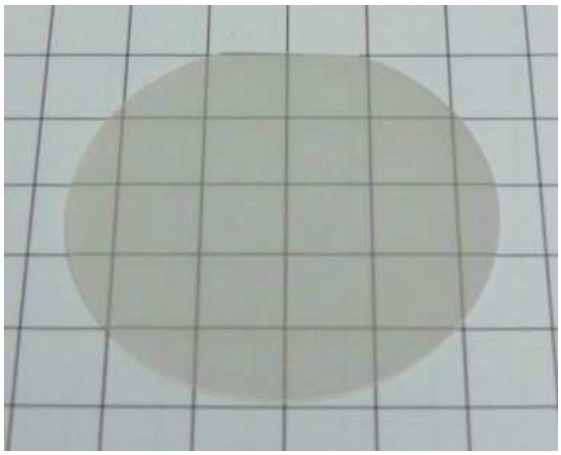
Customised epitaxy GaN structures on sapphire suitable for HEMTs, HB LEDs, photovoltaic cells



3µm GaN n-type on 330µm 2" sapphire wafer.

n-type GaN:Si on sapphire

- Up to 8µm GaN epitaxial layer on sapphire;
- Electron concentration up to $5 \cdot 10^{18}/cm^3$;
- Average electron mobility >= $300 cm^2/Vs$;
- We can use either a conductive n-type or insulating GaN buffer between the n-type GaN and the substrate;
- We can manufacture an n-type GaN layer with electron concentration of $1.5 \cdot 10^{19}/cm^3$ if the layer thickness is <=0.2µm. In that case average electron mobility >= $150 cm^2/Vs$.

p-type GaN:Mg on sapphire

- Up to 1.5µm GaN layer on sapphire;
- Hole concentration of up to $5 \cdot 10^{17}/cm^3$;
- We can use either a conductive (n-type) or insulating (C-compensated) GaN buffer between the p-type GaN and sapphire. We can also include a 10nm subcontact p-type layer Mg-concentration of up to $1.2 \cdot 10^{20}/cm^3$;
- Average hole mobility >= $10 cm^2/Vs$;
- The client is encouraged to specify if the wafer should be activated or not.

semi-insulating GaN on sapphire

- We use carbon compensation. Typical resistivity larger than 1.5 MΩcm;
- An example of a typical HEMT structure on semi-insulating GaN:
  High resistivity C compensated GaN on Sapphire 2µm thick, undoped high mobility GaN channel (2DEG) 0.1µm thick, 1-1.5nm AlN spacer, 20nm thick $Al_xGa_{1-x}N$ spacer, X=23%Al, 2-3nm Si_3N_4 cap.

All epi-wafers:

- Dislocation density EPD ≤ $5 \cdot 10^8/cm^2$; Thickness uniformity < 10% (< 5% on demand);
- XRD r.c. 002 FWHM≤0.1º±10% for structures ≥3µm thick;
- TTV<10µm, bow<10µm, warp<10µm (2" wafers), TTV<20µm, bow<20µm, warp<20µm (4" wafers).

Sapphire substrate specifications:

- We use 2", 3", 4" sapphire wafers;
- Thickness 330µm, 430µm, 550µm, 650µm or chosen by customers.

We also offer:

- InGaN – multi-quantum wells for LEDs and other epi structures demanded by customers;
- a-plane GaN deposited on r-plane sapphire (xrd 002 r.c. ~0.35º);
- customized LED structures, wavelength of 390-450nm or higher on special request.

Single and double side polished wafers are available.

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