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Polarized Rayleigh and Raman Back-scattering from Individual GaP Nanowires DUMING ZHANG, JIAN WU, QIUJIE LU, HUMBERTO GUTIERREZ, PETER EKLUND, Department of Physics, The Pennsylvania State University — Results of polarized Rayleigh and Raman back-scattering studies are reported for individual $\sim$20 μm long crystalline GaP Nanowires (NWs) using 514.5 nm excitation. The NWs were supported over holes in TEM grids. The diameters and growth directions of the NWs were thereby determined by TEM and the same NW could be studied optically. Peak positions of characteristic LO, TO phonon Raman bands were found to agree with bulk GaP. Both the Rayleigh and Raman back-scattering intensity polar patterns $I(\theta)$ were 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. From the Rayleigh back-scattering intensity polar patterns, the factor in the scattered radiation was obtained. Together with the Raman tensor determined from the growth direction of the NWs, the Raman back-scattering intensity polar pattern was calculated for each case and correlated with the experimental data. Our measurement on the Rayleigh and Raman back-scattering intensity polar patterns reveled different patterns ranging from dipole-like to symmetric (circular or elliptical) depending on the NWs growth directions and diameters. This work is supported by NSF- NIRT, grant DMR-0304178.

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