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Mg-related EPR signal in high hole density GaN[1] MARY ELLEN ZVANUT, JAMIYANA DASHDORJ, University of Alabama at Birmingham — Although GaN devices have successfully entered technology, continued development of nitride electronics is hampered by the limitations of p-type doping. For this reason, we have employed electron paramagnetic resonance (EPR) spectroscopy to study GaN:Mg grown with high Mg (1-4x10^{20} cm^{-3}) and hole densities 1-40x10^{18} cm^{-3}. EPR measurements are made in the dark and under illumination at 4 K. Consistent with measurements made on less heavily doped films, the Mg-related EPR signal exhibits a sample-dependent anisotropy which depends on the hole density. Unlike lower doped samples, however, the increased EPR signal intensity created by the high hole density reveals photo-induced changes which suggest direct defect-to-band transitions. Detailed stepped wavelength photo-EPR results indicate that the Mg-related defect may be ionized with photon energy below 1.2 eV, likely related to capture of an electron from the valence band. A second ionization near 2.3 eV remains to be understood.

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