Abstract Submitted
for the MAR07 Meeting of
The American Physical Society

Pressure Induced Stabilization of the Ferroelectricity and Commensurate Magnetic structure in $R\mathbf{Mn_2O_5}$ (R=Tb,Dy,Ho) C.R. DELA CRUZ, B. LORENZ, C.W. CHU[1], TcSUH,Dept. of Physics, Univ. of Houston, W. RATCLIFF, J. LYNN, NIST-NCNR, S. PARK, S.-W. CHEONG, Rutgers Center for Emergent Materials, M. GOSPODINOV, ISSP,Bulgarian Academy of Sciences — Measurements of ferroelectric (FE) polarization were done on $R\mathrm{Mn_2O_5}$ (R=Tb,Dy,Ho) with applied isotropic pressures up to 17kbar. At low temperatures, the high polarization commensurate magnetic state destabilizes into a low polarization incommensurate magnetic state. This is shown by a sharp drop in the ferroelectric polarization with an associated increase in the dielectric constant. This feature was found to be pressure dependent and is suddenly quenched upon passing an R-dependent critical pressure, implying the stabilization of the high ferroelectric polarization state which is coincident with the commensurate magnetic structure. The direct correlation between the commensurability of the magnetic structure and the high polarization state is further revealed by high pressure neutron powder diffraction measurements on $\mathrm{HoMn_2O_5}$showing the pressure induced phase transition from the incommensurate to the commensurate magnetic state.

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Date submitted: 20 Nov 2006 Electronic form version 1.4