

Abstract Submitted
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Anomalous Effect of Chromium on Enhancing Ferromagnetism of SrRuO₃ F. HUANG¹, Department of Materials Science and Engineering, University of Pennsylvania, Philadelphia, PA19104-6272, USA, W. DMOWSKI, Department of Materials Science and Engineering, University of Tennessee, Knoxville, TN 37996-1508, USA, Y-D. WANG, I-W. CHEN, Department of Materials Science and Engineering, University of Pennsylvania, Philadelphia, PA19104-6272, USA — The ferromagnetism in SrRuO₃ is generally thought to be due to Stoner mechanism. It is also known that essentially all modifications, by A-site or B-site substitution, lower the Curie temperature of SrRuO₃. An anomalous effect, however, is found with Cr substitution. When Cr replaces Ru in SrRuO₃, the Curie temperature increases due to the ferromagnetic superexchange interaction between tetrahedral Cr⁴⁺ and octahedral Ru⁴⁺. This case provides the first example that the Stoner ferromagnetism of itinerant electrons can be augmented by superexchange ferromagnetism of localized electrons. On the other hand, the ferromagnetic enhancement effect of Cr is completely suppressed by the simultaneous La substitution of Sr, turning Cr into octahedral Cr³⁺, which leads to antiferromagnetic Ru-Cr and Cr-Cr interactions. Magnetic, transport and XANES data are reported to depict these phenomena.

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