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Time-dependent hydrogen annealing of Mg-doped GaN[1] USTUN SUNAY, MARY ZVANUT, JAMIYANAA DASHDORJ, University of Alabama at Birmingham — Unintentional doping by hydrogen is a concern for industrial growth of p-type GaN which is important in creating blue LEDs and high frequency devices. Using electron paramagnetic resonance (EPR) we investigated hydrogen passivation in p-type nitrides. Samples included conventional GaN and $Al_xGa_{1-x}N$(x=0.12,0.28) grown by chemical vapor deposition (CVD) with 1-4x10^{19} cm^{-3} Mg and GaN grown by Metal Modulation Epitaxy (MME) yielding 1.5x10^{20} cm^{-3} Mg. The Mg signal was observed during isothermal anneals in N_2:H_2 (92%: 7%). The Mg EPR signal unexpectedly increased below 600°C in GaN, but no changes were observed in AlGaN. The MME Mg EPR signal began decreasing after 10 min at 400°C, while the Mg intensity of AlGaN did not start reducing until 500°C. As expected the Mg EPR signal in the CVD GaN quenched at 700°C, as did the signal in AlGaN. However, the intensity of the Mg signal in MME samples was eliminated after only 20 min at 500°C. The different temperature dependence suggests that hydrogen diffusion is affected by increased Mg concentration. These studies are integral for the advancement of p-type GaN.

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