

**Quantitative Analysis of Small Amounts of Cubic GaN Phase in GaN Films Grown  
on Sapphire**

**D. Zhi, U. Tisch, S. Zamir, M. Wei, E. Zolotoyabko and J. Salzman**

**Department of Electrical Engineering  
Technion - Israel Institute of Technology  
Haifa 32000, Israel**

**Abstract**

Thin GaN films, grown by metal organic chemical vapor deposition on a basal plane of sapphire substrates, were characterized by x-ray pole figures, high-resolution x-ray diffraction and transmission electron microscopy. This combination was found sensitive to small amounts (down to 0.1%) of cubic GaN phase in specimens subjected to surface nitridation treatment prior to epitaxial growth for various durations. The presence of the cubic phase and its orientation relations to the hexagonal GaN matrix was established by means of pole figures and selected area electron diffraction. Regions containing the cubic GaN domains were visualized by bright-field cross-sections in transmission electron microscopy. The amount of cubic phase was determined by comparing the integrated x-ray diffraction intensities of the (311) cubic GaN and the (11.2) hexagonal GaN reflections. Strong correlation between the amount of cubic GaN and the broadening of the x-ray rocking curves was observed. An optimum nitridation duration was found, which corresponds to almost complete suppression of the cubic phase formation.