Nitride Epitaxy Products

Cree produces GaN, $Al_xGa_{1-x}N$ and $In_yGa_{1-y}N$ epitaxial layers on up to 100 mm diameter SiC and sapphire substrates. Unless noted otherwise on the product quotation, the epitaxial layer structure will meet or exceed the following specifications (1). Additional comments, terms and conditions may be found at the end of this document.

Nitride Epitaxial Layer Specifications – Structural

Property	Value or Range	Precision	Measurement Technique
Substrate	SiC (n-type or Semi-Insulating) Al_2O_3	—	—
Composition	$Al_xIn_yGa_{1-x-y}N$, $0 \le x \le 0.4$, $0 \le y \le 0.2$, certain restrictions apply	$\Delta x = \pm 0.015$, $\Delta y = \pm 0.02$	XRD peak splitting and PL – mid-radius
Thickness (2)	0.001 µm to 10.0 µm GaN 0.2 nm to 1.0 µm AlN 0.001 µm to 3.0 µm $Al_xIn_yGa_{1-x-y}N$ 10.0 nm to 250.0 nm SiN (Cap Layer)	Average thickness within ± 15% of target thickness and uniformity < 10%. (3)	X-ray or white light interferometry
GaN Crystallinity	< 300 arcsec (3 µm layer on Al_2O_3 substrate) < 250 arcsec (3 µm layer on SiC substrate (5))	—	XRD (0006) FWHM (center point)
$Al_{0.25}Ga_{0.75}N$	< 700 arcsec (3 µm layer on Al_2O_3 substrate) < 500 arcsec (3 µm layer on SiC substrate (5))	—	XRD (0006) FWHM (center point) (4)
Visible Defects	< 50 / cm^2	—	Differential interference microscopy at 50x in cross pattern with 5 mm edge exclusion
Dislocation Density	<1E9 / cm^2, total	—	X-ray / AFM
Wafer Shape	Warp ≤ 45 microns for 3”, ≤ 55 microns for 100 mm	<2 microns	Non-contact optical inspection

Nitride Epitaxial Layer Specifications – Electrical

Property	Value or Range	Precision	Measurement Technique
Dopant type	n-type (Si) p-type (Mg)	—	—
Carrier concentration (undoped, substrate dependent)	< 1E16 cm^{-3}, n-type	—	Hg probe CV
Carrier concentration (n-type, Si doped)	1E16 to 2E19 cm^{-3}	± 50%	Hg probe CV (wafer center, room temperature)
Carrier concentration (p-type, Mg doped)	5E16 to 5E17 cm^{-3} (activated)	± 50%	Hg probe CV (wafer center, room temperature)
Carrier Concentration of HEMT structure	>8E12 cm^2 (25% Al / 25 nm AlGaN)	—	Contactless non-destructive carrier concentration
Mobility of HEMT structure	$\mu_{AlGaN} \ge 1600\ cm^2\ V^{-1}\ s^{-1}$ (25.0% Al / 25.0 nm AlGaN)	—	Contactless non-destructive mobility
Sheet resistivity	< 5% uniformity	—	Contactless non-destructure sheet resistivity

MAT-NITRIDEEPITAXY.00B

1. Certain additional restrictions may apply and will be presented on the product quotation.
2. Range given for undoped layers. Maximum achievable thickness for doped layers or heterostructures will be reduced.
3. Precision specification applies only to layers ≥ 0.01 μm thick. Uniformity = (100 x standard deviation / mean).

Additional Comments, Terms and Conditions

Nitride epiwafers are offered subject to the Cree, Inc. Sales Terms and Conditions, a copy of which may be obtained by contacting a Cree representative or by downloading from www.cree.com/ftp/pub/termsandconditionsread.pdf. In particular, the recipient may not use purchased SiC wafers in the bulk growth of silicon carbide or Group III-nitride-based materials or in the development of processes for bulk growth of such materials.

Sale and export of Nitride epiwafers and some substrates are limited by license. Please contact Cree for details.

Specification sheets may change without notice. Please contact Cree or one of our representatives if an updated specification sheet is desired. Current specification sheets are available for download at www.cree.com.

Copyright © 2004-2009 Cree, Inc. All rights reserved. The information in this document is subject to change without notice. Cree and the Cree logo are registered trademarks of Cree, Inc.

Cree, Inc.
4600 Silicon Drive
Durham, NC 27703
USA Tel: +1.919.313.5300
Fax: +1.919.313.5451
www.cree.com