Crystal Structure and Magnetic Properties of an oxygen deficient
n = 2 Ruddlesden-Popper phase Sr₃Co₂O₅.₆₇ JULIENNE M. HILL, JOHN F.
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versity, DeKalb, IL 60115 — Interest in charge, orbital, and spin state phenomena
in perovskite and related cobalt oxides is a growing area of transition metal oxy-
ide physics. Recently, J. Matsuno et al.¹ have found that epitaxial films of the n
= 1 Ruddlesden-Popper (R-P) phase Sr₂CoO₄ are metallic ferromagnets with rel-
atively high T_C ∼ 250 K. This is particularly interesting in light of the formal
oxidation state of Co, Co⁴⁺, offering no clear source of carriers. To extend the ma-
terials chemistry and physics of the R-P series of cobaltites, we have synthesized the
n = 2 R-P phase Sr₃Co₂O₇₋₄\_₆ in bulk form. The crystal structure [from neutron
powder diffraction (NPD) data] of our most oxygen-deficient sample, Sr₃Co₂O₅.₆₇ is
orthorhombic Imm̅m with a = 3.94025(9) Å, b = 3.67479(9) Å and c = 20.6642(5) Å.
The magnetization versus temperature data show two antiferromagnetic transitions
at approximately 170 K and 220 K. To further elucidate the magnetic properties
of this material, we have conducted a temperature-dependent NPD study. The low
temperature magnetic structure is surprisingly complex and suggestive of an inco-
mensurate ordering wave vector. Full details and results of the NPD study will be
given.

¹J. Matsuno et al., PRL 93, 167202 (2004).

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