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Temperature dependence Infrared and Raman studies of III-V/II-VI core-shell nanostructures FELICIA S. MANCIU, Physics Department, University of Texas at El Paso, BRUCE D. MCCOMBE, BERNARD A. WEINSTEIN, ROBERT E. TALLMAN, Physics Department, The State University of New York at Buffalo, DERRICK LUCEY, Y. SAHOO, PARAS N. PRASAD, Chemistry Department, The State University of New York at Buffalo — The temperature dependence (8 K $<$ T $<$ 300 K) of optical phonon modes confined in InP/II-VI core-shell nanostructures have been investigated by far-infrared (FIR) and Raman scattering spectroscopies. The core-shell nanostructures were fabricated by colloidal chemistry and characterized by transmission electron microscopy and X-ray diffraction prior to being embedded in a polycrystalline CsI matrix for the present studies. The FIR measurements of InP/ZnSe sample exhibits three absorption features, one clearly due to the Froelich mode of the InP cores, and the others related to modes associated with the shell layer and its coupling to the matrix. Strong mixing of the characteristic vibrations of each constituent material was observed for InP/ZnS sample. Raman scattering (457.9 nm excitation) features were determined without polarization selection in the backscattering geometry. Interesting T-dependent resonant Raman effect of the surface optical phonon modes has been discovered in InP/ZnSe sample. Reasonable agreement is obtained between the Raman and FIR results, as well as with theoretical calculations.

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