Abstract Submitted
for the MAR09 Meeting of
The American Physical Society

Determining the optical modes of solid and core-shell nanowires using relativistic electrons JEROME HYUN, Dept. of Physics, Cornell University, MARK LEVENDORF, Dept. of Chemistry and Chemical Biology, Cornell University, MARTIN BLOOD-FORSYTHE, Dept. of Physics, Haverford College, JIWOONG PARK, Dept. of Chemistry and Chemical Biology, Cornell University, DAVID MULLER, Dept. of Applied and Engineering Physics, Cornell University — Nanowires serve as building-blocks for miniaturized optoelectronic devices. Determining the dispersion properties of the nanowires is necessary for device-engineering, but can be experimentally difficult with conventional optical techniques because of fundamental diffraction limitations. Fast electrons, on the other hand, can be focused to nanometer or sub-nanometer probes, providing spatial resolutions far superior to existing optical techniques. The time-varying Fourier components of the electron's evanescent electric field can extend beyond the far ultra-violet regime, providing a near-field, broad-band light source. Using scanning transmission electron microscopy and electron energy loss spectroscopy, we report on the relativistic calculations and measurements of the optical eigenmodes of single Ge nanowires. We also present calculations of a dielectric core/metallic shell system, where couplings between the surface plasmonic modes and the cavity modes occur. The work demonstrates a powerful optical characterization solution for nanowire systems.

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Date submitted: 09 Nov 2008