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Frequency-dependent EPR studies of strain localized around the Mg acceptor in free-standing GaN[1] USTUN SUNAY, MARY ZVANUT, JAMIYANAA DASHDORJ , Univeristy of Alabama at Birmingham, JACOB LEACH, Kyma Technologies — GaN is known for its applications in LEDs, but limited information exists about the local environment of Mg, the only p-dopant in GaN. We investigate GaN:Mg samples and report non-uniform strain around Mg acceptors and estimate a maximum hyperfine splitting using variable frequency electron paramagnetic resonance (EPR). We conducted EPR experiments at 4 K from 9.4 to 150 GHz to study strain variations local to Mg via analysis of the full width at half maximum (FWHM) of the Mg-acceptor signal. 1 mm-thick free-standing hydride vapor phase epitaxy grown GaN with a Mg concentration of 6x10^{18} cm^{-3} was studied so that the Mg could be probed in a minimally strained environment. The results are then compared with those from 4x10^{19} cm^{-3} Mg thin-film heteroepitaxial samples where the strain is thought to be significant. In the free-standing crystals, The FWHM of the Mg EPR signal increases monotonically as the microwave frequency increases, indicating variations in strain among Mg acceptors. The maximum value of the hyperfine splitting, extracted from the zero-frequency limit, is estimated to be 120 G. Measurements obtained at 9.4 GHz suggest that the average strain around the Mg in films is at least an order of magnitude greater than in the free-standing GaN.

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