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Intrinsic nanoscale electronic phase separation and simple percolation in $\mathbf{La_{1-x}Sr_xCoO_3}$[1] J. WU, Materials Science, Univ. of Minnesota, J. PARKER, Physics, Univ. of Minnesota, C. PERREY, B. CARTER, Materials Science, Univ. of Minnesota, J. LYNN, Nist Center for Neutron Research, NIST, H. ZHENG, J. MITCHELL, Materials Science Division, Argonne National Lab, C. LEIGHTON, Materials Science, Univ. of Minnesota — The doped pervoskite cobaltite $La_{1-x}Sr_xCoO_3$ has been advanced as a model system for studying magnetoelectronic phase separation. We present here a combination of chemically sensitive high-resolution TEM, SANS, and transport data that reveal interesting new features of this phase separation. The TEM data show that the material is chemically homogenous down to nm length scales, proving that the phase separation is truly intrinsic electronic phase separation. The SANS data, which were performed at several compositions below x = 0.18 (where long-range ferromagnetism (FM) sets in), reveal that the FM clusters have a maximum size of about 2-3 nm, *independent of doping*. This demonstrates that the percolation transition that occurs at x = 0.18 is due to an increasing density of clusters with increasing x, *not* an expansion of cluster size. These observations naturally explain the simple percolation observed in single crystal transport, i.e. conductivity exponents close to predicted values and a critical composition (x = 0.18) close to the expected value for the 3-D percolation limit.

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J. Wu
University of Minnesota

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