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Optical Characteristics of Bismuth Nanowires JASON REPPERT, RAHUL RAO, TERRY TRITT, APPARAO RAO, Clemson University — Bismuth, in bulk form, is a semimetal with a rhombohedral structure. It has a small band overlap between the conduction and valence bands and a highly anisotropic electron effective-mass tensor. Bismuth nanowires with small enough diameters (<50 nm) undergo a transition from a semimetal with a small band overlap to a semiconductor with a small indirect bad gap; hence significant quantum confinement can occur. These quantum confinement effects can be potentially useful in optical and electrooptical devices. Here, we investigate the optical properties of bismuth nanowires (average diameter 10-12 nm) using Micro-Raman, UV/Visible, and Infrared Spectroscopy techniques. It is known from the literature, that bismuth nanowires exhibit a strong absorption peak ($\sim$1000 cm^{-1}) in the mid-IR that is not present in bulk bismuth. Here we show experimentally that bismuth nanowires exhibit a blue-shift in the mid-IR.

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