Abstract Submitted
for the MAR09 Meeting of
The American Physical Society

Electrical and magnetic properties of $BiFeO_3$-$CoFe_2O_4$ nanotube composite CHANDRAN SUDAKAR, AMBESH DIXIT, MOODAKARE BHEEMA SAHANA, GAVIN LAWES, RATNA NAIK, Department of Physics and Astronomy, Wayne State University, Detroit, MI 48201, VAMAN M. NAIK, Department of Natural Sciences, University of Michigan-Dearborn, Dearborn, MI 48128 —
We report the electrical and magnetic properties of $BiFeO_3$ and $CoFe_2O_4$ nanotube composite multiferroics. $CoFe_2O_4$ nanotubes were prepared on Pt coated Si substrates using a template assisted method, yielding nanotubes with 20-50 nm thick walls and an outer diameter of 200 to 400 nm. These nanotubes were then uniformly coated by a $BiFeO_3$ layer by a metal organic decomposition method to yield the composite multiferroics. We observed ferroelectric switching behavior with saturated hysteresis loops with P_r and E_c values of approximately 0.08 μC/cm^2 and 15 kV/cm, respectively, for a maximum applied electric field of 50 kV/cm. For pure $BiFeO_3$ thin films the hysteresis curves do not show any saturating trend and the E_c is three times smaller than that of the composite. The magnetic measurements show that the pure $BiFeO_3$ is non-ferrimagnetic, while the composite shows a clear hysteresis with saturation magnetization of $\sim$12 emu/cm^3. These composite $BiFeO_3$ – $CoFe_2O_4$ structures provide an approach for studying magnetoelectric coupling at the interfaces between different ferroic materials.

Chandran Sudakar
Dept of Physics and Astronomy, Wayne State University, Detroit, MI 48201

Date submitted: 02 Dec 2008 Electronic form version 1.4