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Polarized Rayleigh and Raman Study of single CuO Nanowire
QIUJIE LU, JIAN WU, HUMBERTO GUTIERREZ, TIMOTHY RUSSIN, Department of Physics, The Pennsylvania State University, PETER EKLUND, Department of Physics and Department of Material Sciences, The Pennsylvania State University — Crystalline CuO is an interesting Ferroelectric and Ferromagnetic system which we have recently grown in nanowire (NW) form. In this paper, we present results of Raman and Rayleigh scattering studies of individual CuO NWs to probe optical antenna effects that we first discovered in GaP NWs. We have shown that these antenna effects can, in general, strongly mask Raman selection rules in semiconducting nanowires[1]. Using a microRaman spectrometer, polarized light scattering experiments (backscattering geometry) were carried on NWs suspended over holes in a TEM grid. TEM was therefore also used to identify the growth axis and determine the NW diameter. As a function of the angle q between the NW axis and the incident laser field, we collect the Rayleigh scattering intensity as well as the Raman LO and TO optical phonon scattering intensity. These results can then be used to quantify the optical antenna effects in the CuO system. NWs of different diameters, from 70nm to 200 nm were studied; the results depend dramatically on the NW diameter. Our results will be compared to EM calculations based on the DDA approximation. This work is supported by NSF NIRT, grant DMR-0304178.
[1] Chen G. Jian Wu, etc., Nano Lett. 2008 Vol.8 pp. 1341-1346.

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