Securing the Future of Space Infrastructure through Domestic Manufacturing of Germanium Wafers

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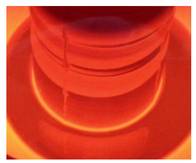
5N PLUS SEMICONDUCTORS

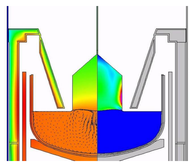
Role of 5N Plus Semiconductors in Critical Production of Space Solar Power

The production of space solar power relies heavily on single-crystal germanium substrates. These substrates are essential for manufacturing high-quality and efficient solar cells. 5N Plus Semiconductors is the only domestic supplier in the United States that provides epi-ready, 150 mm dislocation-free substrates, making them a unique and critical player in the growing space market. Concerns about supply chain disruptions and national security interests have increased the demand for these products.

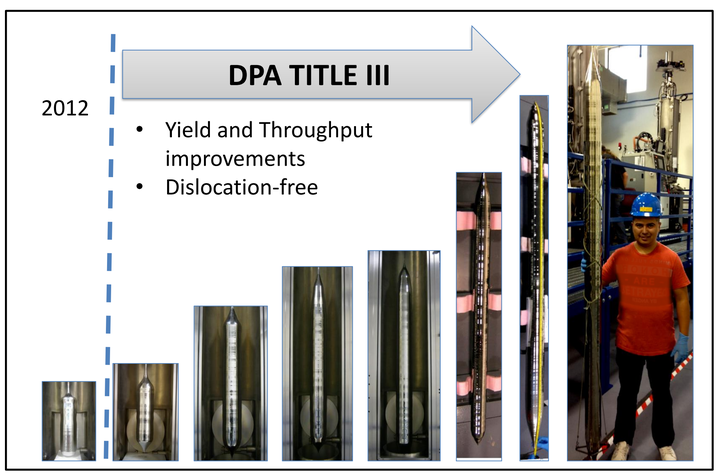




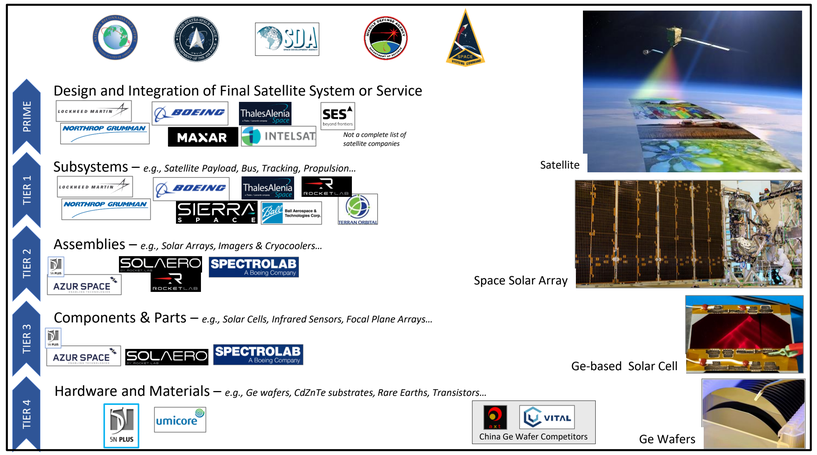




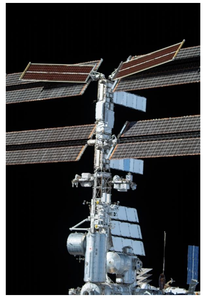




The production of **dislocation-free substrates** is challenging, making it the main barrier to entry for the germanium substrate manufacturing business. Silicon and germanium are the only semiconductor materials that can be grown dislocation-free, highlighting the critical nature of 5N Plus Semiconductors' capability. Crystal growth simulation software is used to tune the crystal growth interface, improving yield and throughput internally and in the customers' devices. This technology is critical in the production of high-quality, dislocation-free germanium substrates.





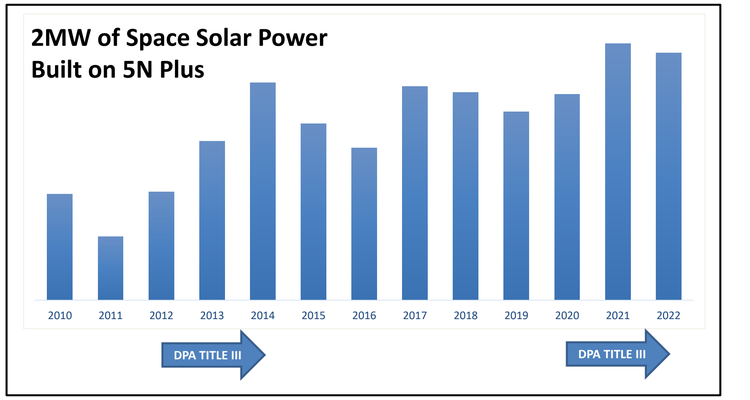




Future of Space Infrastructure and Domestic Manufacturing of Ge Wafers

The U.S. government has provided cost-shared funding through the Cares Act Title III to support the manufacturing of germanium wafers, ensuring a secure and reliable supply of satellite critical components. This initiative maintains the space infrastructure for national defense and commercial applications.

Further investment in domestic manufacturing of germanium wafers is essential to prevent reliance on foreign suppliers and develop a **competitive domestic supply chain**. Government funding supports the development of advanced manufacturing technologies to improve efficiency, yield, and quality, reducing production costs and increasing accessibility of space-grade PV. Continued investment is needed for a wider range of space missions and applications, **maintaining critical infrastructure for national defense** and commercial applications.

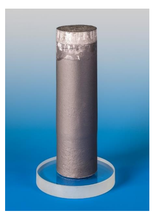


Heritage of Success in Challenging Defense-Critical Crystal Growth

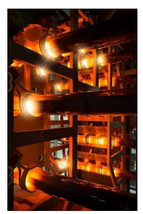
Since its inception in 2005, 5N Plus Semiconductors has contributed to over 2 MW of solar power installation on missions ranging from the sun to Jupiter. 5N Plus Semiconductors is a key player in the North American germanium purification and recycle supply chain. 5N Plus is the preferred supplier of InSb substrates for infrared imaging focal plane arrays and has developed single crystal CdZnTe growth for medical imaging and infrared substrate fabrication.



InSb



CdZnTe



Ge Zone Refining

