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Magnetic Structure and Phase Separation in Epitaxial $SrCoO_x$ Thin Films[1] F.J. RUECKERT, University of Connecticut, C. ABUGHAYADA, S.A. SABOK, Northern Illinois University, F. HE, Canadian Light Source, H. MOHOTTALA, University of Hartford, J.I. BUDNICK, W.A. HINES, University of Connecticut, B. DABROWSKI, Northern Illinois University, B.O. WELLS, University of Connecticut — Bulk $SrCoO_x$ separates into three distinct ferromagnetic phases as the oxygen content is increased from x = 2.75 to 3.0, corresponding to T_C = 165 K ($SrCoO_{2.75}$), T_C = 220 K ($SrCoO_{2.88}$), and T_C = 280 K ($SrCoO_{3.0}$). Over this composition, the lattice evolves smoothly and remains a single crystallographic phase. Using pulsed laser deposition and electrochemical oxidation, we have prepared epitaxial films of $SrCoO_x$ of varying thickness and orientation on $SiTiO_3$ substrates. While in polycrystalline samples intermediate oxygen concentrations show a two-phase magnetic behavior, 100nm thick (0 0 1) films remain single phase but still favor the same ferromagnetic transitions. Thicker, 150 nm (1 1 1) films also order at comparable T_C's, but again show two-phase behavior during deoxidation. Resonant x-ray diffraction on these samples reveals both commensurate and incommensurate ordering dependent on the oxidation state. This implies a charge or orbital ordering which may be influenced by finite size effects.

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