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Phase separation at the $La_{1-x}Sr_xCoO_3$ / $SrTiO_3$ (001) interface from thickness and doping dependent magnetotransport[1] M.A. TORIJA, M. SHARMA, C. LEIGHTON, University of Minnesota — Bulk $La_{1-x}Sr_xCoO_3$ (LSCO) has received considerable attention with regard to nanoscale magnetic phase separation. Fabrication of epitaxial films provides a means to study this phase separation under dimensional confinement and at interfaces. Moreover, the characteristic intercluster "GMR" effect observed in the phase-separated state of this material provides a simple means to probe phase separation even in very thin films. We have found that even at x = 0.5 (a homogeneous ferromagnetic metal in bulk), sufficiently thin films (< 60 Å) grown on $SrTiO_3$ (001) show a crossover to a reduced moment insulating phase, with the characteristic intercluster MR effect, i.e. phase separation occurs. By measuring the thickness dependence of the magnetotransport as a function of doping we have assembled a three-dimensional phase diagram in temperature-doping-thickness space. The interfacial phase-separated region increases dramatically as x is decreased (to over 250 Å at x = 0.2) and the non-ferromagnetic phase boundary is approached. The increased prominence of phase separation as proximity to the non-ferromagnetic phase is increased provides a strong hint to the origin of this interfacial phase separation.

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