

Abstract Submitted  
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**High Resolution Neutron Diffraction Study of  $\text{La}_{1-x}\text{Sr}_x\text{CoO}_3$  [ $0.2 < x < 0.35$ ] Nanoparticles.** N. SUNDARAM, I. E. ANDERSON, D. P. BELANGER, Physics Dept., Univ. of California, Santa Cruz, K. KAMAZAWA, D. LOUCA, Physics Dept., Univ. of Virginia, TH. PROFFEN, Lujan Neutron Scattering Center, LANL — The crystal structure and properties of  $\text{La}_{1-x}\text{Sr}_x\text{CoO}_3$  (LaSrCoO) have been extensively studied in bulk crystals. We have extended the studies to nanoparticles of LaSrCoO in the size range of 10-50 nm, synthesized using a hetero-nuclear complex precursor. Particle sizes were determined from TEM measurements. High-resolution neutron diffraction experiments were carried out on the NPDF diffractometer at the Los Alamos National Laboratory to analyze the local structure above and below  $T_c$ . Data were collected at  $T = 12, 100$  and  $300$  K. We examined the implication of the particle size on the local and average structures using both routine Rietveld and PDF techniques. The ‘ $r$ ’ range dependent PDF analyses indicate distortions from the average crystal structure. The Jahn-Teller distortions, observed earlier in bulk compounds, are not observed in these nanoparticle systems. Preliminary magnetic measurements show that, although  $T_c$  is similar to that of the bulk, the spin-glass-like behavior persists even above the critical composition  $x = 0.18$ , unlike the bulk.  $M$  vs  $T$  plots indicate inhomogeneity. Based on these initial results, the local structure-property correlations will be discussed for all the compositions studied.

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