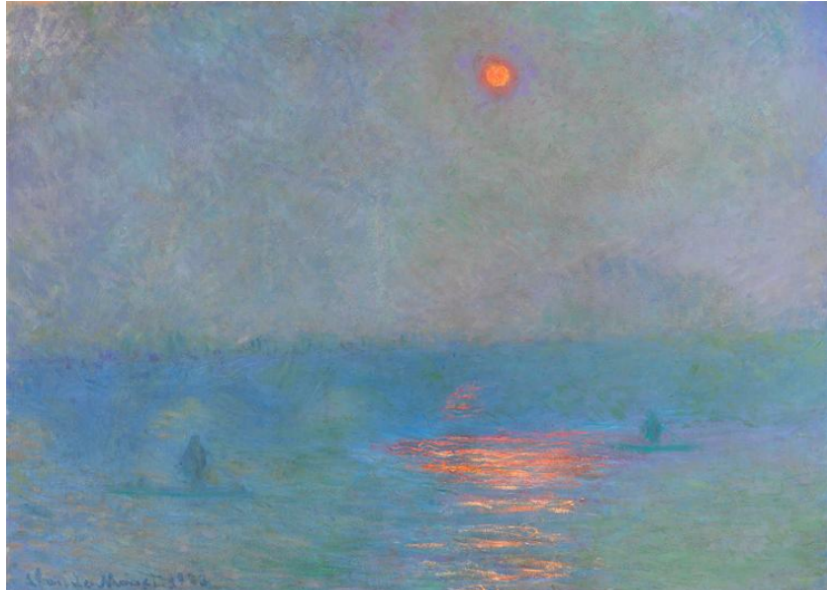


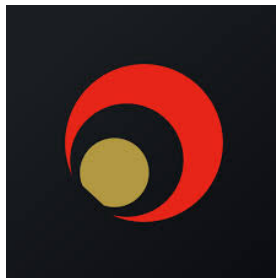
Let there be light, and there was light

george.xu@uwaterloo.ca

7-23-2026



AXTI (AXT Inc)



AXT Inc. (*AXTI*) specializes in the manufacturing and sale of semiconductor substrates, particularly gallium arsenide (GaAs) and indium phosphide (InP) substrates. These substrates are integral to various high performance applications, including optical networking, wireless communications, and LED technologies.

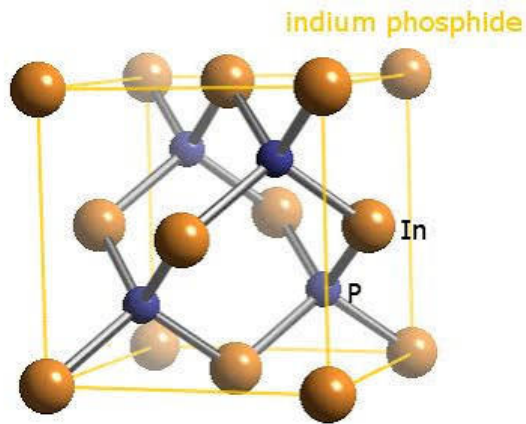
Why AI Needs AXT

It's very simple, because AI Requires Optical Networking.

Modern AI clusters contain tens of thousands of GPUs , and the biggest bottleneck is often moving data between GPUs, not computing it.

That requires: Optical transceivers, CW lasers, Coherent optics, Silicon photonics modules, etc.

Many of these devices are built using InP substrates.



InP molecular structure



InP price CNY/kg

InP enables: EMLs (Electro-Absorption Modulated Lasers), DFB lasers, Coherent optical components, High-speed photodetectors.

If you rank them by current AI data-center demand:

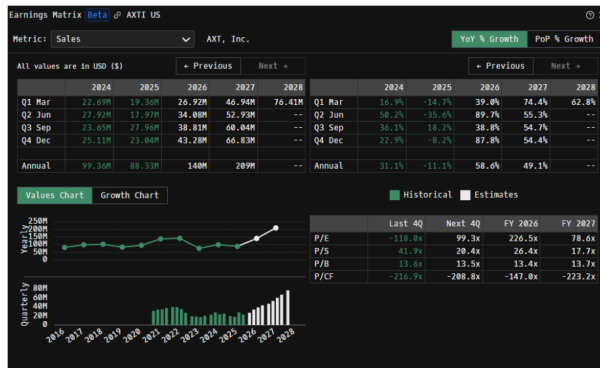
Direct-detect EML optics — compact InP-based transmitters widely used in 400G, 800G, and emerging 1.6T pluggable modules.

