whether due to error or fraud, and performing procedures that respond to those risks. Such procedures included examining, on a test basis, evidence regarding the amounts and disclosures in the 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 matters communicated below are matters arising from the current period audit of the consolidated financial statements that were communicated or required to be communicated to the audit committee and that: (1) relate 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 matters below, providing separate opinions on the critical audit matters or on the accounts or disclosures to which they relate.

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 \$86.5 million as of December 31, 2023, which was net of a reserve of \$21.9 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 consolidated 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 15, 2024

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

	December 31,	
	2023	2022
ASSETS		
Current assets:		
Cash and cash equivalents	\$ 37,752	\$ 34,948
Restricted cash	12,362	6,400
Short-term investments	2,140	9,339
Accounts receivable, net of allowances for credit losses of \$579 and \$307 as of December 31, 2023 and December 31, 2022	19,256	29,252
Inventories	86,503	89,629
Prepaid expenses and other current assets	12,643	13,977
Total current assets	<u>170,656</u>	<u>183,545</u>
Long-term investments	—	2,118
Property, plant and equipment, net	166,348	161,017
Operating lease right-of-use assets	2,799	1,761
Other assets	18,898	21,631
Total assets	<u>\$ 358,701</u>	<u>\$ 370,072</u>
LIABILITIES, REDEEMABLE NONCONTROLLING INTERESTS AND STOCKHOLDERS' EQUITY		
Current liabilities:		
Accounts payable	\$ 9,617	\$ 10,084
Accrued liabilities	19,019	18,164
Bank loans	52,921	47,078
Total current liabilities	<u>81,557</u>	<u>75,326</u>
Noncurrent operating lease liabilities	2,351	1,322
Other long-term liabilities	5,647	3,678
Total liabilities	<u>89,555</u>	<u>80,326</u>
Commitments and contingencies (Note 16)		
Redeemable noncontrolling interests (Note 18)	41,663	44,846
Stockholders' equity:		
Preferred stock Series A, \$0.001 par value; 2,000 shares authorized; 883 shares issued and outstanding as of December 31, 2023 and December 31, 2022 (Liquidation preference of \$7,875 and \$7,699 as of December 31, 2023 and December 31, 2022)	3,532	3,532
Common stock, \$0.001 par value; 70,000 shares authorized; 44,239 and 43,554 shares issued and outstanding as of December 31, 2023 and December 31, 2022	44	44
Additional paid-in capital	238,452	235,308
Accumulated deficit	(32,040)	(14,159)
Accumulated other comprehensive loss	(5,999)	(3,118)
Total AXT, Inc. stockholders' equity	<u>203,989</u>	<u>221,607</u>
Noncontrolling interests	23,494	23,293
Total stockholders' equity	<u>227,483</u>	<u>244,900</u>
Total liabilities, redeemable noncontrolling interests and stockholders' equity	<u>\$ 358,701</u>	<u>\$ 370,072</u>

See accompanying notes to consolidated financial statements.

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

	Year Ended December 31,		
	2023	2022	2021
Revenue	\$ 75,795	\$ 141,118	\$ 137,393
Cost of revenue	62,477	88,997	89,979
Gross profit	13,318	52,121	47,414
Operating expenses:			
Selling, general and administrative	22,806	25,654	24,189
Research and development	12,081	13,913	10,328
Total operating expenses	34,887	39,567	34,517
Income (loss) from operations	(21,569)	12,554	12,897
Interest expense, net	(1,527)	(1,071)	(213)
Equity in income of unconsolidated joint ventures	1,884	5,957	4,409
Other income, net	2,179	3,487	509
Income (loss) before provision for income taxes	(19,033)	20,927	17,602
Provision for income taxes	160	2,185	1,093
Net income (loss)	(19,193)	18,742	16,509
Less: Net (income) loss attributable to noncontrolling interests and redeemable noncontrolling interests	1,312	(2,931)	(1,934)
Net income (loss) attributable to AXT, Inc.	\$ (17,881)	\$ 15,811	\$ 14,575
Net income (loss) attributable to AXT, Inc. per common share:			
Basic	\$ (0.42)	\$ 0.37	\$ 0.35
Diluted	\$ (0.42)	\$ 0.37	\$ 0.34
Weighted-average number of common shares outstanding:			
Basic	42,643	42,104	41,367
Diluted	42,643	42,715	42,720

See accompanying notes to consolidated financial statements.

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

	Year Ended December 31,		
	2023	2022	2021
Net income (loss)	<u>\$ (19,193)</u>	<u>\$ 18,742</u>	<u>\$ 16,509</u>
Other comprehensive income (loss), net of tax:			
Change in foreign currency translation gain (loss), net of tax	(3,818)	(10,994)	3,719
Change in unrealized gain (loss) on available-for-sale debt investments, net of tax	<u>283</u>	<u>(238)</u>	<u>(68)</u>
Total other comprehensive income (loss), net of tax	<u>(3,535)</u>	<u>(11,232)</u>	<u>3,651</u>
Comprehensive income (loss) attributable to AXT, Inc.	(22,728)	7,510	20,160
Less: Comprehensive (income) loss attributable to noncontrolling interests and redeemable noncontrolling interests	<u>1,965</u>	<u>(1,117)</u>	<u>(2,492)</u>
Comprehensive income (loss) attributable to AXT, Inc.	<u><u>\$ (20,763)</u></u>	<u><u>\$ 6,393</u></u>	<u><u>\$ 17,668</u></u>

See accompanying notes to consolidated financial statements.

AXT, INC.

CONSOLIDATED STATEMENTS OF STOCKHOLDERS' EQUITY
(In thousands)

	Common Stock					Accumulated Deficit	Accumulated Other Comprehensive Income (Loss)	AXT, Inc. Stockholders' Equity	Noncontrolling Interests	Total Stockholders' Equity
	Preferred Stock Shares	Preferred Stock Amount	Common Stock Shares	Common Stock Amount	Additional Paid-In Capital					
Balance as of January 1, 2021	883	\$ 3,532	41,967	\$ 42	230,381	\$ (44,545)	\$ 3,209	\$ 192,619	\$ 15,350	\$ 207,969
Common stock options exercised			507	1	1,669			1,670		1,670
Formation of new subsidiary with noncontrolling interests					(262)			(262)	1,413	1,151
Transfer of subsidiary with noncontrolling interests					(1,229)			(1,229)	1,229	—
Restricted stock awards canceled			(14)							—
Stock-based compensation					4,519			4,519		4,519
Issuance of common stock in the form of restricted stock			426							—
Purchase of subsidiary shares from noncontrolling interests					(2,691)			(2,691)	(1,039)	(3,730)
Transfer of subsidiary with redeemable noncontrolling interests					(1,241)			(1,241)		(1,241)
Noncontrolling interest portion of Tongmei stock-based compensation					(62)			(62)	40	(22)
Sale of common stock to employees in connection with the reorganization					538			538		538
Net income								14,575	1,045	15,620
Other comprehensive income								3,093	279	3,372
Balance as of December 31, 2021	883	3,532	42,886	43	231,622	(29,970)	6,302	211,529	18,317	229,846
Common stock options exercised			172	1	517			518		518
Investment in subsidiary with noncontrolling interest					(466)			(466)	2,699	2,233
Investment in subsidiary with redeemable noncontrolling interest			(91)		(471)			(471)		(471)
Restricted stock awards canceled										—
Stock-based compensation					3,273			3,273		3,273
Issuance of common stock in the form of restricted stock			587					—		—
Tongmei stock-based compensation					733			733		733
Noncontrolling interest portion of Tongmei stock-based compensation					100			100	(42)	58
Investment in subsidiary from noncontrolling interest						15,811		15,811	1,887	17,144
Net income								(9,420)	(901)	(10,321)
Other comprehensive loss								221,607	23,293	244,900
Balance as of December 31, 2022	883	3,532	43,554	44	235,308	(14,159)	(3,118)	221,607	23,293	244,900
Common stock options exercised			4		10			10		10
Investment in subsidiary with noncontrolling interest					(153)			(153)	861	708
Investment in subsidiary with redeemable noncontrolling interest					(155)			(155)		(155)
Restricted stock awards canceled			(23)							—
Stock-based compensation					2,779			2,779		2,779
Issuance of common stock in the form of restricted stock			704					—		—
Tongmei stock-based compensation					761			761		761
Noncontrolling interest portion of Tongmei stock-based compensation					(98)			(98)	55	(43)
Investment in subsidiary from noncontrolling interest						(17,881)		—		—
Net loss								(17,881)	(391)	(18,272)
Other comprehensive loss								(2,881)	(324)	(3,205)
Balance as of December 31, 2023	883	\$ 3,532	44,239	\$ 44	\$ 238,452	\$ (32,040)	\$ (5,999)	\$ 203,989	\$ 23,494	\$ 227,483

See accompanying notes to consolidated financial statements.

AXT, INC.

