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Defect energy distribution in GaN/AlGaN heterostructures grown in Ga-rich and ammonia-rich conditions[1] TANIA ROY, YEVGENIY PUZYREV, ENXIA ZHANG, DANIEL FLEETWOOD, RONALD SCHRIMPF, SOKRATES PANTELIDES — We use low-frequency noise measurements to estimate energy distributions of electrical-stress-induced defects in AlGaN/GaN high electron mobility transistors from 85 K to 450 K. The devices were grown under Ga-rich and ammonia-rich conditions using molecular beam epitaxy. The Ga-rich devices show a positive shift in pinch-off voltage and a decrease in gate leakage current with stress under a gate voltage of -3.6 V and a drain voltage of 20 V. These changes in response are associated with hydrogenated Ga vacancies in AlGaN. The ammonia-rich devices show a negative shift in pinch-off voltage and an increase in gate leakage current under the same stress conditions; these changes in device response are caused by N-antisite defects. The excess drain voltage power spectral density of the low frequency $1/f$ noise peaks at ~ 100 K in both device types, which corresponds to a trap energy of 0.2 eV. We attribute this to N-vacancy-related defects, which are also observed in proton damage experiments.

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