

Abstract Submitted  
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**BaTiO<sub>3</sub> nanocrystals studied by Raman spectroscopy<sup>1</sup>**

A.K. FARRAR, T. ENGMAN, D.A. TENNE, Department of Physics, Boise State University, S. ADIREDDY, G. CARUNTU, Advanced Materials Research Institute, Department of Chemistry, University of New Orleans — Variable-temperature Raman spectroscopy study of BaTiO<sub>3</sub> nanocrystals of varied sizes (from 8 to 20 nm) will be presented. Highly uniform cube-shaped BaTiO<sub>3</sub> nanocrystals have been prepared by solvothermal synthesis at temperatures below 140 °C and characterized by x-ray diffraction and transmission electron microscopy. Raman spectra (measured with ultraviolet and visible excitation) show that all nanocrystals studied are ferroelectric; nanocrystal size effect on the Curie temperature has been investigated. Temperature evolution of Raman spectra (10–600K) demonstrates that the ferroelectric phase of the nanocrystals is different from the bulk BaTiO<sub>3</sub>. The transitions from tetragonal to orthorhombic and from orthorhombic to rhombohedral phases, which are characteristic for bulk BaTiO<sub>3</sub>, have not been observed in the nanocrystals; the ferroelectric phase in the nanocrystals is the same in the entire temperature range below  $T_c$ , and is different from any of the bulk phases. The observed behavior may be explained by complex polarization patterns theoretically predicted for zero-dimensional ferroelectrics.

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