Abstract Submitted
for the MAR11 Meeting of
The American Physical Society

Hydrogen incorporation in high hole density GaN:Mg[1] M.E. ZVANUT, Y. UPRETY, J. DASHDORJ, University of Alabama at Birmingham, M. MOSELEY, W. ALAN DOOLITTLE, Georgia Institutute of Technology — We investigate hydrogen passivation in heavily doped p-type GaN using electron paramagnetic resonance (EPR) spectroscopy. Samples include both conventionally grown GaN (10^{19} cm^{-3} Mg, 10^{17} cm^{-3} holes) and films grown by metal modulation epitaxy (MME), which yielded higher Mg (1-4x10^{20} cm^{-3}) and hole (1-40x10^{18} cm^{-3}) densities than found in conventionally grown GaN. The Mg acceptor signal is monitored throughout 30 minute annealing steps in N_2:H_2 (92%:7%)) and subsequently pure N_2. N_2:H_2 heat treatments of the lower hole density films begin to reduce the Mg EPR intensity at 750 ^{o}C, but quench the signal in high hole density films at 600 ^{o}C. Revival of the signal by subsequent N_2 annealing occurs at 800 ^{o}C for the low hole density material and 600 ^{o}C in MME GaN. The present work highlights chemical differences between heavily Mg doped and lower doped films; however, it is unclear whether the difference is due to changes in hydrogen-Mg complex formation or hydrogen diffusion.

[1]The work at UAB is supported by the NSF.

M.E. Zvanut
University of Alabama at Birmingham

Date submitted: 10 Dec 2010

Electronic form version 1.4