

Abstract Submitted
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Measurement of $[N]$ and T-dependence of electron effective mass in GaAsN TASSILO DANNECKER, Tyndall National Institute, YU JIN, Materials Science and Engineering, University of Michigan, JOHN BUCKERIDGE, Tyndall National Institute, CTIRAD UHER, CAGLIYAN KURDAK, Physics Department, University of Michigan, STEPHEN FAHY, Tyndall National Institute, RACHEL S. GOLDMAN, Materials Science and Engineering, University of Michigan — The electron effective mass of $\text{GaAs}_{1-x}\text{N}_x$ is predicted to be dependent on N-composition, x , and temperature, T ; however, conflicting results have been observed using cyclotron resonance and thermomagnetic measurements. Using thermopower and Hall measurements, in conjunction with assumptions of parabolic bands and Fermi-Dirac statistics, we determined the T-dependence of the electron effective mass of $\text{GaAs}_{1-x}\text{N}_x$, in comparison with that of GaAs. Measurements of the T-dependent Seebeck coefficient, S , for N compositions ranging from $x=0$ to 0.0100, reveal a decrease in dS/dT with increasing x . For GaAs, the free carrier concentration, $[n]$, is independent of T . In all other cases, $[n]$ increases (decreases) with T (x). For GaAs, the effective mass decreases from $0.06m_0$ at 140K to $0.052m_0$ at 300K, similar to literature reports.⁴ For GaAsN, the effective mass apparently increases (decreases) with x (T), ranging from $0.1m_0$ to $0.16m_0$ at 140K, with values 14% (40%) lower for $x=0.0075$ ($x=0.0100$) at 300K.

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