

Abstract Submitted
for the MAS14 Meeting of
The American Physical Society

Structural and Magnetic Properties of Oxygen-Deficient Perovskites (Sr,Ca)FeO_x and Sr(Fe,Co)O_x¹ J.R. POLLICHEMI, M.E. EVANS, I.A. LEAHY, W. VOGEL, J.P. CARLO, Villanova University — A wide variety of compounds crystallize into perovskite-related structures, making them versatile laboratories for a variety of inquiries and applications. Oxygen-deficient perovskites, in particular, have attracted interest for use in fuel cells and related applications due to high oxygen mobility. We have studied oxygen-deficient perovskites based on SrFeO_x using x-ray diffraction and Mossbauer spectroscopy. While SrFeO_x exhibits cubic Pm-3m symmetry, CaFeO_x has a more distorted structure (orthorhombic Pnma), with gradual reduction in lattice symmetry in doped (Sr,Ca) intermediaries. SrFeO_x exhibits magnetic order below 50K, while CaFeO_x is ordered (with a possible paramagnetic volume fraction) at 300K. Oxygen contents x of the air-annealed samples ranged from 2.3 to 2.65; interestingly, synthesis under 1 atm of flowing O₂ did not result in a significant change in oxygen content. Somewhat different behavior is observed for the B-site doped series Sr(Fe,Co)O_x. In this case, cubic symmetry is maintained down to 10% Fe composition, with a sudden reduction thereafter. While the structure of air-annealed SrCoO_x is consistent with orthorhombic symmetry, it is not consistent with previously reported results; the reason for this discrepancy remains unknown.

¹We acknowledge support from the Villanova University Department of Physics, and the Villanova Undergraduate Research Fellowship program.

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Date submitted: 29 Aug 2014

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