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### Laser Focus World Online Article

## Group4 Labs announces Ga-facing GaN-on-diamond wafer

**April 6, 2006, Menlo Park, CA--**Group4 Labs has announced a gallium (Ga)-facing gallium nitride (GaN)-on-diamond semiconductor wafer. The new 10 mm<sup>2</sup> Ga-facing wafer is the third product in the Xero Wafer family and shares the same proprietary technology that permits a single GaN layer to be atomically attached to a synthetic diamond substrate.

All three Xero Wafer products exhibit high temperature resilience for very high-power, high-frequency electronic, solid-state white lighting, military and photonics applications. The semiconductor wafers are ideal for use in the conventional epitaxial growth of GaN and its aluminum and indium-based alloys.



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The GaN-on-diamond technology enables the GaN layer to be atomically attached to a freestanding, proprietary polycrystalline chemical-vapor-deposited (CVD) diamond substrate (25-microns thick). The new wafer's GaN exterior is an atomically smooth finish with a gallium-facing surface that is epi-ready for further epitaxial deposition. The wafer is shipped freestanding or optionally on a disposable, silicon wafer mount to allow easy handling during wafer processing.

The GaN-on-Diamond wafer addresses the classic heat problem plaguing the high power and high-

speed transistor industry: excessive heat build-up inside the chip's engine that ultimately leads to device failure. The new wafer offers a unique solution by extricating heat from the chip's core almost at the instant that it is generated. This is due to the sub-nanometer proximity of the chip's active region to diamond, a nearly perfect thermal conductor.

CVD diamond's thermal conductivity is about 3X to 30X more than that of conventional semiconductors. Just a 3X improvement in the thermal conductivity of a transistor array's substrate could boost the array's power-density by 10X to 100X depending on device configuration. Group4 Labs' scientists have successfully attached a compound semiconductor such as GaN to the tough-to-handle diamond.

According to Group4 Labs' CEO, Felix Ejeckam, "This wafer features a Gallium-facing surface

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rather than the Nitrogen-facing surface which we introduced last month". He continues, "Unlike the optional N-facing version, this new surface resembles the conventional crystallographic structure that many of our customers are accustomed to using."

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