

## Preparation and peculiarities of bulk AlN substrates

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Single crystals of aluminum nitride (AlN) are most promising as substrates for epitaxy of Al-rich group III nitrides, to be employed e.g. for novel UV optoelectronics and high-frequency electronics. Therefore, growth of AlN single crystals has spawned high interest during the last decade. But AlN substrates are still available only in small sizes and quantities, while every wafer seems to be unique in its properties. Reasons lie in the critical thermodynamic and chemical properties of this material. The author, who has spent more than ten years in AlN crystal growth research, will show what issues make preparation of bulk AlN a challenge, and how this is reflected in the peculiar properties of currently available bulk AlN substrates.

Similar to SiC, AlN crystals are grown by sublimation and re-condensation at temperatures exceeding 2000°C. Due to aggressive Al gaseous species, however, only few materials can be used in the crucible area, and contamination with oxygen, carbon and silicon is almost inevitable. In particular, also no foreign seed is stable under such growth conditions. On the other hand, strong faceting prevents from expanding the single crystalline diameter and leads to formation of zones with different properties in a single crystal. Finally, strategies for improvements in structural quality and impurity control are discussed.