Abstract Submitted
for the MAR06 Meeting of
The American Physical Society

Electrical and Magnetic Properties of $Pb(Zr,Ti)O_3/CoFe_2O_4$ Composite Thin Films NORA ORTEGA, S. MAJUMDER, P. BHATTACHARYA, R.S. KATIYAR, University of Puerto Rico, P. DUTTA, M.S. SEEHRA, A. MANIVANNAN, West Virginia University — Composite thin films made of ferroelectric and ferromagnetic materials are the potential candidates for sensors, data storage, and transducers due to possible manipulation of magnetic properties by electric field and vice versa. In this work, we have fabricated $Pb(Zr,Ti)O_3$–$CoFe_2O_4$ (PZT-CFO) multilayer thin films using pulsed laser deposition on $Pt/TiO_2/SiO_2/Si$ substrates at 400 $^\circ$C and post annealed at 650 $^\circ$C using rapid thermal annealing (RTA) process. The X-ray diffraction studies revealed the growth of the perovskite PZT and the spinel CFO in two separated phases in the composite films. The dielectric constant (ε_r) of PZT-CFO multilayer showed strong frequency dispersion with an order of magnitude decrease in the frequency range of 1kHz to 1MHz. Similar decrease in ε_r was also observed with decrease of temperature from 300 to 150 K. The remanent polarization (P_r) of the film (23 $\mu C/cm^2$) was also reduced to 1 $\mu C/cm^2$with decrease in the temperature (at 100 K). The magnetic measurements in the composite thin films showed the saturation magnetization (M_s) to be 9 emu/cm^3 at room temperature that increased to 38 emu/cm^3 at 5 K.

Naba Karan
University of Puerto Rico

Date submitted: 22 Nov 2005 Electronic form version 1.4