CONSOLIDATED STATEMENTS OF CASH FLOWS

	Year Ended December 31,		
	2023	2022	2021
Cash flows from operating activities:			
Net income (loss)	\$ (19,193)	\$ 18,742	\$ 16,509
Adjustments to reconcile net income (loss) to net cash provided by (used in) operating activities:			
Depreciation and amortization	8,722	8,119	7,078
Amortization of marketable securities premium	18	58	68
Stock-based compensation	3,540	4,006	4,519
Provision for credit losses	272	(177)	87
Loss on sale of equity investment	166	—	—
(Gain) Loss on disposal of equipment	21	(85)	(8)
Return of equity method investments as dividends	4,316	1,608	774
Equity in income of unconsolidated joint ventures	(2,050)	(5,957)	(4,409)
Deferred tax assets	553	104	2,340
Changes in operating assets and liabilities:			
Accounts receivable	9,306	4,535	(9,748)
Inventories	1,073	(31,412)	(12,401)
Prepaid expenses and other current assets	(652)	(3,486)	(798)
Other assets	419	(471)	(6,283)
Accounts payable	(162)	(5,519)	3,563
Accrued liabilities	(1,897)	(2,127)	(3,445)
Other long-term liabilities	(1,049)	3,297	(1,151)
Net cash provided by (used in) operating activities	3,403	(8,765)	(3,305)
Cash flows from investing activities:			
Purchases of property, plant and equipment	(10,475)	(28,465)	(29,645)
Purchases of available-for-sale debt securities	—	(2,158)	(9,645)
Proceeds from sales and maturities of available-for-sale debt securities	9,582	5,400	480
Proceeds from sales of equity securities - 15% of Jia Mei	827	—	—
Investments in non-marketable equity investments	(2,538)	—	—
Net cash used in investing activities	(2,604)	(25,223)	(38,810)
Cash flows from financing activities:			
Proceeds from common stock options exercised	10	518	1,670
Proceeds from sale of subsidiary shares to noncontrolling interests	—	—	538
Proceeds from short-term bank loans	56,470	53,078	20,543
Proceeds from long-term loan from noncontrolling interest	—	—	1,834
Payments on short-term bank loans	(49,210)	(17,798)	(19,066)
Proceeds from capital increase in subsidiary shares from noncontrolling interests	708	2,233	—
Proceeds from long-term loan	635	—	—
Formation of new subsidiary with noncontrolling interests	—	—	1,283
Proceeds from issuance of Tongmei's common stock to redeemable noncontrolling interests, net of costs	—	—	(1,077)
Net cash provided by financing activities	8,613	38,031	5,725
Effect of exchange rate changes on cash and cash equivalents, and restricted cash	(646)	542	551
Net increase (decrease) in cash and cash equivalents, and restricted cash	8,766	4,585	(35,839)
Cash, restricted cash and cash equivalents at the beginning of the year	41,348	36,763	72,602
Cash, restricted cash and cash equivalents at the end of the period	\$ 50,114	\$ 41,348	\$ 36,763
Supplemental disclosures:			
Income taxes paid, net of refunds	\$ 686	\$ 1,692	\$ 3,177
Interest expense paid	\$ 1,564	\$ —	\$ —
Supplemental disclosure of non-cash flow information:			
Loan proceeds received by notes receivable	\$ 1,481	\$ —	\$ —
Notes receivables paid to purchase fixed assets	\$ 4,170	\$ 6,835	\$ —
Non-cash consideration received from sale of DongFang	\$ 585	\$ —	\$ —
Conversion of related party borrowings to Additional Paid-in Capital	\$ —	\$ 1,887	\$ —
Investment in subsidiary shares from noncontrolling interest	\$ 308	\$ 937	\$ —
Bank loan proceeds paid directly to a third-party vendor, included in accounts payable	\$ —	\$ 474	\$ —
Sales of land and building to unconsolidated joint venture	\$ —	\$ 976	\$ —
Consideration payable in connection with construction in progress, included in accrued liabilities	\$ 6,574	\$ 4,135	\$ 2,974

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 2023, our substrate product group generated 63% of our revenue and raw materials product group generated 37%. 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”), AXT-Tongmei, Inc. (“AXT-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”), ChaoYang XinMei High Purity Semiconductor Materials Co., Ltd. (“ChaoYang XinMei”), Nanjing JinMei Gallium Co., Ltd. (“JinMei”), ChaoYang JinMei Gallium Ltd. (“ChaoYang JinMei”), ChaoYang ShuoMei High Purity Semiconductor Materials Co., Ltd. (“ChaoYang ShuoMei”), MaAnShan JinMei Gallium Ltd., (“MaAnShan JinMei”) 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 2023 and 2022, we have three and six companies accounted for by the equity method, respectively. 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 2023 and 2022, expenses associated with ChaoYang LiMei had a de minimis impact on our consolidated financial statements.

In February 2021, Tongmei signed a joint venture agreement with certain investors to fund a new company, ChaoYang XinMei. The agreement called for a total investment of approximately \$3.0 million, of which Tongmei would 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. In May 2021, the investors completed the funding of the remaining balance of approximately \$1.5 million. Tongmei's portion of the final investment was approximately \$0.9 million, for a total investment of approximately \$1.8 million for a 58.5 percent ownership of ChaoYang XinMei. In September 2021 and October 2021, ChaoYang XinMei received funding from a minority investor of \$0.9 million and \$1.0 million, respectively. In December 2021 and January 2022, ChaoYang XinMei received funding from Tongmei of \$1.4 million and \$1.4 million, respectively. In January 2022, the China local government certified this additional funding in ChaoYang XinMei as an equity investment. Tongmei's ownership remained at 58.5% after these equity investments. In April 2022, Tongmei entered into a capital increase agreement (the "Capital Increase Agreement") with minority investors to further invest \$4.5 million in ChaoYang XinMei. Tongmei's portion of the investment was approximately \$2.6 million, of which \$1.1 million was invested in April 2022 and \$0.8 million was invested in May 2022. The minority investors' portion of the investment was approximately \$1.9 million, of which \$0.7 million was invested in April 2022 and \$0.6 million was invested in May 2022. As a result, noncontrolling interests increased \$1.4 million and redeemable noncontrolling interests increased \$0.1 million. Tongmei's ownership remained at 58.5% after the April 2022 and May 2022 equity investments. In July 2022, Tongmei and the minority investors further invested \$0.8 million and \$0.6 million in ChaoYang XinMei, respectively. This completed the investment obligations under the Capital Increase Agreement. As a result, noncontrolling interests increased \$610,000 and redeemable noncontrolling interests increased \$57,000. Tongmei's ownership remained at 58.5% after the July 2022 equity investment.

In April 2022, ChaoYang JinMei signed a joint venture agreement with a certain investor to fund a new company, ChaoYang ShuoMei, our consolidated subsidiary. The agreement calls for a total investment of approximately \$4.4 million, of which ChaoYang JinMei will fund approximately \$3.3 million for a 75 percent ownership of ChaoYang ShuoMei. In July and August 2022, ChaoYang JinMei completed the initial funding of \$1.0 million in ChaoYang ShuoMei. In August 2022, the investor invested \$334,000 in ChaoYang ShuoMei. As a result, noncontrolling interests increased \$406,000 and redeemable noncontrolling interests increased \$73,000. In January 2023, ChaoYang ShuoMei received \$0.5 million in funding from ChaoYang JinMei and \$0.2 million in funding from one of the minority investors. As a result, noncontrolling interests increased \$0.2 million and redeemable noncontrolling interests increased \$36,000. In May 2023, ChaoYang ShuoMei received \$1.0 million in funding from ChaoYang JinMei and \$0.3 million in funding from one of the minority investors. As a result, noncontrolling interests increased \$0.4 million and redeemable noncontrolling interests increased \$75,000. In August 2023, ChaoYang ShuoMei received \$0.6 million in funding from ChaoYang JinMei and \$0.2 million in funding from one of the minority investors. As a result, noncontrolling interests increased \$0.2 million and redeemable noncontrolling interests increased \$44,000. ChaoYang JinMei has completed its investment obligations under the ChaoYang ShuoMei Joint Venture Agreement. ChaoYang JinMei's ownership of ChaoYang ShuoMei remained at 75% after these equity investments.

In April 2022, Tongmei signed a joint venture agreement with certain investors to fund a new company, ChaoYang KaiMei. The agreement called for a total investment of approximately \$7.6 million, of which Tongmei would fund approximately \$3.0 million for a 40.0 percent ownership of ChaoYang KaiMei. In July 2022, the investors completed the initial funding of approximately \$2.2 million. Tongmei's portion of the investment was approximately \$0.9 million. In January 2023, Tongmei made an investment of \$0.9 million to ChaoYang KaiMei. In each of July 2023 and August 2023, Tongmei made an investment of approximately \$0.6 million in ChaoYang KaiMei. These contributions culminated in the fulfillment of all of Tongmei's financial obligations under the April 2022 ChaoYang KaiMei Joint Venture Agreement. In September 2023, Tongmei entered into another joint venture agreement with the same group of investors. This new agreement called for additional investment of approximately \$5.6 million, with Tongmei committing to fund approximately \$2.3 million. In December 2023, Tongmei made its initial additional investment of approximately \$0.6 million in ChaoYang KaiMei. Tongmei's ownership of ChaoYang KaiMei remained at 40% after these equity investments.

All activities for MaAnShan JinMei ceased during the first half of 2022 and the subsidiary was subsequently dissolved in May 2022. The dissolution of MaAnShan JinMei had a de minimis impact on the consolidated results.

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 of shares in an initial public offering (the “IPO”) on the Shanghai Stock Exchange’s Sci-Tech innovAtion boARd (the “STAR Market”), in late December 2020, 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. Additionally, Baoding Tongmei and ChaoYang Tongmei, were assigned to Tongmei as wholly owned subsidiaries. In 2020, the private equity funds (the “Investors”) 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 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 approximately \$49 million investment in its entirety on January 25, 2021, at which time the Investors owned a redeemable noncontrolling interest in Tongmei of 7.28%. As of September 30, 2022, Tongmei’s noncontrolling interests and redeemable noncontrolling interests totaled approximately 14.5%. AXT remains the controlling stakeholder of Tongmei and holds a majority of the board of director positions of Tongmei. In June 2021, AXT sold AXT-Tongmei to Tongmei for \$1. Since Tongmei is 85.5% owned by AXT, and the transaction was between common interest holders, the transaction was accounted for at net book value and resulted in an increase of \$1.2 million to noncontrolling interests and \$1.2 million to redeemable noncontrolling interests.

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, restricted cash, short-term investments and long-term investments, accounts receivable, accounts payable, accrued liabilities and bank loans 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, 2023 and 2022, 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 gain totaled \$0.2 million and \$1.6 million for the years ended December 31, 2023 and 2022, respectively. The transaction loss for the year ended December 31, 2021 totaled \$434,000. 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)”, net of tax in the consolidated statements of comprehensive income (loss).

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, 2023, or 2022.