Silicon photonics with InP CW/DFB lasers — external InP lasers supply light to silicon modulators for scalable optical engines and future co-packaged optics.

Coherent optics — higher-capacity, longer-reach links for AI campuses, inter-building connections, and geographically separated data centers.

VCSEL optics — low-cost short-reach links inside racks, rows, and data halls, typically using multimode fiber.

These are found in: 400G, 800G, 1.6T. Without these optical links, AI clusters cannot scale efficiently.

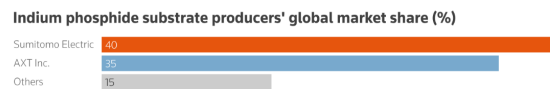


Projections

• The top tier of global InP wafer makers include Sumitomo Electric (5802 JP, covered by Yuji Matsumoto, Buy), JX Metal (5016 JP, covered by Daiki Ban, Neutral), and AXT (AXTI US, Not rated), according to the expert. In the China market, Yunnan Germanium (002428 CH, Not rated) and Vital Materials (Unlisted) are leading players among peers. China players have lower yields on single crystal lifting and their process control was less stable vs global peers, according to the expert.

• Epi wafer makers can be divided into two categories, including third-party foundry players like IOE (IOE.L.N. Not rated), Landmark (3081.TT. Not rated), and IDM vendors

Piece of an exclusive report



Market share

China's control over indium phosphide exports threatens AI data centre rollout

By Laurie Chen and Liam Mo

June 10, 2026 9:02 PM EDT · Updated June 11, 2026



China risk

China export controls

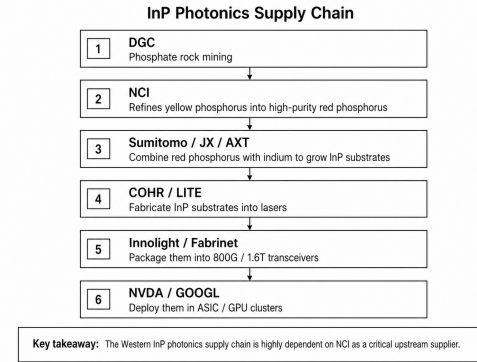
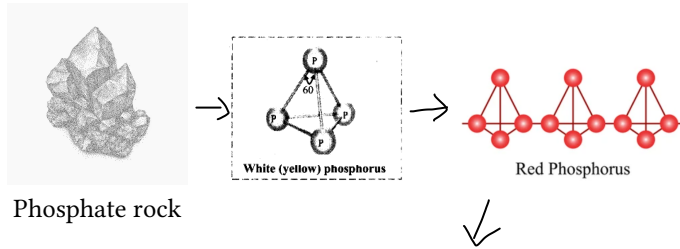
Since China introduced InP export controls 02/04/2025, the average price for a 6-inch InP wafer has surged 250% to \$5,000.

Ministry of Commerce of the People's Republic of China and General Administration of Customs, *Announcement No. 10 of 2025: Decision to Implement Export Controls on Tungsten-, Tellurium-, Bismuth-, Molybdenum-, and Indium-Related Items* February 4, 2025. (Source: China Export Control Information Network, operated by MOFCOM)

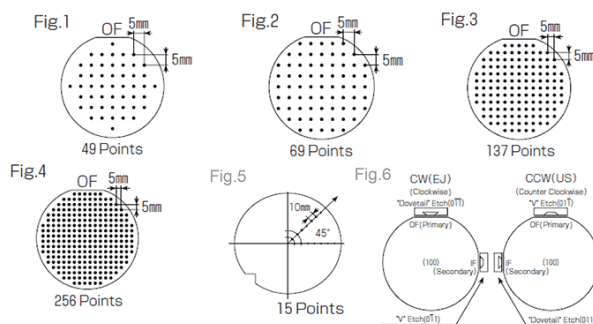
Tongmei (Beijing Tongmei Xtal Technology) is AXT's China-based subsidiary that produces key semiconductor materials such as indium, gallium, and germanium. These materials are used to manufacture AXT's Indium Phosphide (InP) and Gallium Arsenide (GaAs) substrates.

