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Electron irradiation effects in n-type GaN studied with EPR spectroscopy WILLIAM WILLOUGHBY, MARY ELLEN ZVANUT, USTUN SUNAY, Univ of Alabama - Birmingham — Characterizing defects in GaN under a wide range of conditions is critical to improving device performance. Bulk, UID, n-type GaN samples were studied using electron paramagnetic resonance (EPR) spectroscopy before and after irradiation with electrons. Sample A was irradiated with 0.5 MeV electrons (below threshold for Ga displacements, but above that for N), and Sample B was irradiated with 1 MeV electrons (above threshold for both Ga and N displacements). Irradiation was double-sided and the electron dose was 10^{17} cm^{-2}. EPR measurements at 3.5 K showed the number of donors per unit area in Sample A decreased with irradiation by 2.1 $\times$ 10^{15} cm^{-2} and in Sample B by 5.3 $\times$ 10^{15} cm^{-2}. This difference can be accounted for, considering that the penetration depth of 0.5 MeV electrons was 100 μm, and that of 1 MeV electrons was 300 μm. No new EPR lines appeared in the samples after irradiation. The samples were then annealed in dry N_2, and the donor signal intensity increased. An interpretation of the data is that N interstitials, reportedly forming after irradiation, act as compensating acceptors, lowering the donor signal intensity. N interstitials are also claimed to recombine with N vacancies during annealing, increasing the donor signal intensity.

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