Gallium Nitride on Diamond

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Gallium Nitride (GaN) electronics is transforming what communication and radar system can deliver, and are presently mostly based on GaN-on-SiC technology; though SiC is a material of good thermal conductivity (450 W/mK) the devices are still thermally limited which restricts the power density achievable with GaN technology. Diamond substrates which can have more than six times greater thermal conductivity than SiC provide a pathway to overcome the thermal limitations of GaN-on-SiC technology. However integrating both GaN and diamond has its challenges including due to the coefficient of thermal expansion mismatch of both materials. The latest developments in this field will be presented, including different integration approaches to maximize thermal heat extraction from the active device region to device results.