Abstract Submitted
for the MAR08 Meeting of
The American Physical Society

Optical properties of MOCVD selective area growth of GaN D.Y. SONG, A. CHANDOLU, L. TIAN, N. STOJANOVIC, S.A. NIKISHIN, M. HOLTZ, Texas Tech University — Selective area growth (SAG) is useful for overcoming mismatch between non-native substrates and epitaxial materials. SAG of GaN is carried out using metallorganic chemical vapor deposition with silicon dioxide as the mask material with openings ranging from 500 nm to several microns. This talk addresses optical properties of completed GaN pyramidal islands grown using SAG. SEM-based cathodoluminescence (CL) is used to investigate the bandgap emission. The optical properties at different positions on the pyramids are related to overgrowth conditions which determine the luminescence properties. The apex region is almost fully relaxed, while the pyramid base exhibits a red-shifted CL spectrum. This shift is attributed to stress and impurity incorporation in the overgrown sidewall region. The red shift observed in CL spectra on the pyramid sidewall region gradually increases from apex to base, varying by $\sim$ 40 meV, when they exceed the size of the opening in the silicon dioxide mask. However, the pyramid has almost uniform luminescence properties when overgrowth does not occur. The CL line width is narrowest at the pyramid apex, suggesting a decrease in the dislocation density. The authors acknowledge support from the National Science Foundation (ECS–0609416 and ECS–0304224) and the J. F Maddox Foundation.

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Date submitted: 27 Nov 2007 Electronic form version 1.4