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Study of Ferroelectricity in Monodisperse BaTiO3 Nanoparticles by Optical Second-Harmonic Generation DAOHUA SONG, LIMIN HUANG, ZHUOYING CHEN, MICHAEL LOY[1], STEPHAN O'BRIEN, TONY HEINZ, Columbia University — The influence of finite-size effects on the ferroelectric response of materials has been a subject of intense interest for both fundamental reasons and because of its implications for applications. In particular, the role of film thickness and grain size on the ferroelectric properties of the well-known $BaTiO_3$ system has attracted considerable attention. In this work we present the results of studies on controlled monodispersive $BaTiO_3$ nanoparticles. The samples, prepared using a solution-phase method with a single bimetallic alkoxide molecular precursor,[1]were studied in thin film form.An organic ligand attached to the surface of the nanoparticles ensured that the nanoparticles remained well separated from one another and that they did not sinter. The ferroelectric response was probed using optical second-harmonic generation for monodisperse nanoparticles with a range of diameters between 4 - 12 nm. The second-harmonic generation process was chosen as a non-contact method of examining the ferroelectric-paraelectric phase transition, since this nonlinear optical process is allowed only for the non-centrosymmetric ferroelectric phase. Results on the dependence of ferroelectric response on the nanoparticle size will be reported. [1] S. O'Brien, L. Brus, and C. B. Murray, J. Am. Chem. Soc. **123**, 12085 (2001).

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