	December 31, 2023	December 31, 2022
Contract liabilities	\$ 305	\$ 338
During the three and twelve months ended December 31, 2023, the Company recognized \$9,000 and \$287,000, respectively, of revenue that was included in the contract balances as of December 31, 2022. During the three and twelve months ended December 31, 2022, the Company recognized \$22,000 and \$760,000 of revenue that was included in the contract balances as of December 31, 2021.		

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 and Use 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. No customer accounted for more than 10% of our accounts receivable as of December 31, 2023 and two customers accounted for more than 10% of our accounts receivable as of December 31, 2022.

No customer represented 10% of our revenue for the year ended December 31, 2023 and 2021. One customer represented 15% of our revenue for the year ended December 31, 2022. Our top five customers, although not the same five customers for each period, represented 25% of our revenue for the year 2023, 34% of our revenue for the year 2022, and 26% of our revenue for the year 2021.

For the year ended December 31, 2023, two third-party customers 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, 2022 and 2021, one third-party customer 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.

Restricted Cash

We maintain restricted cash in connection with cash balances temporarily restricted for regular business operations. In May 2022, Tongmei and the Bank of Beijing signed a credit facility for \$3.4 million. As a condition of the credit facility we must maintain a time deposit at the Bank of Beijing as collateral, and therefore we placed time deposits of \$2.9 million and \$1.0 million at the Bank of Beijing in April 2022 and May 2022, respectively. In December 2022, we

placed another time deposit of \$2.5 million at the Bank of Beijing as collateral for a bank loan of \$2.3 million received by Tongmei in January 2023. In January 2023, our consolidated subsidiary, ChaoYang LiMei, placed a time deposit of \$3.0 million at the Bank of China as collateral for a bank loan of \$2.9 million received by Tongmei in January 2023. When the May 2022 bank loan under the credit facility matured, we utilized the same time deposit of \$3.9 million as collateral for a new bank loan of \$3.5 million from the Bank of Beijing in June 2023. Furthermore, during June 2023 and December 2023, time deposits of \$1.5 million each were placed at the Bank of Beijing as collateral for two bank loans of \$1.4 million each received by Tongmei. Each of the bank loans has a term of 12 months. Therefore, the January 2023 bank loans, the June 2023 bank loans, and the December 2023 bank loan, along with the respective time deposits, are classified as short-term investments in our consolidated balance sheets. The time deposits have been excluded from the Company's cash and cash equivalents balance. As of December 31, 2023, \$12.4 million was included in restricted cash in our consolidated balance sheets.

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 Credit Losses and Sales Returns

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 credit losses. We measure the expected credit losses on a collective (pool) basis when similar delinquency status exist. 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.

In accordance with ASC 326-20's current expected credit loss impairment model, 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 reasonable and supportable forecasts of future economic conditions. Uncollectible receivables are recorded as provision for credit losses 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, 2023 and 2022, our accounts receivable, net balance was \$19.3 million and \$29.3 million, respectively, which was net of an allowance for credit losses of \$579,000 and \$307,000 as of December 31, 2023 and 2022, respectively. During 2023, we increased the allowance for credit losses by \$272,000. During 2022, we increased the allowance for credit losses by \$177,000. If actual uncollectible accounts differ substantially from our estimates, revisions to the estimated allowance for credit losses would be required, which could have a material impact on our financial results for the future periods.

As of December 31, 2023 and 2022, the sales returns reserve (included in accrued liabilities) balance was \$39,000 and \$112,000, respectively. During 2023, we utilized \$39,000 and reduced an additional \$34,000 and during 2022, we utilized \$112,000 and reserved an additional \$176,000.

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, 2023 and 2022, accrued product warranties totaled \$703,000 and \$669,000, respectively. The increase in accrued product warranties is primarily attributable to increased claims for quality issues experienced by some 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 over 3 to 5 years, machinery and equipment over 1 to 20 years, automobiles over 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 2023, 2022 and 2021.

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 fair value 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 fair value method investments considering available information such as pricing in recent rounds of financing, current cash positions, earnings (loss) and cash flow forecasts, recent operational performance, and any other readily available market data.

For the year ended December 31, 2023, one of our PRC joint ventures assessed one of its equity investments was fully impaired. For the year ended December 31, 2023, we divested our equity investment in a PRC joint venture. The impairment and divestiture resulted in a total of \$1.9 million in impairment charges in our financial results. There were no impairment charges during the year ended December 31, 2022.

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, 2023, 2022 and 2021 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 (loss). The balance of accumulated other comprehensive income (loss) is as follows (in thousands):

	As of December 31,	
	2023	2022
Accumulated other comprehensive loss:		
Unrealized loss on investments, net	\$ (20)	\$ (303)
Cumulative translation adjustment	<u>(6,530)</u>	<u>(3,042)</u>
	(6,550)	(3,345)
Less: Cumulative translation adjustment attributable to noncontrolling interests and redeemable noncontrolling interests	<u>(551)</u>	<u>(227)</u>
Accumulated other comprehensive loss attributable to AXT, Inc.	<u>\$ (5,999)</u>	<u>\$ (3,118)</u>

Net Income (Loss) Per Share

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

Recent Accounting Pronouncements

In March 2022, the Financial Accounting Standards Board (“FASB”) pronouncement Accounting Standards Update (“ASU”) 2022-02, Financial Instruments-Credit Losses (Topic 326): Troubled Debt Restructurings and Vintage Disclosures was issued as an amendment to ASU 2016-13, Financial Instruments-Credit Losses. ASU 2022-02 aims to modify disclosure requirements for certain loan refinancings and restructurings by creditors. The amendment also require that an entity disclose current-period gross write offs by year of origination for financing receivables and net investments in leases within the scope of Subtopic 326-20, Financial Instruments—Credit Losses—Measured at Amortized Cost. The guidance is effective for fiscal years beginning after December 15, 2022, including interim periods within those fiscal years. Adoption of the new standard had an immaterial effect on our consolidated financial statements.

In September 2022, FASB issued ASU 2022-04, Liabilities—Supplier Finance Programs (Subtopic 405-50): Disclosure of Supplier Finance Program Obligations, to enhance the transparency about the use of supplier finance programs for investors. The amendments in this Update require that a buyer in a supplier finance program disclose sufficient information about the program to allow a user of financial statements to understand the program’s nature, activity during the period, changes from period to period, and potential magnitude. The guidance is effective for fiscal years beginning after December 15, 2022, including interim periods within those fiscal years. Adoption of the new standard had an immaterial effect on our consolidated financial statements.

In November 2023, FASB released ASU 2023-07— Segment Reporting (Topic 280): Improvements to Reportable Segment Disclosures, aiming to enhance the transparency and relevance of segment information provided in financial statements. The amendments in this Update require that a public entity disclose significant segment expenses, profit or loss and assets, etc. for each reportable segment, on an annual and interim basis. The Update is effective for fiscal years beginning after December 15, 2023, and interim periods within fiscal years beginning after December 15, 2024. Adoption of the new standard will have an immaterial effect on our consolidated financial statements.

In December 2023, FASB issued ASU 2023-09— Income Taxes (Topic 740): Improvements to Income Tax Disclosures, to help investors better understand an entity’s exposure to potential changes in jurisdictional tax legislation and the ensuing risks and opportunities. Furthermore, the Update improves to assess income tax information that affects cash flow forecasts and capital allocation decisions. The Update is effective for public business entities for annual periods beginning after December 15, 2024, on a prospective basis. Adoption of the new standard will have an immaterial effect on our consolidated financial statements.

Note 2. Cash, Cash Equivalents and Investments

Our cash and cash equivalents consist of cash and instruments with original maturities of less than three months. Our investments consist of instruments with original maturities of more than three months. As of December 31, 2023 and 2022, our cash, cash equivalents and debt investments are classified as follows (in thousands):

	December 31, 2023				December 31, 2022			
	Amortized Cost	Gross Unrealized Gain	Gross Unrealized (Loss)	Fair Value	Amortized Cost	Gross Unrealized Gain	Gross Unrealized (Loss)	Fair Value
Classified as:								
Cash and restricted cash	\$ 50,114	\$ —	\$ —	\$ 50,114	\$ 41,348	\$ —	\$ —	\$ 41,348
Cash equivalents:								
Certificates of deposit ¹ . . .	—	—	—	—	—	—	—	—
Total cash, restricted cash and cash equivalents.	<u>50,114</u>	<u>—</u>	<u>—</u>	<u>50,114</u>	<u>41,348</u>	<u>—</u>	<u>—</u>	<u>41,348</u>
Investments (available-for- sale):								
Certificates of deposit ² . . .	2,160	—	(20)	2,140	6,440	—	(175)	6,265
Corporate bonds	—	—	—	—	5,320	—	(128)	5,192
Total investments	<u>2,160</u>	<u>—</u>	<u>(20)</u>	<u>2,140</u>	<u>11,760</u>	<u>—</u>	<u>(303)</u>	<u>11,457</u>
Total cash, restricted cash, cash equivalents and investments	<u>\$ 52,274</u>	<u>\$ —</u>	<u>\$ (20)</u>	<u>\$ 52,254</u>	<u>\$ 53,108</u>	<u>\$ —</u>	<u>\$ (303)</u>	<u>\$ 52,805</u>
Contractual maturities on investments:								
Due within 1 year ³	\$ 2,160			\$ 2,140	\$ 9,600			\$ 9,339
Due after 1 through 5 years ⁴	<u>—</u>			<u>—</u>	<u>2,160</u>			<u>2,118</u>
	<u>\$ 2,160</u>			<u>\$ 2,140</u>	<u>\$ 11,760</u>			<u>\$ 11,457</u>

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, 2023 was \$20,000, 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.

