Abstract Submitted
for the MAR09 Meeting of
The American Physical Society

Structure, Magnetism, and Transport in $SrTiO_3$(001) / $La_{1-x}Sr_xCoO_3$: Evidence for Interfacial Magnetic Phase Separation
M.A. TORIJA, M. SHARMA, C. HE, Univ. of Minnesota, J. GAZQUEZ, M. VARELA, ORNL, M. LAVER, B.B. MARANVILLE, J.A. BORCHERS, NIST, C. LEIGHTON, Univ. of Minnesota — Doped cobaltites have proven to be excellent choices for the study of the magneto-electronic phase separation phenomenon. Strong motivation exists for the study of these materials in films and heterostructures, the effect of dimensional confinement on this phase separation being a prime example. We investigated the structure, magnetism, and magnetotransport, in epitaxial $La_{1-x}Sr_xCoO_3$ on $SrTiO_3$ (001). We have observed deterioration in ferromagnetism and conductivity in the thin film limit (e.g. < 8 nm at x = 0.50). We demonstrate that this can be definitively ascribed to interfacial magnetoelectronic phase separation. Key observations are the existence of an intercluster "GMR", anomalous multiterminal transport, strongly non-gaussian resistance fluctuations, and direct measurement of short-range ferromagnetic order by SANS. The thickness of the phase-separated region diverges as the doping is reduced from x = 0.50 to x = 0.18, and it can also be induced by deposition of $SrTiO_3$ overlayers. STEM/EELS data rule out the possibility of chemical phase separation proving that the deterioration in magnetic and electronic properties near the interface with $SrTiO_3$ is due to an intrinsic magnetic phase separation effect. [Supported by NSF and DOE].

M.A. Torija
Univ. of Minnesota

Date submitted: 01 Dec 2008 Electronic form version 1.4