

Synthesis and Characterization of the First 1:2 ordered Perovskite Ruthenate

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Abstract

Perovskite-like mixed metal ruthenates are of interest owing to their varied electronic and magnetic properties, which are heavily dependent on the ordering of the transition metals. The authors report the synthesis and structural characterization of the 1st 1:2 ordered perovskite ruthenate, Sr₃CaRu₂O₉. The structure was detd. from a combination of powder x-ray, electron and neutron diffraction data and was characterized by a 1:2 ordering of Ca21 and Ru51 over the six-coordinate B-sites of the perovskite lattice. Sr₃CaRu₂O₉ is the 1st example of this structure-type to include a majority metal with d electrons (Ru(V), d³). The relation of this material to the K₂NiF₄-type Sr_{1.5}Ca_{0.5}RuO₄ (i.e., Sr₃CaRu₂O₈) highlights the dramatic effects of the Ru valence on the resultant structure. Remarkably, these two structures can be quant. interconverted by the appropriate choice of reaction temp. and atm.

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