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, 2023 (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, 2023						
Investments:						
Certificates of deposit	\$ —	\$ —	\$ 2,140	\$ (20)	\$ 2,140	\$ (20)
Total in loss position	<u>\$ —</u>	<u>\$ —</u>	<u>\$ 2,140</u>	<u>\$ (20)</u>	<u>\$ 2,140</u>	<u>\$ (20)</u>

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, 2022 (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, 2022						
Investments:						
Certificates of deposit	\$ 2,118	\$ (42)	\$ 4,146	\$ (133)	\$ 6,264	\$ (175)
Corporate bonds	—	—	4,842	(128)	4,842	(128)
Total in loss position	<u>\$ 2,118</u>	<u>\$ (42)</u>	<u>\$ 8,988</u>	<u>\$ (261)</u>	<u>\$ 11,106</u>	<u>\$ (303)</u>

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 \$12.5 million and \$14.6 million as of December 31, 2023 and 2022, respectively. As of December 31, 2023 and 2022, there were three and six companies accounted for under the equity method, respectively.

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, 2023. There have been no transfers between fair value measurement levels during the years ended December 31, 2023 and 2022.

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, 2023, 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, 2023 (in thousands):

	Balance as of December 31, 2023	Quoted Prices in Active Markets of Identical Assets (Level 1)	Significant Other Observable Inputs (Level 2)	Significant Unobservable Inputs (Level 3)
Assets:				
Investments:				
Certificates of deposit	\$ 2,140	\$ —	\$ 2,140	\$ —
Corporate bonds	—	—	—	—
Total	<u>\$ 2,140</u>	<u>\$ —</u>	<u>\$ 2,140</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, 2022 (in thousands):

	Balance as of December 31, 2022	Quoted Prices in Active Markets of Identical Assets (Level 1)	Significant Other Observable Inputs (Level 2)	Significant Unobservable Inputs (Level 3)
Assets:				
Investments:				
Certificates of deposit	\$ 6,265	\$ —	\$ 6,265	\$ —
Corporate bonds	5,192	—	5,192	—
Total	<u>\$ 11,457</u>	<u>\$ —</u>	<u>\$ 11,457</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 fair value method (See Note 6). For the year ended December 31, 2023, one of our PRC joint ventures assessed one of its equity investments was fully impaired. For the year ended December 31, 2023, we divested our equity investment in a PRC joint venture. The impairment and divestiture resulted in a total of \$1.9 million in impairment charges in our financial results. We had no impairment charges for 2022 and 2021.

Note 3. Inventories

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

	December 31, 2023	December 31, 2022
Inventories:		
Raw materials	\$ 32,910	\$ 46,476
Work in process	50,008	39,956
Finished goods	3,585	3,197
	<u>\$ 86,503</u>	<u>\$ 89,629</u>

As of December 31, 2023 and 2022, carrying values of inventories were net of inventory reserves of \$21.9 million and \$24.7 million, respectively, for excess and obsolete inventory and \$78,000 and \$47,000, respectively, for lower of cost or net realizable value reserves.

Note 4. Related Party Transactions

ChaoYang Tongmei purchases raw materials from one of PRC joint ventures, Donghai County Dongfang High Purity Electronic Materials Co., Ltd. (“Dongfang”) for production in the ordinary course of business. As of December 31, 2023 and 2022, amounts payable of \$0 and \$103,000, respectively, were included in “Accounts payable” in our consolidated balance sheets.

In September 2021 and October 2021, our consolidated subsidiary, ChaoYang XinMei received funding from a minority investor of \$0.9 million and \$1.0 million, respectively. As of December 31, 2021, \$1.9 million was included in short-term loan from noncontrolling interest in our consolidated balance sheets. In December 2021 and January 2022, the same subsidiary received funding from Tongmei of \$1.4 million and \$1.4 million, respectively. In January 2022, the China local government certified this additional funding in ChaoYang XinMei as an equity investment. As a result, noncontrolling interests increased \$2.2 million and redeemable noncontrolling interests increased \$0.2 million. Short-term loan from noncontrolling interest decreased to \$0. In April 2022, Tongmei entered into the Capital Increase Agreement with minority investors to further invest \$4.5 million in ChaoYang XinMei. In April 2022 and May 2022, ChaoYang XinMei received funding from Tongmei of \$1.1 million and \$0.8 million, respectively, as equity investments. In April 2022 and May 2022, the minority investors invested \$0.7 million and \$0.6 million, respectively. As a result, noncontrolling interests increased \$1.4 million and redeemable noncontrolling interests increased \$0.1 million. Tongmei’s ownership remained at 58.5% after these equity investments. In July 2022, Tongmei and the minority investors further invested \$0.8 million and \$0.6 million in ChaoYang XinMei, respectively. This completed the investment obligations under the Capital Increase Agreement. As a result, noncontrolling interests increased \$610,000 and redeemable noncontrolling interests increased \$57,000. Tongmei’s ownership remained at 58.5% after the July 2022 equity investment.

In September 2022, our consolidated subsidiary, ChaoYang LiMei completed the sale of land and its attached buildings to our equity investment entity, ChaoYang KaiMei, for a total consideration of \$1.5 million. In January 2023, ChaoYang KaiMei paid to ChaoYang LiMei \$1.5 million. As of December 31, 2023, \$0 million was included in “Prepaid expenses and other current assets” in our consolidated balance sheets.

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, 2023	December 31, 2022
Property, plant and equipment:		
Machinery and equipment, at cost	\$ 65,918	\$ 62,797
Less: accumulated depreciation and amortization	(42,112)	(38,477)
Building, at cost	125,786	118,550
Less: accumulated depreciation and amortization	(23,339)	(20,403)
Leasehold improvements, at cost	7,596	7,430
Less: accumulated depreciation and amortization	(5,984)	(5,559)
Construction in progress	38,483	36,679
	<u>\$ 166,348</u>	<u>\$ 161,017</u>

As of December 31, 2023, the balance of construction in progress was \$38.5 million, of which \$31.2 million was related to our buildings in our Dingxing and Kazuo locations, \$3.1 million was for manufacturing equipment purchases not yet placed in service and \$4.2 million was from our construction in progress for our other consolidated subsidiaries. As of December 31, 2022, the balance of construction in progress was \$36.7 million, of which \$27.2 million was related to our buildings in our Dingxing and Kazuo locations, \$5.4 million was for manufacturing equipment purchases not yet placed in service and \$4.1 million was from our construction in progress for our other consolidated subsidiaries.

Depreciation and amortization expense was \$8.7 million, \$8.1 million and \$7.1 million for the years ended December 31, 2023, 2022 and 2021, respectively.

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, 2023	December 31, 2022		
Nanjing JinMei Gallium Co., Ltd.....	\$ 592	\$ 592	Consolidated	** 85.5 %
ChaoYang JinMei Gallium Co., Ltd.....	1,820	1,820	Consolidated	** 85.5 %
Beijing BoYu Semiconductor Vessel Craftwork Technology Co., Ltd.....	1,346	1,346	Consolidated	** 85.5 %
ChaoYang ShuoMei High Purity Semiconductor Materials Co., Ltd. . .	3,122	1,000	Consolidated	**** 75.0 %
ChaoYang XinMei High Purity Semiconductor Materials Co., Ltd. . .	7,331	7,331	Consolidated	*** 58.5 %
	<u>\$ 14,211</u>	<u>\$ 12,089</u>		
Beijing JiYa Semiconductor Material Co., Ltd..	\$ 3,806	6,381	Equity	39 %
Xiaoyi XingAn Gallium Co., Ltd.	5,516	5,094	Equity	** 25 %
ChaoYang KaiMei Quartz Co., Ltd.	3,154	827	Equity	***** 40 %
Emeishan Jia Mei High Purity Metals Co., Ltd.	N/A	418	Equity	***** 25 %
	<u>\$ 12,476</u>	<u>\$ 12,720</u>		
Emeishan Jia Mei High Purity Metals Co., Ltd.	551	N/A	Fair value	***** 10 %
	<u>\$ 551</u>	<u>\$ —</u>		
Donghai County Dongfang High Purity Electronic Materials Co., Ltd.	—	1,887	N/A	***** 0 %
	<u>\$ —</u>	<u>\$ 1,887</u>		

* These percentages reflect the ownership currently in effect upon the completion of the reorganization in China and the ownership in effect upon the completion of the new capital funding by private equity investors in January 2021.

** In preparation for Tongmei's application for a listing of shares in an IPO on the STAR Market, in late December 2020 we reorganized our entity structures in China. JinMei and BoYu and their 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. In 2020, the Investors 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 approximately \$49 million investment in its entirety on January 25, 2021 at which time the Investors owned

a redeemable noncontrolling interest in Tongmei of 7.28%. As of December 31, 2022, Tongmei's noncontrolling interests and redeemable noncontrolling interests totaled approximately 14.5%. AXT remains the controlling stakeholder of Tongmei and holds a majority of the Board of Director positions of Tongmei.

*** In February 2021, Tongmei signed a joint venture agreement with certain investors to fund ChaoYang XinMei.

**** In April 2022, ChaoYang JinMei signed a joint venture agreement with certain investor to fund a new company, ChaoYang ShuoMei.

***** In April 2022, Tongmei signed a joint venture agreement with certain investors to fund a new company, ChaoYang KaiMei.

***** In May 2023, we sold 15% of our equity investments in Jia Mei to a third party. We now own 10% of the equity ownership of Jia Mei and account for it under the fair value method.

***** In November 2023, we completed the sale of our entire 46% equity ownership interests in Dongfang to a third party.

In May 2023, we reduced our ownership in Jia Mei from 25% to 10% by selling a portion of our Jia Mei shares to an unrelated third party for approximately \$827,000. Considering our decreased ownership and that we no longer have significant influence over its operations and financial policies, we adopted the fair value method of accounting to report on the investment in Jia Mei. As Jia Mei's equity interest is without a readily determinable fair value, we elected to use the measurement alternative to measure at cost, less any impairment, plus or minus fair value changes resulting from observable price changes in orderly transactions for identical or similar investments of the same issuer. As a result of the share sale, we recognized a gain of \$575,000. Additionally, in accordance with ASC 321-10-35-2, we adjusted the investment in Jia Mei to its fair value at the time of the sale. The gain resulting from the sale and the subsequent remeasurement was incorporated as a component of "Equity in income of unconsolidated joint ventures" in the consolidated statements of operations for the twelve months ended December 31, 2023. The gain from the sale and the subsequent remeasurement includes the following:

	Amount (in thousands)
Fair value of the consideration received	\$ 779
Foreign income tax withholding	48
Carrying value of 15% of Emeishan Jia Mei High Purity Metals Co., Ltd.	(252)
Gain recognized on sale of 15% of Emeishan Jia Mei High Purity Metals Co., Ltd.	<u>\$ 575</u>
	Amount (in thousands)
Fair value of the retained investment in Emeishan Jia Mei High Purity Metals Co., Ltd.	\$ 551
Carrying value of retained noncontrolling investment (10%)	(168)
Gain on retained noncontrolling investment due to remeasurement (10%)	<u>\$ 383</u>

The Jia Mei investment is reviewed for other-than-temporary declines in value on a quarterly basis. We did not record any other-than-temporary impairment charges for Jia Mei investment during the twelve months ended December 31, 2023.

