

Abstract Submitted
for the TSS08 Meeting of
The American Physical Society

Size-dependent Raman and infrared studies of PbSe nanoparticles FELICIA MANCIU, Physics Department, FRANCISCO CARRETO, Physics Department, University of Texas at El Paso, TX 79968, YUDHISTHIRA SAHOO, Institute for Lasers, Photonics and Biophotonics, PARAS PRASAD, Institute for Lasers, Photonics and Biophotonics, Buffalo, NY 14260 — The existence of optical phonon modes of PbSe nanoparticles (NP) prepared by colloidal chemistry were investigated by micro-probe Raman and far-infrared absorption spectroscopies. To the best of our knowledge, this is the first time when evidence of the surface phonon (SP) mode by Raman has been experimentally observed. The frequency of the SP mode is consistent with its prediction by a dielectric continuum model. While for different PbSe NP sizes the frequency of the SP mode is almost unaffected, there is a clear shift by approximately 4 cm^{-1} toward higher frequency in the appearance of the longitudinal optical mode in the Raman spectra from the 3 nm to the 7 nm PbSe NPs. Far-infrared measurements demonstrate the presence of the transverse optical $\text{TO}(\Gamma)$ and of the coupled phonon modes. The samples were also characterized by Transmission Electron Microscopy.

Felicia Manciu
University of Texas at El Paso

Date submitted: 11 Feb 2008

Electronic form version 1.4