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Influence of the $SrTiO_3$ Phase Transformation on Magnetotransport Phenomena in Ultrathin $SrTiO_3$(001) / $La_{0.5}Sr_{0.5}CoO_{3-\delta}$[1] SRINIVAS POLISETTY, SHAMEEK BOSE, SHUN WANG, CHRIS LEIGHTON, University of Minnesota — The existence of electronic and magnetic "dead layers" at interfaces in complex oxide heterostructures presents a significant challenge to the realization of functional oxide devices. Our recent work on $La_{0.5}Sr_{0.5}CoO_{3-\delta}$ (LSCO) [1,2] has shown that the formation of these "dead layers" in cobaltites is due to strain-induced oxygen vacancy formation and ordering. Here, we present some of the remarkable array of complex magnetotransport phenomena that accompany this interfacial magnetic inhomogeneity in $SrTiO_3$(001)/LSCO. Reduction of the film thickness from 70 to 30 Å results in a percolative metal-insulator transition, the onset of large magnetoresistance due to inter-cluster transport, and clear signatures of the 108 K cubic-tetragonal phase transition in the $SrTiO_3$. The latter include resistivity anomalies at 108 K, strong temperature hysteresis, in-plane anisotropy, and stochastic discontinuities in resistivity [3]. We attribute these effects to strain-mediated propagation of the substrate phase transformation into the pseudomorphic LSCO and argue that the interplay between this effect and the thickness evolution of the magnetic inhomogeneity provides qualitative understanding of all observed phenomena.

[1] Torija *et al.*, Adv. Mater. **23**, 2711 (2011).
[2] Gazquez *et al.*, APL Mater. **1**, 012105 (2013).
[3] Polisetty *et al.* (*unpublished).*

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