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Near resonance enhanced Raman scattering and room temperature photoluminescence in highly degenerate InN films V.M. NAIK, University of Michigan - Dearborn, Dearborn, MI, R. NAIK, D.B. HADDAD, J.S. THAKUR, G.W. AUNER, Wayne State University, Detroit, MI, H. LU, W.J. SCHAFF, Cornell University, Ithaca, NY — We report the results of near resonance enhanced Raman scattering and room temperature photoluminescence (PL) studies on highly degenerate (carrier concentration, $n_e > 3 \times 10^{19}$ cm^{-3}), wurtzite InN films grown on c-plane sapphire substrates by plasma source molecular beam epitaxy. At room temperature, carrier concentration dependent strong PL emission is observed in the 1.4-1.8 eV range. These films show strong resonance enhanced first and second order Raman scattering under 785 nm (1.58 eV) excitation energy and not with 514.5 nm (2.41 eV) excitation, suggesting large shifts in the optical absorption edges due band filling effects in these highly degenerate InN samples. The PL emission peak energies and their dependence on the carrier concentration are consistent with observed optical absorption edges. The present results are compared and contrasted to the data on single crystalline, low degenerate InN films which show a bandgap energy of $\sim$0.7 eV.

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