In November 2023, our 46% equity ownership interest in Dongfang was sold to a third party for consideration valued at approximately \$0.6 million, including raw materials, equipment, and vehicle. As a result, our equity ownership interest of Dongfang decreased from 46% to 0%. The loss resulting from the sale was incorporated as a component of "Equity in income of unconsolidated joint ventures" in the consolidated statements of operations for the twelve months ended December 31, 2023. The loss from the sale includes the following:

	Amount (in thousands)
Fair value of the consideration received	\$ 585
Carrying value of 46% of Donghai County Dongfang High Purity Electronic Materials Co., Ltd.	(1,710)
Loss recognized on sale of 46% of Donghai County Dongfang High Purity Electronic Materials Co., Ltd. . . .	<u>\$ (1,125)</u>

Although we have representation on the board of directors of each of the privately held raw material 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 sales of finished product, are made by local management with regular guidance and input from us.

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 \$12.5 million and \$14.6 million as of December 31, 2023 and 2022, respectively. Our respective ownership interests in ChaoYang KaiMei, JiYa, Xiaoyi XingAn and Jia Mei was 40%, 39%, 25%, and 10%, respectively. 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.

Occasionally, one of our PRC subsidiaries or PRC raw material joint ventures declares and pays a dividend. These dividends generally occur when the PRC joint venture declares a dividend for all of its shareholders. Dividends paid to the Company are subject to a 10% PRC withholding tax. The Company is required to obtain approval from the State Administration of Foreign Exchange (“SAFE”) to transfer funds in or out of the PRC. SAFE requires a valid agreement to approve the transfers, which are processed through a bank. Other than PRC foreign exchange restrictions, the Company is not subject to any PRC restrictions and limitations on its ability to distribute earnings from its businesses, including its PRC subsidiaries and PRC joint ventures, to the Company and its investors as well as the ability to settle amounts owed by the Company to its PRC subsidiaries and PRC joint ventures. If SAFE approval is denied the dividend payable to the Company would be owed but would not be paid.

For the years ended December 31, 2023, 2022 and 2021, the aggregate dividends paid to us, directly or to an intermediate entity within our corporate structure, by our PRC subsidiaries and PRC raw material joint ventures were approximately \$4.3 million, \$2.9 million and \$774,000, respectively. In June 2021, we received a dividend of \$774,000 from Xiaoyi XingAn. In June 2022, July 2022 and August 2022, we received a dividend of \$1.3 million from BoYu, \$1.5 million from Xiaoyi XingAn and \$0.1 million from JiYa, respectively. In April 2023, Xiaoyi XingAn distributed a dividend of \$1.8 million to us. Additionally, in both April 2023 and November 2023, JiYa distributed dividends to us, totaling \$2.0 million and \$0.5 million, respectively. For the years ended December 31, 2023 and 2022, there were no dividends paid to minority shareholders by our PRC subsidiaries or PRC raw material joint ventures.

AXT’s minority investment entities are not consolidated and are accounted for under the equity method. The equity entities had the following summarized income information (in thousands) for the years ended December 31, 2023, 2022 and 2021, respectively: (The 2023 income information includes results of Jia Mei for Q1 and Q2.)

	Year Ended December 31,			Our share for the Year Ended December 31,		
	2023	2022	2021	2023	2022	2021
Net revenue	\$ 32,544	\$ 48,139	\$ 35,939	\$ 10,033	\$ 15,031	\$ 11,424
Gross profit	11,698	27,000	17,465	3,365	8,229	5,482
Operating income	10,115	24,987	14,293	2,724	7,532	4,495
Net income	8,681	19,104	12,560	1,884	5,957	4,409

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, 2023 and 2022, respectively: (The 2023 balance sheet information excludes Jia Mei.)

	As of December 31,	
	2023	2022
Current assets	\$ 31,636	\$ 43,091
Noncurrent assets	19,751	12,520
Current liabilities	7,367	10,552
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 an income of \$1.9 million, \$6.0 million and \$4.4 million for the years ended December 31, 2023, 2022 and 2021, respectively. Undistributed retained earnings relating to our investments in these minority investment entities amounted to \$8.1 million and \$9.2 million as of December 31, 2023 and 2022, respectively.

Note 7. Balance Sheets Details

Other Assets

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

	As of December 31,	
	2023	2022
Equity method investments	\$ 12,476	\$ 14,607
Value added tax receivable, long term	1,291	1,632
Other intangible assets	1,821	1,926
Deferred tax assets	1,683	2,236
Other assets	1,627	1,230
	<u>\$ 18,898</u>	<u>\$ 21,631</u>

Accrued Liabilities

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

	As of December 31,	
	2023	2022
Payable in connection with construction in progress	\$ 7,249	\$ 4,135
Accrued compensation and related charges	3,707	4,774
Preferred stock dividends payable	2,901	2,901
Accrued professional services	868	930
Accrued product warranty	703	669
Other tax payable	493	867
Current portion of operating lease liabilities	458	485
Advances from customers	305	338
Other personnel-related costs	286	291
Accrual for sales returns	39	112
Accrued income taxes	—	729
Other accrued liabilities	2,010	1,933
	<u>\$ 19,019</u>	<u>\$ 18,164</u>

Note 8. Bank Loans and Line of Credit

Our bank loans and credit facilities typically have a term of 12 months or less and are included in “Bank loan” in our consolidated balance sheets. The following table represents bank loans as of December 31, 2023 and 2022 (in thousands, except interest rate data):

Subsidiary	Bank	Loan Interest		Start Date	Due Date	December 31,	December 31,
		Detail	Rate			2022	2023
Tongmei . . .	Bank of China (1)	\$ 2,108	2.7 %	September-22	March-23	\$ 2,175	\$ -
		3,935	4.6 %	January-22	January-23	4,059	-
		1,405	4.2 %	April-22	April-23	1,450	-
	Bank of China (5)	1,848	3.5 %	January-23	January-24	-	1,795
		2,184	2.8 %	March-23	March-24	-	2,118
		376	2.7 %	September-23	September-24	-	386
		876	3.5 %	November-23	November-24	-	876
		1,003	3.5 %	November-23	November-24	-	1,003
	Bank of China (3)	2,911	3.5 %	January-23	January-24	-	2,825
	Bank of Communications (2)	1,405	3.3 %	January-22	January-23	1,450	-
		1,405	3.3 %	January-22	January-23	1,450	-
	Bank of Communications (5)	1,450	3.3 %	December-22	December-23	1,450	-
		1,455	3.3 %	January-23	January-24	-	1,414
		1,380	3.8 %	May-23	May-24	-	1,414
		1,373	3.8 %	July-23	May-24	-	1,414
	China Merchants Bank (5)	4,367	3.7 %	January-23	January-24	-	4,235
	Bank of Beijing (4)	3,192	4.2 %	May-22	May-23	3,292	-
		2,290	4.2 %	January-23	January-24	-	2,220
		3,541	3.2 %	June-23	May-24	-	3,626
		1,380	3.2 %	June-23	February-24	-	1,414
		1,414	3.0 %	December-23	December-24	-	1,414
	Industrial Bank (5)	5,621	4.4 %	June-22	June-23	5,798	-
		2,811	4.4 %	September-22	September-23	2,900	-
		2,757	4.3 %	June-23	June-24	-	2,825
		2,744	4.3 %	July-23	July-24	-	2,825
		2,744	4.3 %	September-23	September-24	-	2,825
	NingBo Bank (5)	1,405	4.8 %	June-22	June-23	1,450	-
		1,405	4.8 %	August-22	August-23	1,450	-
		1,405	4.8 %	September-22	September-23	1,450	-
		1,406	4.5 %	November-22	November-23	1,450	-
		2,900	4.5 %	December-22	December-23	2,900	-
		2,744	4.2 %	August-23	September-24	-	2,820
		1,271	4.3 %	November-23	November-24	-	1,271
	Industrial and Commercial Bank of China (5)	2,825	4.3 %	December-23	December-24	-	2,825
		5,621	3.2 %	September-22	July-23	5,800	-
		2,744	3.3 %	September-23	September-24	-	2,825
	NanJing Bank (5)	2,811	4.3 %	September-22	September-23	2,899	-
		1,265	4.3 %	November-22	November-23	1,305	-
		2,752	3.8 %	October-23	October-24	-	2,752
BoYu	Industrial and Commercial Bank of China (6)	1,450	2.8 %	December-22	December-23	1,450	-
		1,414	2.7 %	December-23	December-24	-	1,414
	Bank of China (5)	1,204	2.4 %	January-23	January-24	-	849
	NingBo Bank (5)	703	4.8 %	September-22	March-23	725	-
		1,406	3.6 %	November-22	May-23	1,450	-
		725	4.8 %	December-22	June-23	725	-
		1,414	3.3 %	November-23	May-24	-	1,414
	Industrial Bank (5)	688	3.6 %	September-23	September-24	-	708
	Bank of Communications (5)	1,414	3.0 %	November-23	May-24	-	1,414
	Loan Balance					\$ 47,078	\$ 52,921

Collateral for the above bank loans and line of credit

- (1) Baoding Tongmei's land use rights and all of its buildings located at its facility in Dingxing, China.
- (2) ChaoYang Tongmei's land use rights and all of its buildings located at its facility in Kazuo, China.
- (3) ChaoYang LiMei time deposit.
- (4) AXT time deposit.
- (5) Not collateralized.
- (6) BoYu's land use rights and its building located at its facility in Tianjin, China. In addition, the December 2023 loan attracts a guarantee fee amounting to 0.7% of the loan amount.

