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Spectroscopic characterizations of CdS polymer nanocomposites
FELICIA MANCIU, JAYESH GOVANI, ERIC HAGEDORN, University of Texas at El Paso, Texas, RONALD ZIOLO, Centro de Investigácion en Quimica Aplicada, Mexico — We explore the optically active phonon modes of CdS nanoparticles synthesized in poly(styrenesufonate) ion exchange resin and in free standing, uncrosslinked films to obtained information about the morphology, crystallinity, and surface interactions. The infrared (IR) transmission measurements were carried out with a Bruker IFS 66v Fourier Transform Spectrometer. The micro-probe and FT-Raman analysis were performed with a Jobin-Yvon and a Bruker FRA 106 system, respectively. Two excitations of 1064 nm and 632.8 nm were used. Both IR and Raman results demonstrate the existence of crystalline CdS. The dominant feature in the far-IR spectrum of the CdS/resin nanocomposites is a sharp peak centered at 255 cm^{-1}. This feature, based on a core-shell dielectric model calculation, is attributed to the presence of a very thin layer of CdS. The IR spectrum of CdS/ film nanocomposites reveals the presence of a broad absorption, which is a combination of transversal and surface optical phonon modes of CdS nanoparticles. HRTEM images of the CdS nanocomposites show CdS nanoparticles of about 2.5 nm aligned in rows or strings on the polymer surface. Amorphous CdS is also present and may be seen surrounding the nanocrystalline regions.

Felicia Manciu
University of Texas at El Paso

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