

Abstract Submitted
for the MAR05 Meeting of
The American Physical Society

Combined Excitation Emission Spectroscopy of Eu ions in GaN

V. DIEROLF, Z. FLEISCHMAN, C. SANDMANN, Physics Dept., Lehigh University, C. MUNASINGHE, A.J. STECKL, Nanoelectronics Laboratory, University of Cincinnati — Rare earth doped GaN is a promising candidate for light emitters and electrically pumped laser for various applications, such as displays. The rare earth ions are incorporated in this material in various sites, which exhibit different excitation efficiencies and therefore a precise control of these sites is crucial for optimizing potential devices. To this end, we have performed site-selective combined excitation emission spectroscopy studies on Eu-doped GaN layers that have been prepared using the *Interrupted Growth Epitaxy* (IGE) growth technique. In the spectral regime of the single 4D_0 – 4F_0 excitation transition of Eu^{3+} , a large number of excitation peaks (>7) can be observed. At least four of them can unambiguously be assigned to different sites. Their relative number depends on growth condition. Selective excitation allows to produce fingerprints of their crystal field splitting in the $^4F_{1,2}$ states which allow to identify the sites in electro-luminescence and in PL under above-bandgap excitation. In contrast to this assignment, other strong excitation peaks exist that yield identical emission spectra and must originate therefore from a *single* defect site. The separation of these peaks coincides with GaN Raman frequencies. We therefore suspect that electron-phonon coupled transitions may account for the discrepancy with the single zero-phonon excitation peak that is expected for a single site.

V. Dierolf
Lehigh University

Date submitted: 01 Dec 2004

Electronic form version 1.4