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Photo-induced EPR spectroscopy of C-doped GaN[1] SUBASH PAUDEL, W. R. WILLOUGHBY, M. E. ZVANUT, Univ of Alabama - Birmingham — The Group-III nitride semiconductor GaN is being investigated as an active material in light-emitting diodes and high electron mobility transistors. High-power applications in electronic devices often require semi-insulating substrates, which can be adequately obtained by incorporation of impurities like carbon. We used electron paramagnetic resonance (EPR) spectroscopy to investigate point defects in C-doped GaN. Photo-induced EPR was performed at 3.5 K on 1x10^{-19} cm^{-3} C-doped free-standing GaN substrates grown by hydride vapor phase epitaxy. A broad, isotropic signal having g $\sim$1.985 was observed. The intensity of the EPR signal began to decrease at 0.95 +/- 0.05 eV and increase at 2.75 +/- 0.15 eV during illumination with a quartz tungsten halogen (QTH) lamp using constant photon flux. The 2.75 eV threshold is interpreted as the energy required to excite electrons from the defect to the conduction band minimum, whereas the 0.95 eV threshold is interpreted as the energy required to excite electrons from the valance band maximum to the defect indicating a deep level defect. This deep level is assumed to be the cause of the electrical compensation and high resistivity in C-doped GaN.

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Subash Paudel
Univ of Alabama - Birmingham

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