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Deep level characterization in sulfur-doped GaPN layers grown by OMVPE A.F. BASILE, S. HATAKENAKA, H. OKADA, A. WAKAHARA — Dilute Nitrides based on GaP and its alloys can be lattice matched to Silicon, thus opening a window for optoelectronic circuits on Si wafers. Some of the intrinsic defects in GaPN alloys may either be related to displaced N atoms, or instead be introduced because of the nonequilibrium growth conditions, specifically low-temperature organo-metallic vapor phase epitaxy. Sulfur-doped GaPN layers on GaP substrate, with N content either at a low doping level of about 0.3% or in the dilute-alloy range of 1% were characterized by four electrophysical techniques: C-V, Hall, deep level transient spectroscopy and thermal admittance spectroscopy measurements. Two deep-level defects were observed. A shallow trap at ∼0.4eV, which increases in concentration with N content and displays Poole-Frenkel effects, corresponds to the N interstitial. A mid-gap level with a tendency to form complexes and occurring in high concentration, independent of N content, is believed to be the Ga interstitial and is likely to strongly affect the optical and transport properties.

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