Supply chain dynamics

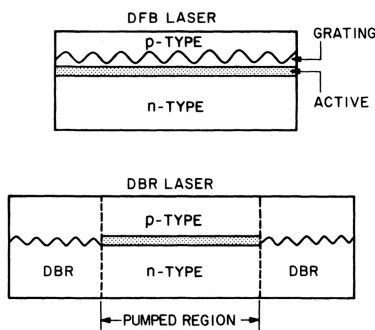
The InP photonics supply chain is highly concentrated and technically difficult to replicate. DGC supplies phosphate rock, Nippon Chemical Industrial (4092.T) refines it into semiconductor-grade red phosphorus, and Sumitomo (2582.T), JX Advanced Metals (5016.T), and AXT combine that phosphorus with indium to grow InP substrates. Coherent (COHR) and Lumentum (LITE) then turn those wafers into lasers, which Innolight (SHE: 300308) and Fabrinet (FN) package into 800G and 1.6T transceivers for AI clusters operated by Nvidia, Google, and other hyperscalers. The key bottlenecks are high-purity phosphorus and low-defect InP wafer production, making upstream suppliers strategically important despite their small size.



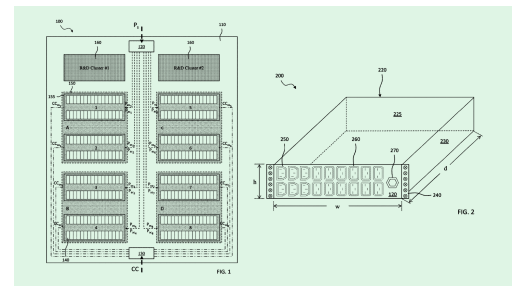
Supply chain mapping



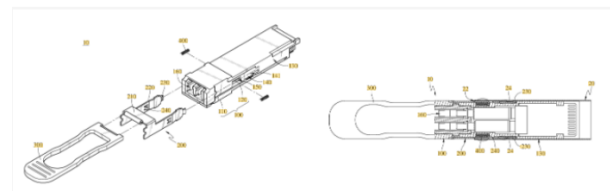
InP substrates n-type wafers



DFB laser



GPU clusters



Optical transceiver

Patents

1. US 12,054,851 / US 11,608,569 (Low etch pit density, low slip-line density, and low-strain indium phosphide)

Methods and wafers for low etch pit density, low slip line density, and low strain indium phosphide are disclosed and may include an indium phosphide single crystal wafer having a diameter of 4 inches or greater, having a measured etch pit density of less than 500 cm^{-2} , and having fewer than 5 dislocations or slip lines as measured by x-ray diffraction imaging. The wafer may have a measured etch pit density of

200 cm⁻² or less, or 100 cm⁻² or less, or 10 cm⁻² or less. The wafer may have a diameter of 6 inches or greater. An area of the wafer with a measured etch pit density of zero may be at least 80% of the total area of the surface. An area of the wafer with a measured etch pit density of zero may be at least 90% of the total area of the surface.

2. US 12,398,486 (Vertical gradient freeze 8-inch gallium arsenide substrates)

Methods and wafers for vertical gradient freeze 8 inch gallium arsenide (GaAs) substrates. In disclosed examples, vertical gradient freeze systems for forming gallium arsenide (GaAs) substrates having silicon as a dopant, the system includes a crucible to contain a GaAs liquid melt and seed material during a formation process; one or more heating coils arranged in a plurality of heating zones; and a pedestal to move relative to the crucible, the system operable to control heating of the plurality of heating zones and movement of the pedestal to form a single crystal GaAs substrate.

