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**A<sub>1</sub>(LO)phonon in degenerate InN semiconductor films** J.S. THAKUR, D. HADDAD, R. NAIK, G.W. AUNER, Wayne State University, Detroit, MI, V.M. NAIK, University of Michigan-Dearborn, Dearborn, MI, H. LU, W.J. SCHAFF, Cornell University, Ithaca, NY — We have studied the A<sub>1</sub>(LO) structure of InN thin films from a low ( $n_e=6.7 \times 10^{17}/\text{cm}^3$ ) to a very high ( $n_e=9.6 \times 10^{20}/\text{cm}^3$ ) carrier concentration using Raman scattering experiments. Theoretically we investigated this structure using a wavevector dependent dielectric function  $\varepsilon(q, \omega)$  which takes into account the coupling of longitudinal-optical (LO) phonon and electrons with non-parabolic energy dispersion. Phonon-plasmon interaction cannot explain the origin of this structure. However, phonon interaction with electron-hole pair excitations forms a well-defined structure in  $\text{Im}\varepsilon(q, \omega)^{-1}$  which emerges from the electron hole pairs spectrum when higher-energy coupled-mode becomes Landau damped. With increasing values of  $q$ , this structure moves towards the experimental value. This peak structure is formed by a weaker (relative to the plasmon) interaction between the LO-phonon and electron hole pair excitations. Experimentally it is observed that the energy of this structure increases with increasing value of electron density.

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