

Ready for “new space”: Special bonding technology by SCHOTT Primoceler provides increased reliability for VCSELs in aerospace applications

By Ville Hevonkorpi, SCHOTT Primoceler Oy



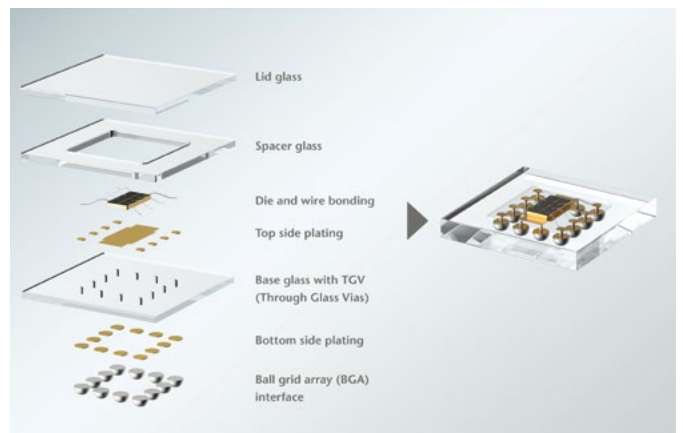
Components used in optics have to work reliably also under extreme space conditions, e.g. in satellites. This picture from ESA shows a satellite measuring the activities of cyclones. Photo: ESA

The more sophisticated and sensitive optoelectronics are, the more important it is to protect them from harsh environmental influences. Optical components, which transmit and receive light signals, face new challenges when they are exposed to space conditions, such as cosmic radiation, extreme temperatures, and vacuums.

The “New Space” trend aims to bring mature, established technologies and products to the Space market that either compete with or complement existing commercial space services. The focus of the latest conference included topics such as miniaturized LiDAR, ultra-low power & highly efficient datacom receivers, concepts for optical network architecture, as well as novel cameras and sensors for environmental monitoring.

When it comes to optoelectronic components like VCSELs (vertical cavity surface-emitting lasers) in satellites or telescopes, specialty glass and technology from SCHOTT Primoceler offer promising solutions.

“Our unique wafer-level micro bonding method enables a hermetic and radiation tolerant glass package for VCSEL arrays. And this is not only interesting for terrestrial applications”, explains Ville Hevonkorpi, Managing Director of SCHOTT Primoceler Oy.

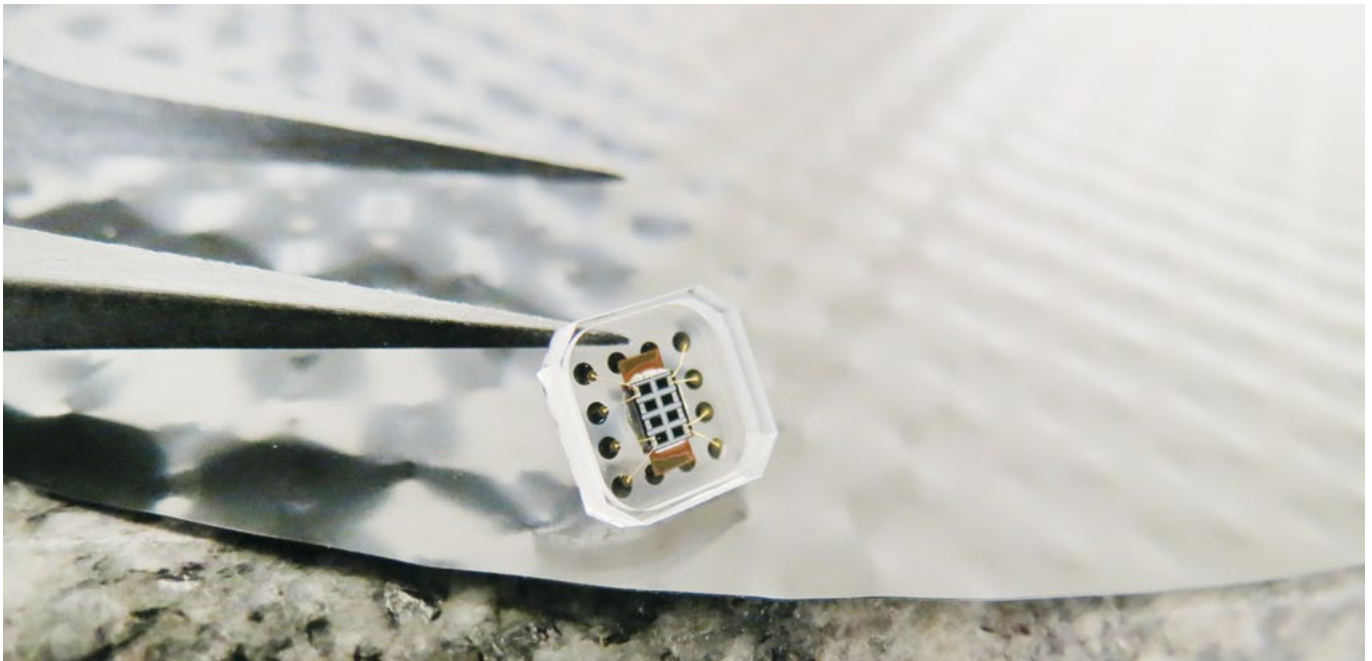


SCHOTT Primoceler has developed an innovative, extremely precise technology that enables additive-free, room-temperature hermetic glass bonding. Photo: SCHOTT Primoceler Oy

In a study in cooperation with ESA, Primoceler's glass bonding experts verified the performance of all-in-glass packages under extreme conditions. The laser-based technology demonstrated that the risks of surface and internal contamination, such as outgassing, are reduced as no additive materials are used for the contactless bonding of two or more glass wafers. Additionally, the room-temperature process has an extremely low heat affected zone, which means it can be beneficial for encapsulating sensitive components and reducing safety zones, enabling miniaturization. Hevonkorpi: "All tests regarding optical quality, moisture resistance, vibration, hermeticity, and resistance to glass cracking have been passed.

This means our all-in-glass packages for VCSELs and other optical systems are suitable for space applications and provide high reliability for these applications."

SCHOTT Primoceler's glass-to-glass bonding technology opens new doors for hermetic sealing possibilities thanks to unprecedented miniaturization and no need for additive materials. Besides microfluidics, microelectronics, and micro-optics, the full-glass packages also enable the development of next-generation active medical implants. "Our hermetic packages come in sizes so small, you have to see it to believe it", says bonding specialist Ville Hevonkorpi.



In a joint project with ESA, SCHOTT Primoceler's all-in-glass-packages for VCSELs have shown to be suitable for extreme conditions in space. Photo: SCHOTT Primoceler Oy