

ALUMINUM NITRIDE SUBSTRATE

AlN-20 • M – PLANE

Next generation devices demand advances in semiconductor materials.

UV-C LEDs and laser diodes, as well as high performance power and RF devices are all made using AlGaN epitaxial layers, often with Al concentrations above 60%. The key to manufacturing these high performance devices is the ability to produce high quality AlN substrates on which these epitaxial layers are laid down.

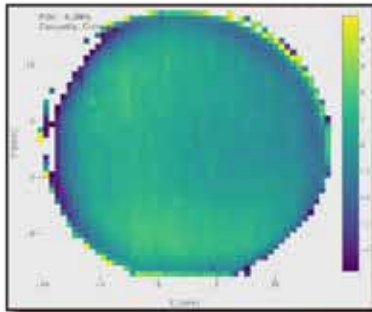
By building devices directly on HexaTech's native AlN substrates, device layer defects can be reduced 10,000 to 1,000,000 times when compared to the next best technologies. Utilizing HexaTech's high quality substrates translates to devices with optimum performance, reliability and production yields.

Standard Specifications

Characteristic	Specification
Diameter	25.0 mm
Shape	Round
Thickness	550.0 μm \pm 50.0 μm
Orientation	{ 10-10 } \pm 1.0°
Surface Finish	Front face: CMP Back face: Mechanical
High resolution XRD Rocking Curve, (10-10) Reflection	< 100 arcsec FWHM
Usable Area	> 90%
Edge Exclusion	1.0 mm
Flat Orientation	{0001}
Laser Marking	Backside, parallel to flat
Packaging	Single wafer cups

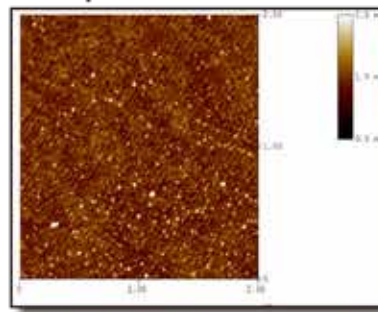
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Aluminum Nitride M-Plane and C-Plane Substrate Selected Characterization Examples



Surface Shape

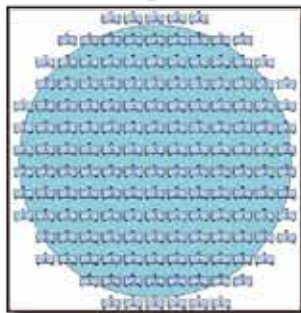
Polished c-plane substrate with full wafer variation of ± 4 microns.



Surface Roughness

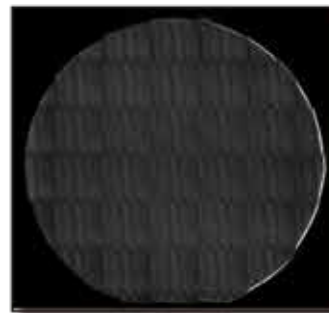
AFM image ($2 \times 2 \mu\text{m}^2$) of a CMP polished m-plane substrate with RMS surface roughness of ~ 0.1 nm.

High Resolution X-Ray (Philips X'Pert Pro MRD)



XRC Map

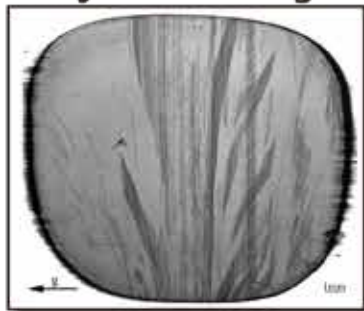
Full-wafer XRC map at 2 mm step size with FWHM of (00.2) and (10.2) reflections at 11" and 12", respectively.



XRT Reflection Composite

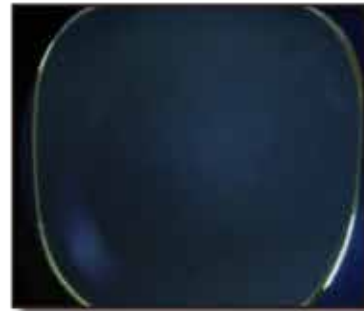
Composite of X-ray topograph images showing no extended structural defects.

White Beam X-Ray Topography (National Synchrotron Light Source)



Dislocation Density

Transmission X-ray topograph of m-plane substrate exhibiting low dislocation density ($< 10^3/\text{cm}^2$).



Cross Polarization

Crossed polarizer image of m-plane substrate exhibiting uniform extinction.