Abstract Submitted
for the MAR05 Meeting of
The American Physical Society

Finite Size Effects in Nanocrystals of Magnetoelectric Multiferroic Oxides.[1] PRASENJIT GUPTASARMA, , SHISHIR RAY, MARK WILLIAMSEN, University of Wisconsin Milw, WI, USA, VAIJAYANTI PALKAR, Tata Institute of Fundamental Research, Mumbai, India, UNIV WISC MILW COLLABORATION, TIFR MUMBAI COLLABORATION — The coexistence of coupled ground states of ferroelectricity and magnetism is an intriguing phenomenon, observed in some multiferroic materials. Among the many interests in such materials is the possibility of using an electric field as a means to control magnetic spin. The ability to maintain a small grain size is an important parameter in memory devices, and therefore it is important to study the effect of reduced crystal size on properties. We report studies of a select group of ABO3-type oxide materials with controlled particle size in the 20-100 nm size range, fabricated using solution techniques (samples $\sim$ 20nm, 33nm, 56nm and 80nm particle size). We have studied particle-size induced changes in the lattice structure, and in the electric and magnetic properties. We also find a change in the electronic band gap and the phonon spectrum. We compare these results with bulk single crystals and conclude that our size effects mostly arise from a size induced change in lattice symmetry.

[1]Partial support: NSF-DMR:CAREER

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Date submitted: 01 Dec 2004 Electronic form version 1.4