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, 2023 and 2022, 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 Optonics, Inc. stockholders in connection with the completion of our acquisition of Lyte Optonics, Inc. on May 28, 1999.

Changes in AXT, Inc.'s ownership interests 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,	
	2023	2022
Net income (loss) attributable to AXT, Inc.	\$ (17,881)	\$ 15,811
Decrease in additional paid-in capital for:		
Investment in subsidiary with noncontrolling interest	(308)	(937)
Change from net income (loss) attributable to AXT, Inc., net of transfers to noncontrolling interests	\$ (18,189)	\$ 14,874

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 2023, 2022 and 2021 under this program. As of December 31, 2023, 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 2023, 2022 and 2021, 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. In May 2021, our stockholders approved 3,600,000 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, 2023, approximately 1.7 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, 2021, 2022 and 2023 (in thousands, except per share data):

	Number of Options Outstanding	Weighted- average Exercise Price	Weighted- average Remaining Contractual Life (in years)	Aggregate Intrinsic Value
Stock Options				
Balance as of January 1, 2021	1,885	\$ 4.42	6.17	\$ 9,713
Granted	—	—		
Exercised	(507)	3.30		
Canceled and expired	—	—		
Balance as of December 31, 2021	1,378	\$ 4.83	5.60	\$ 5,573
Granted	—	—		
Exercised	(172)	3.02		
Canceled and expired	—	—		
Balance as of December 31, 2022	1,206	\$ 5.09	5.08	\$ 630
Granted	—	—		
Exercised	(4)	2.30		
Canceled and expired	(4)	4.12		
Balance as of December 31, 2023	1,198	\$ 5.10	4.09	\$ 14
Options vested as of December 31, 2023 and unvested options expected to vest, net of forfeitures	1,198	\$ 5.10	4.09	\$ 14
Options exercisable as of December 31, 2023	1,198	\$ 5.10	4.09	\$ 14

The options outstanding and exercisable as of December 31, 2023 were in the following exercise price ranges (in thousands, except per share data):

Range of Exercise Price	Options Outstanding as of December 31, 2023			Options Vested and Exercisable as of December 31, 2023	
	Shares	Weighted-average Exercise Price	Weighted-average Remaining Contractual Life	Shares	Weighted-Average Exercise Price
\$ 2.14 - \$ 2.14	8	\$ 2.14	0.33	8	\$ 2.14
\$ 2.18 - \$ 2.18	54	\$ 2.18	1.84	54	\$ 2.18
\$ 2.47 - \$ 2.47	15	\$ 2.47	0.84	15	\$ 2.47
\$ 2.56 - \$ 2.56	10	\$ 2.56	2.01	10	\$ 2.56
\$ 3.06 - \$ 3.06	330	\$ 3.06	5.85	330	\$ 3.06
\$ 5.21 - \$ 5.21	352	\$ 5.21	2.82	352	\$ 5.21
\$ 5.77 - \$ 5.77	245	\$ 5.77	4.85	245	\$ 5.77
\$ 7.95 - \$ 7.95	60	\$ 7.95	3.08	60	\$ 7.95
\$ 9.50 - \$ 9.50	124	\$ 9.50	3.82	124	\$ 9.50
	<u>1,198</u>	\$ 5.10	4.09	<u>1,198</u>	\$ 5.10

There were 4,000, 172,000 and 507,000 options exercised in the years ended December 31, 2023, 2022 and 2021, respectively. The total intrinsic value of options exercised for the years ended December 31, 2023, 2022 and 2021, was \$7,000, \$0.8 million and \$3.7 million, respectively.

As of December 31, 2023, the unamortized compensation costs related to unvested stock options granted to employees under our 2015 plan was \$0. We did not capitalize any stock-based compensation to inventory as of December 31, 2023 and 2022, as the amount was insignificant.

Restricted Stock Awards

A summary of activity related to restricted stock awards for the years ended December 31, 2021, 2022 and 2023 is presented below (in thousands, except per share data):

Stock Awards	Shares	Weighted-Average Grant Date Share Value
Non-vested as of January 1, 2021	1,022	\$ 5.27
Granted	274	\$ 9.07
Vested	(407)	\$ 5.70
Forfeited	(14)	\$ 5.38
Non-vested as of December 31, 2021	875	\$ 6.26
Granted	513	\$ 4.67
Vested	(387)	\$ 6.01
Forfeited	(17)	\$ 5.34
Non-vested as of December 31, 2022	984	\$ 5.55
Granted	692	\$ 2.20
Vested	(446)	\$ 5.25
Forfeited	(10)	\$ 6.37
Non-vested as of December 31, 2023	<u>1,220</u>	\$ 3.75

Total fair value of stock awards vested during the years ended December 31, 2023, 2022 and 2021 was \$2.3 million, \$2.3 million and \$3.8 million, respectively. As of December 31, 2023, we had \$4.1 million of unrecognized compensation expense related to restricted stock awards, which will be recognized over the weighted average period of 1.5 years.

At-Risk, Performance Shares

In February 2021 and 2022 and March 2023, the Company issued at-risk, performance shares classified as equity awards. Expense is recognized quarterly on a straight-line method over the requisite service period, based on the probability of achieving the specified financial performance metric, with changes in expectations recognized as an adjustment to earnings in the period of change. Compensation cost is not recognized for at-risk, performance shares that do not vest because service or performance conditions are not satisfied and any previously recognized compensation cost is reversed. At-risk, performance shares are eligible to receive dividend equivalents under the Company's 2015 Equity Incentive Plan (the "Plan"), as determined by the Board of Directors. The Company will recognize forfeitures as they occur.

The Company's at-risk, performance shares are classified as equity and contain performance and service conditions that must be satisfied for an employee to receive the shares. The financial performance metric for the at-risk, performance shares issued in February 2021 is based upon year-end 2020 actual results as compared to the Company's year-end actual results in 2021. The financial performance metric for the at-risk, performance shares issued in February 2022 is based upon year-end 2021 actual results as compared to the Company's year-end actual results in 2022. The financial performance metrics for the at-risk, performance shares issued in March 2023 are based upon the Company's year-end actual results in 2023. The financial performance metric for the at-risk, performance shares issued in February 2024 is based upon the Company's year-end actual results in 2024. All performance shares, if earned, are still subject to annual vesting over a four-year period, except that no shares are vested on the first anniversary because the performance measurement is based on year-end results for the year 2021, 2022 and 2023, respectively.

The fair value of the at-risk, performance shares is determined based on the closing price of the Company's common stock on the first day after the public issuance of the Company's earnings release for the most recent fiscal quarter, following the Compensation Committee and Board of Directors approval, which is considered the grant date. The fair value per share of the at-risk, performance shares classified as equity awards granted in February 2021 and 2022 and March 2023 was \$15.37, \$7.83 and \$3.71, respectively.

On February 17, 2021, the Compensation Committee recommended, and the Board approved, the grant to Dr. Morris Young, our Chief Executive Officer, of 113,130 at-risk, performance shares under the Plan. On February 17, 2021, the Compensation Committee approved the grant to Gary Fischer, our Chief Financial Officer and Corporate Secretary, of 38,475 at-risk, performance shares under the Plan. On March 14, 2022, the Compensation Committee met and certified that the year-over-year annual revenue growth rate achieved for fiscal year 2021, expressed as a percentage, was 44%. Therefore, all of the at-risk performance shares became eligible to vest.

On February 15, 2022, the Compensation Committee recommended, and the Board approved, the grant to Dr. Morris Young of 114,320 at-risk, performance shares under the Plan. On February 15, 2022, the Compensation Committee approved the grant to Gary Fischer of 32,100 at-risk, performance shares under the Plan. If the performance financial metric is less than 50% achieved these shares are forfeited. If the performance financial metric is between 50% and 200% achieved, then a corresponding pro rata portion of the 114,320 shares issued to Dr. Young would be eligible to vest and a corresponding pro rata portion of the 32,100 shares issued to Mr. Fischer would be eligible to vest. Any shares that are not eligible to vest are forfeited. If the target financial metric exceeds 200%, then the maximum number of at-risk performance shares that would be eligible to vest is 114,320 for Dr. Young and 32,100 for Mr. Fischer. On February 14, 2023, the Compensation Committee met and certified the year-over-year annual revenue growth rate achieved for fiscal year 2022, expressed as a percentage, was 2.7%. Therefore, none of the at-risk performance shares became eligible to vest.

On March 15, 2023, the Compensation Committee recommended, and the Board approved, the grant to Dr. Morris Young of 223,590 at-risk, performance shares under the Plan. On March 15, 2023, the Compensation Committee approved the grant to Gary Fischer of 77,600 at-risk, performance shares under the Plan. If the minimum financial metric for fiscal year 2023 is achieved, then based upon a performance formula, a corresponding portion of the 223,590 shares issued to Dr. Young would be eligible to vest and a corresponding portion of the 77,600 shares issued to Mr. Fischer would be eligible to vest. If the target financial metric is exceeded and an additional financial metric for fiscal year 2023 is achieved, then additional shares above the target number of shares are earned based on such performance formula and the maximum number of additional shares earned is capped at 100% of the target. If the minimum financial metric for fiscal year 2023

is not achieved, then these awards are forfeited. On February 20, 2024, the Compensation Committee met and certified that the minimum revenue metric for fiscal year 2023 was not achieved. Therefore, none of the at-risk performance shares became eligible to vest.

