

Synthesis and crystal growth of Rh(IV) oxides with double perovskite structure

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Transition metal oxides with the perovskite crystal structure constitute a class of materials long considered highly interesting for research in structure-property relationships and materials design. In this work we consider the B cation rock salt ordered double perovskite structure, with general formula $A_2BB'O_6$. We are interested in the magnetically frustrated fcc B' cation sublattice, where on the B' position we have placed Rh $4d^5$ as a reduced SOC analogue in the context of our previous iridate double perovskite work.

We have synthesized La_2BRhO_6 ($B = \text{Zn, Mg}$) compounds as powders and single crystals that form in the $P2_1/n$ space group. Their structure and properties have been characterized with a combination of XRD, SQUID magnetometry, and heat capacity. Interestingly, the materials exhibit no long range order to very low temperatures, and may host an exotic magnetic ground state.

Keywords: Crystal growth, double perovskite, magnetic frustration