

Abstract Submitted  
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**Evidence for mobile electrons in p-type GaN:Mg<sup>1</sup>**

MARY ELLEN ZVANUT, WILLIAM WILLOUGHBY, University of Alabama at Birmingham — Although Mg-doping is the only successful means of achieving p-type conductivity in GaN, little is known about the local environment of the impurity. Our work focuses on a unique phenomena revealed in the electron paramagnetic resonance (EPR) spectrum attributed to Mg: an angular dependent line-shape suggesting the presence of free carriers. 10 GHz EPR measurements were made at 4 K with the magnetic field in the plane of the *c*-axis. Samples included 0.5 – 1.5  $\mu\text{m}$  thick Mg-doped GaN films grown on sapphire by molecular beam epitaxy or chemical vapor deposition. As expected, the angular dependence of the *g* value reflects axial symmetry. Unexpected is the line shape change from pure Lorentzian with the magnetic field 30° from the *c*-axis to increasingly Dysonian upon rotation. The latter reflects the presence of mobile carriers due to, for instance, an interfacial conducting layer, polarization charge, or loosely bound electrons from Ga near neighbors. The new EPR analysis suggests local fields surround the Mg impurity which influence the acceptor's response.

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