On February 20, 2024, the Compensation Committee recommended, and the Board approved, the grant to Dr. Morris Young of 223,590 at-risk, performance shares under the Plan. On February 20, 2024, the Compensation Committee approved the grant to Gary Fischer of 77,600 at-risk, performance shares under the Plan. If the minimum financial metric for fiscal year 2024 is achieved, then based upon a performance formula, a corresponding portion of the 223,590 shares issued to Dr. Young would be eligible to vest and a corresponding portion of the 77,600 shares issued to Mr. Fischer would be eligible to vest. If the target financial metric is exceeded, then additional shares above the target number of shares are earned based on such performance formula and the maximum number of additional shares earned is capped at 100% of the target. If the minimum financial metric for fiscal year 2024 is not achieved, then these awards are forfeited.

A summary of the status of our unvested at-risk, performance shares as of December 31, 2023 is presented below (in thousands, except per share data):

Stock Awards	Shares	Weighted-Average Grant Date Share Value
Non-vested as of January 1, 2022	152 *	\$ 15.37
Granted	74	\$ 7.83
Vested	(76)	\$ 15.37
Forfeited	(74)	\$ 7.83
Non-vested as of December 31, 2022	76	\$ 15.37
Granted	13	\$ 3.71
Vested	(38)	\$ 15.37
Forfeited	(13)	\$ 3.71
Non-vested as of December 31, 2023	38	\$ 15.37

**The number of share presented is based on achieving 150% of the targeted financial performance metric as defined in the at-risk, performance shares agreement.*

As of December 31, 2023, there was \$0.1 million of unrecognized compensation expense related to unvested at-risk, performance shares that is expected to be recognized over a weighted-average period of 0.85 years.

Common Stock

The following number of shares of common stock were reserved and available for future issuance as of December 31, 2023 (in thousands, except per share data):

Options outstanding	1,198
Restricted stock awards outstanding	1,257
Stock available for future grant: 2015 Equity Incentive Plan	1,743
Total	4,198

Stock-based Compensation

We recorded \$3.5 million, \$4.0 million and \$4.5 million of stock-based compensation in our consolidated statements of operations for the years ended December 31, 2023, 2022 and 2021, respectively. The following table summarizes compensation costs related to our stock-based compensation awards (in thousands, except per share data):

	Year Ended December 31,		
	2023	2022	2021
Cost of revenue	\$ 414	\$ 379	\$ 368
Selling, general and administrative	2,502	2,947	3,514
Research and development	624	680	637
Net effect on net income (loss)	\$ 3,540	\$ 4,006	\$ 4,519
Shares used in computing basic net income (loss) per share	42,643	42,104	41,367
Shares used in computing diluted net income (loss) per share	42,643	42,715	42,720
Effect on basic net income (loss) per share	\$ 0.08	\$ 0.10	\$ 0.11
Effect on diluted net income (loss) per share	\$ 0.08	\$ 0.09	\$ 0.11

We estimate the fair value of stock options using a Black-Scholes option pricing model. There were no stock options granted during 2023, 2022 and 2021.

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 \$186,000, \$191,000 and \$208,000 for the years ended December 31, 2023, 2022 and 2021, 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 2023 and 2022 (in thousands):

	Year Ended December 31,	
	2023	2022
Beginning accrued product warranty	\$ 669	\$ 743
Accruals for warranties issued	794	1,024
Adjustments related to pre-existing warranties including expirations and changes in estimates	(159)	(286)
Cost of warranty repair	(601)	(812)
Ending accrued product warranty	<u>\$ 703</u>	<u>\$ 669</u>

Note 12. Income Taxes

Consolidated income before provision for income taxes was a loss of \$19.0 million for the year ended December 31, 2023 and income of \$20.9 million and \$17.6 million for the years ended December 31, 2022 and 2021, respectively. We recorded a current tax provision of \$0.2 million, \$2.2 million and \$1.1 million for the years ended December 31, 2023, 2022 and 2021, respectively. The components of the provision for income taxes are summarized below (in thousands):

	Year Ended December 31,		
	2023	2022	2021
Current:			
Federal	\$ (317)	\$ 848	\$ 223
State.	41	34	91
Foreign	(62)	918	3,119
Total current	<u>(338)</u>	<u>1,800</u>	<u>3,433</u>
Deferred:			
Federal	(9)	(591)	(188)
State.	(7)	(4)	(1)
Foreign	514	980	(2,151)
Total deferred	<u>498</u>	<u>385</u>	<u>(2,340)</u>
Total provision for income taxes	<u>\$ 160</u>	<u>\$ 2,185</u>	<u>\$ 1,093</u>

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

	Year Ended December 31,		
	2023	2022	2021
Statutory federal income tax rate	21.0 %	21.0 %	21.0 %
State income taxes, net of federal tax benefits	(0.6)	0.1	0.4
Valuation allowance	(25.7)	(19.3)	(25.4)
Stock-based compensation	(1.7)	0.7	(3.2)
Foreign tax rate differential	6.1	(2.6)	(8.6)
Foreign tax incentives	0.1	(3.5)	(3.2)
Foreign income inclusion	—	18.9	10.4
Gain from sale of IP	—	—	16.9
Tax effect in equity method loss or gain from unconsolidated affiliates.	0.4	(3.0)	(2.6)
Other	(0.4)	(1.8)	0.5
Effective tax rate	<u>(0.8)%</u>	<u>10.5 %</u>	<u>6.2 %</u>

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

	As of December 31,	
	2023	2022
Deferred tax assets:		
Net operating loss carryforwards	\$ 14,362	\$ 9,571
Accruals, reserves and other	4,349	4,053
Credit carryforwards	325	206
Operating lease liability	206	60
Gross deferred tax assets	19,242	13,890
Valuation allowance	(17,462)	(11,885)
Total deferred tax assets	<u>1,780</u>	<u>2,005</u>
Deferred tax liabilities:		
Operating lease right-of-use assets	(323)	(50)
Total net deferred tax assets (included in other assets)	<u>\$ 1,457</u>	<u>\$ 1,955</u>

As of December 31, 2023 we have federal net operating loss (“NOL”) carryforwards of approximately \$40.2 million, which will begin to expire in 2025. We have California net operating loss carryforwards of approximately \$115,000 as of December 31, 2023.

The deferred tax assets valuation allowance as of December 31, 2023 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 for the year ended December 31, 2023 by \$5.6 million and decreased \$3.5 million for the year ended December 31, 2022.

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 \$47,000, \$0.9 million and \$1.0 million for 2023, 2022 and 2021, respectively. As of December 31, 2023, 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 for the year-ended December 31, 2023 is completed and any limitation known, no amounts are being presented as an uncertain tax position. The Company does not believe that per Section 382 there will be a limitation on the utilization of the net operating loss and tax credit carryforwards. 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 2023 and 2022, the amount of gross unrecognized tax benefits was \$1.1 million as of December 31, 2023 and 2022. 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. All of the unrecognized tax benefit would 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 August 9, 2022, Congress passed the Creating Helpful Incentives to Produce Semiconductors (CHIPS) Act to strengthen domestic semiconductor manufacturing, design and research, fortify the economy and national security, and reinforce America’s chip supply chains. The CHIPS Act provides for a new 25% advanced manufacturing investment credit for investments in semiconductor manufacturing and for the manufacture of certain equipment required in the semiconductor manufacturing process. Since the Company has all its manufacturing in China, the Company will not qualify for the investment credit.

On August 16, 2022, President Biden signed the Inflation Reduction Act (IRA) into law. The law is intended to address inflation by paying down the national debt, lower consumer energy costs, provide incentives for the production of clean energy and reduce health care costs. The new law imposes a 1% excise tax on corporate buybacks, and a 15% minimum tax on the adjusted financial statement income (AFSI) for corporations with average annual AFSI over a three-tax year period in excess of \$1 billion. The Company does not anticipate the IRA to have a material impact on its financial statements.

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 per share calculations is as follows (in thousands, except per share data):

	Year ended December 31,		
	2023	2022	2021
Numerator:			
Net income (loss) attributable to AXT, Inc.....	\$ (17,881)	\$ 15,811	\$ 14,575
Less: Preferred stock dividends	(177)	(177)	(177)
Net income (loss) available to common stockholders.....	<u>\$ (18,058)</u>	<u>\$ 15,634</u>	<u>\$ 14,398</u>
Denominator:			
Denominator for basic net income (loss) per share - weighted-average common shares	42,643	42,104	41,367
Effect of dilutive securities:			
Common stock options	—	333	803
Restricted stock awards	—	278	550
Denominator for dilutive net income (loss) per common shares	<u>42,643</u>	<u>42,715</u>	<u>42,720</u>
Net income (loss) attributable to AXT, Inc. per common share:			
Basic	\$ (0.42)	\$ 0.37	\$ 0.35
Diluted.....	<u>\$ (0.42)</u>	<u>\$ 0.37</u>	<u>\$ 0.34</u>
Options excluded from diluted net income (loss) per share as the impact is anti- dilutive	<u>1,198</u>	<u>220</u>	<u>21</u>
Restricted stock excluded from diluted net income (loss) per share as the impact is anti-dilutive.....	<u>1,258</u>	<u>291</u>	<u>118</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,		
	2023	2022	2021
Product Type:			
Substrates	\$ 47,466	\$ 111,094	\$ 103,026
Raw materials and others	28,329	30,024	34,367
Total	<u>\$ 75,795</u>	<u>\$ 141,118</u>	<u>\$ 137,393</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,		
	2023	2022	2021
Geographical region:			
China	\$ 39,778	\$ 55,414	\$ 67,394
Taiwan	8,651	28,780	16,841
Japan	4,641	11,724	10,112
Asia Pacific (excluding China, Taiwan and Japan)	3,814	4,188	7,540
Europe (primarily Germany)	12,315	20,592	23,069
North America (primarily the United States)	6,596	20,420	12,437
Total	<u>\$ 75,795</u>	<u>\$ 141,118</u>	<u>\$ 137,393</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,	
	2023	2022
Long-lived assets by geographic region, net of depreciation:		
North America	\$ 1,631	\$ 346
China	167,516	162,432
	<u>\$ 169,147</u>	<u>\$ 162,778</u>

