Magnetic Phase Separation in Oxygen Doped SrCoO$_{3-y}$

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SrCoO$_{3-y}$ forms the perovskite structure with oxygen vacancies and is ferromagnetic for y<0.25. We have performed a study on polycrystalline samples, controlling the oxidation state using electrochemistry. Under these conditions we have found that magnetically the system segregates into separate, stable phases that correspond to SrCoO$_{2.75}$($T_C = 165$ K), SrCoO$_{2.875}$($T_C = 220$ K), and SrCoO$_3$ ($T_C = 280$ K), with two phase behavior for intermediate oxygen concentrations. Surprisingly, these same samples show only a single structural phase that evolves smoothly. We have recently learned to grow high quality epitaxial films of SrCoO$_y$, allowing for more typical single crystal diffraction experiments. Our initial results indicate that magnetic phase separation is suppressed in the films.

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