Abstract Submitted
for the MAR12 Meeting of
The American Physical Society

A Combined Excitation Experiment and the Emission Nature of Eu in GaN JONATHAN POPLAWSKY, Physics Department, Lehigh University, ATSUSHI NISHIKAWA, YASUFUMI FUJIWARA, Division of Materials and Manufacturing Sciences, Osaka University, VOLKMAR DIEROLF, Physics Department, Lehigh University
— We have developed a fiber based confocal optical microscope that operates inside of a commercial SEM instrument (JEOL 6400) enabling the excitation of a sample either by a laser or by electron beam, and hence combining the complimentary techniques of photoluminescence (PL) and cathodoluminescence (CL). The capabilities of the instrument are demonstrated by experiments involving the excitation of europium ions in-situ doped in Mg doped GaN thin films. The combination of the Eu and Mg defect create new optically active centers (Eu/Mg centers) that absorb energy from electron-hole pairs (EHP) more efficiently than the normal Eu centers in non co-doped GaN (Eu centers). However, the luminescence from these centers decrease as a function of EHP exposure time. The instrument used enables us to perform PL studies before and after electron beam exposure to investigate the nature of this effect. We use a below band gap PL excitation source tuned to resonantly excite the Eu centers using their $^7F_0$ to $^5D_0$ transitions. This allows us to determine their relative numbers and monitor changes of each of the relevant centers. Uitilizing these data, the nature of the decrease in emission is investigated with our new and unique experimental apparatus.

Jonathan Poplawsky
Physics Department, Lehigh University

Date submitted: 07 Nov 2011 Electronic form version 1.4