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Polarized Rayleigh Back Scattering from Individual GaP Nanowires JIAN WU, G. CHEN, QIUJIE LU, P.C. EKLUND — Results of polarized Rayleigh back-scattering studies are reported for individual ∼20 μm long crystalline GaP Nanowires (NWs) using 514.5 nm excitation. The NWs were supported on Transmission Electron Microscope (TEM) grids. The diameters of the NWs were determined by TEM. Positions of characteristic LO, TO phonon Raman bands were found to agree with bulk GaP. The Rayleigh back-scattering intensity polar pattern I(θ) was measured at room temperature, where θ is the angle between the incident electric field and the NW axis. The scattered radiation was polarized parallel to the incident electric field. For small NW diameter (d∼70) nm, we observed $\sim \cos^4\theta$ polar patterns. With increasing NW diameter above 100 nm, the polar scattering patterns rotate by 90° with respect to those seen in small diameter NWs and then they broaden to a circle. Our experimental data will be compared to the calculated Rayleigh back-scattering efficiency calculated via the Discrete Dipole Approximation (DDA). Our DDA calculations show that the polar patterns are sensitive to both the diameter and the NW length. Although the calculated polar patterns qualitatively support our data, improvement in the modeling is still needed. This work is supported by NSF NIRT, grant DMR-0304178.

Jian Wu

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