Abstract Submitted
for the MAR08 Meeting of
The American Physical Society

Thickness dependent magnetotransport properties of epitaxial $La_{0.5}Sr_{0.5}CoO_3$(001) films[1] M. SHARMA, M. TORIJA, C. LEIGHTON, University of Minnesota, M. VARELA, Oak Ridge National Lab — Thin films of the doped perovskite cobaltite $La_{1-x}Sr_xCoO_3$ offer an ideal system to study the effect of dimensional confinement on spin state transitions and magnetoelectronic phase separation, and have application possibilities as electrodes in ferroelectric memory and solid oxide fuel cells. In this work we present the magnetotransport properties of epitaxial $La_{0.5}Sr_{0.5}CoO_3$ (001) thin films deposited on $SrTiO_3$ (001) by high pressure reactive sputtering. The films were structurally characterized by high-resolution x-ray diffraction, scanning probe microscopy, and STEM. Films with thickness $>$ 100 Å exhibit bulk-like ferromagnetic metallic characteristics with the conventional negative MR in the vicinity of T_C and a large AMR at low T. In stark contrast, films with thickness below 60 Å exhibit reduced magnetization and a crossover to an insulating-like temperature dependence of the resistivity. This crossover is accompanied by a large negative MR at low T which bears a striking resemblance to that seen in bulk at $x < 0.17$, which is known to be due to an intercluster "GMR" effect. In essence, $x = 0.5$ films on STO, when sufficiently thin, behave much like $x < 0.17$ bulk samples, i.e. phase separation is evidenced at the LSCO/STO interface.

[1]Work supported by NSF DMR and DMSE-DoE

M. Sharma
University of Minnesota

Date submitted: 21 Nov 2007 Electronic form version 1.4