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Probing Ferroelectricity in Barium Titanate Nanorods by Optical Spectroscopy KIN FAI MAK, DAOHUA SONG, JOANNA ATKIN, Columbia University, YUANBING MAO, STANISLAUS S. WANG, Stony Brook University, TONY F. HEINZ, Columbia University — Finite-size effects in ferroelectric materials have attracted interest for both fundamental reasons and applications. In particular, previous studies have examined the role of film thickness and grain size on the ferroelectric properties of the well-known $BaTiO_3$ system. In this work we examine chemically synthesized nanorods of $BaTiO_3$to probe ferroelectricity in well-controlled samples. The ferroelectric response in nanorods of 30-100 nm diameter and micron length was measured using optical second-harmonic generation (SHG) and Raman spectroscopy. SHG serves as a non-contact method of identifying the ferroelectric-paraelectric phase transition since the process is allowed only for the non-centrosymmetric ferroelectric phase; Raman spectroscopy provides a complementary method of probing structure relevant for the phase transition. Both the SHG and Raman signals show evidence of the expected ferroelectric to paraelectric phase transition at temperature above the bulk transition temperature. Results obtained both for ensemble samples and for many individual nanorods will be presented and compared.

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