Note 15. Other income (expense), net

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

	Year Ended December 31,		
	2023	2022	2021
Foreign exchange gain (loss)	\$ 169	\$ 1,573	\$ (434)
Income from local China government subsidy	2,557	1,710	1,125
Other income (expense)	(547)	204	(182)
	<u>\$ 2,179</u>	<u>\$ 3,487</u>	<u>\$ 509</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 our facility in Fremont, California with approximately 19,467 square feet, which was scheduled to expire 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. Furthermore, in September 2023, we entered into another agreement to extend the lease for an additional five years, commencing December 2023. There are no variable lease payments, residual value guarantees or any restrictions or covenants imposed by the facility lease. The remainder 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. 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, 2023, the maturities of our operating lease liabilities (excluding short-term leases) are as follows (in thousands):

Maturity of Lease Liabilities

2024	\$ 591
2025	604
2026	618
2027	633
2028	614
Thereafter	<u>153</u>
Total minimum lease payments	3,213
Less: Interest	<u>(404)</u>
Present value of lease obligations	2,809
Less: Current portion, included in accrued liabilities	<u>(458)</u>
Long-term portion of lease obligations	<u>\$ 2,351</u>

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

	<u>December 31,</u> <u>2023</u>	<u>December 31,</u> <u>2022</u>
Weighted-average remaining lease term (years)	5.22	5.89
Weighted-average discount rate	5.14 %	4.61 %

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

	<u>Year Ended</u> <u>December 31,</u>	
	<u>2023</u>	<u>2022</u>
Cash paid for amounts included in the measurement of lease liabilities:		
Operating cash flows from operating leases	\$ 578	\$ 574

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

	<u>Year Ended</u> <u>December 31,</u>	
	<u>2023</u>	<u>2022</u>
Operating lease	\$ 548	\$ 530
Short-term lease expense	143	137
Total	<u>\$ 691</u>	<u>\$ 667</u>

Royalty Agreement

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 years ended December 31, 2023 and 2022, the royalty expense under the Cross License Agreement was not considered material to our consolidated financial statements.

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)			
2023:				
Revenue	\$ 19,405	\$ 18,595	\$ 17,366	\$ 20,429
Gross profit	5,110	1,715	1,866	4,627
Net income attributable to AXT, Inc.	(3,348)	(5,089)	(5,823)	(3,621)
Net income attributable to AXT, Inc. per share, basic	\$ (0.08)	\$ (0.12)	\$ (0.14)	\$ (0.09)
Net income attributable to AXT, Inc. per share, diluted.	\$ (0.08)	\$ (0.12)	\$ (0.14)	\$ (0.09)
2022:				
Revenue	\$ 39,653	\$ 39,487	\$ 35,183	\$ 26,795
Gross profit	13,308	15,435	14,782	8,596
Net income (loss) attributable to AXT, Inc.	3,165	5,546	5,759	1,341
Net income (loss) attributable to AXT, Inc. per share, basic	\$ 0.07	\$ 0.13	\$ 0.14	\$ 0.03
Net income (loss) attributable to AXT, Inc. per share, diluted	\$ 0.07	\$ 0.13	\$ 0.13	\$ 0.03

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 Investors that invested approximately \$48.1 million in the form of redeemable noncontrolling interests representing 7.06% of the outstanding shares of 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 Investors owned a redeemable noncontrolling interest in Tongmei of 7.28%. The initial carrying amount of the redeemable noncontrolling interest 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 amortization 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 the IPO fails to pass the audit of the Shanghai Stock Exchange, is not approved by the Chinese Securities Regulatory Commission ("CSRC") or Tongmei cancels the IPO application. The aggregate redemption amount is approximately \$49 million, subject to the foreign exchange rate variable at time of redemption.

Tongmei submitted its IPO application to the Shanghai Stock Exchange in December 2021 and it was formally accepted for review on January 10, 2022. The Shanghai Stock Exchange approved the IPO application on July 12, 2022. On August 1, 2022, the CSRC accepted for review Tongmei's IPO application. The STAR Market IPO remains subject to review and approval by the CSRC and other authorities. The process of going public on the STAR Market includes several periods of review and, therefore, is a lengthy process. Subject to review and approval by the CSRC and other authorities, Tongmei hopes to accomplish this goal in the coming months. The listing of Tongmei on the STAR Market will not change the status of AXT as a U.S. public company.

The components of the change in redeemable noncontrolling interests for the years ended December 31, 2023 and 2022 are presented in the following table (in thousands):

Balance as of January 1, 2022	\$ 50,385
Investment in subsidiary with redeemable noncontrolling interest	471
Equity issuance costs incurred	(2,699)
Stock-based compensation attributable to redeemable noncontrolling interests	(36)
Net income attributable to redeemable noncontrolling interests	1,598
Effect of foreign currency translation on redeemable noncontrolling interests	(3,962)
Effect of foreign currency translation attributable to redeemable noncontrolling interests	(911)
Balance as of December 31, 2022	<u>44,846</u>
Investment in subsidiary with redeemable noncontrolling interest	155
Equity issuance costs incurred	(880)
Stock-based compensation attributable to redeemable noncontrolling interests	52
Net loss attributable to redeemable noncontrolling interests	(920)
Effect of foreign currency translation on redeemable noncontrolling interests	(1,260)
Effect of foreign currency translation attributable to redeemable noncontrolling interests	(330)
Balance as of December 31, 2023	<u>\$ 41,663</u>

Note 19. Subsequent Events

In January and February 2024, the Company obtained a total of \$7.9 million in new one-year bank loans with interest rates ranging from 3.0% to 4.3%. The \$5.1 million of the new bank loans are unsecured, while the remaining

\$2.8 million was collateralized by a ChaoYang LiMei time deposit. The Company repaid \$14.5 million of existing loans In January and February 2024.

In January 2024, the Company secured a new line of credit amounting to \$9.9 million, structured as a five-year bank loan. The credit facility bears an interest rate of 6.5% on the amount drawn from the line of credit. The credit facility is collateralized by the real estate properties owned by ChaoYang Tongmei. In January 2024, the Company borrowed \$5.9 million against the credit facility. The primary intended use of the credit facility is for construction projects.

In January, February and March 2024, our consolidated subsidiaries, collectively, received approximately \$715,000 in subsidies from the Chinese government. These funds are designated to support digital projects within enterprises and initiatives aimed at waste recycling, etc.

Item 16. *Form 10-K Summary*

Not applicable.

AXT, Inc.
EXHIBITS
TO
FORM 10-K ANNUAL REPORT
For the Year Ended December 31, 2023

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
10.5(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	Form of Capital Increase Agreement between Beijing Tongmei Xtal Technologies Co., Ltd. and certain investors
10.11(a)	Schedule identifying agreements substantially identical to the form of Capital Increase Agreement filed as Exhibit 10.11 hereto
10.12	Form of First Supplemental Agreement between Beijing Tongmei Xtal Technology Co., Ltd. and certain investors
10.12(a)	Schedule identifying agreements substantially identical to the form of First Supplemental Agreement filed as Exhibit 10.12 hereto
10.13	Form of Second Supplemental Agreement between Beijing Tongmei Xtal Technology Co., Ltd. and certain investors
10.13(a)	Schedule identifying agreements substantially identical to the form of Second Supplemental Agreement filed as Exhibit 10.13 hereto
10.14	Letter of Commitment on Share Lock-up
10.15	Letter of Commitment on the Shareholding Intention and Share Reduction Intention
10.16	Letter of Commitment on Plan for Stabilizing Tongmei's Stock Price within Three Years upon the Listing and the Restraint Measures
10.17	Letter of Commitment on Share Repurchase for Fraudulent Listing
10.18	Letter of Commitment on No False Records, Misleading Statements or Major Omissions in the Prospectus
10.19	Letter of Commitment on Filling the Diluted Spot Return
10.20	Letter of Commitment on Restraint Measures for Nonperformance of the Commitments
10.21	Letter of Commitment on Avoiding Horizontal Competition
10.22	Letter of Commitment on Regulating and Reducing Related Party Transactions

10.23	Letter of Commitment on Avoiding Illegal Guarantees
10.24	Statement and Letter of Commitment
10.25	Special Commitment Letter for Disclosure of Shareholders' Information and Verification of Retired Personnel of CSRC
12.1	Computation of Ratio of Earnings to Fixed Charges
21.1	List of Subsidiaries
23.1	Consent of BPM LLP, Independent Registered Public Accounting Firm
24.1	Power of Attorney (see signature page)
31.1	Certification by principal executive officer pursuant to Section 302 of the Sarbanes-Oxley Act of 2002
31.2	Certification by principal financial officer pursuant to Section 302 of the Sarbanes-Oxley Act of 2002
32.1 †	Certification by Chief Executive Officer Pursuant to 18 U.S.C. Section 1350, as adopted Pursuant to Section 906 of the Sarbanes-Oxley Act of 2002
32.2 †	Certification by Chief Financial Officer Pursuant to 18 U.S.C. Section 1350, as adopted Pursuant to Section 906 of the Sarbanes-Oxley Act of 2002
97.1*	Compensation Recovery Policy
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)

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- (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.

† The certifications attached as Exhibits 32.1 and 32.2 that accompany this Annual Report on Form 10-K are deemed furnished and not filed with the Securities and Exchange Commission and are not to be incorporated by reference into any filing of AXT, Inc. under the Securities Act of 1933, as amended, or the Securities Exchange Act of 1934, as amended, whether made before or after the date of this Annual Report on Form 10-K, irrespective of any general incorporation language contained in such filing.

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 15, 2024

POWER OF ATTORNEY

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

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

Signature	Title	Date
<u>/s/ MORRIS S. YOUNG</u> Morris S. Young	Chief Executive Officer and Chairman of the Board of Directors <i>(Principal Executive Officer)</i>	March 15, 2024
<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 15, 2024
<u>/s/ JESSE CHEN</u> Jesse Chen	Lead Independent Director	March 15, 2024
<u>/s/ DAVID C. CHANG</u> David C. Chang	Director	March 15, 2024
<u>/s/ CHRISTINE RUSSELL</u> Christine Russell	Director	March 15, 2024