Magnetic Properties of Geometric-Frustrated Double Perovskite Hg_2MnTeO_6

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The perovskite oxide has a chemical formula ABO_3 and has provided a playground for synthesizing the various functional materials, such as superconductors, thermoelectric materials, semiconductors, magnetic materials, multiferroics, and so on. In this project, it is aimed to prepare perovskite containing both transition metals manganese (II) which are considered as magnetic element and tellurium (VI) with full filled d-orbital would form a structure which have potential to give the geometrical frustration in magnetism. The materials were all synthesized by solid-state solution under high pressure to stabilize mercury into the system. From the x-ray powder diffraction (Figure 1(a)), the system of Hg_2MnTeO_6 (HMTO) is characterized as B-site ordered double perovskite which implies the magnetic cations are isolated by non-magnetic cations. In comparison to reported double perovskites with Ca, Sr, or Ba analogues [1-4], the A site of HMTO is occupied by $5d^{10}$ mercury cation, which may contribute in further electronic or magnetic interaction. The magnetic properties of the system were studied by magnetometer and the result has shown that they all have magnetic ordering at low temperature, indicating an extended exchange pathway (Figure 1(b)). Further magnetic investigation with heat capacity and neutron powder diffraction will be discussed in this report.

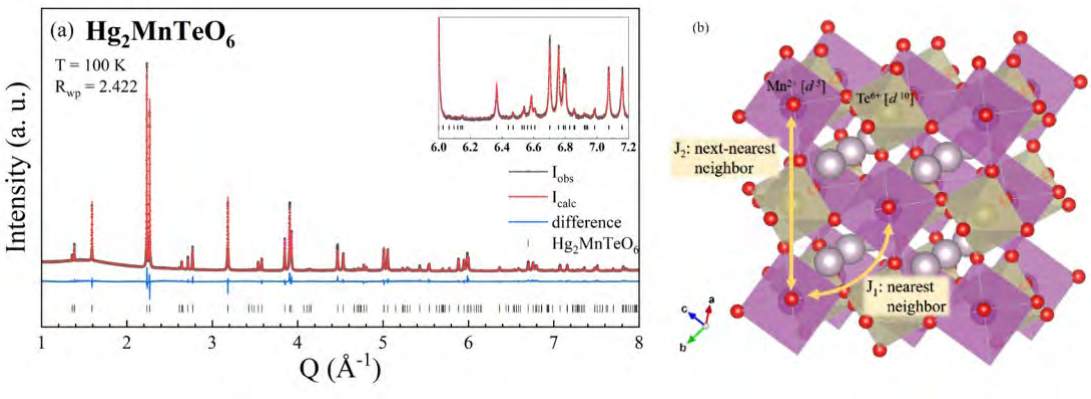

Figure 1. (a) Rietveld refinement of x-ray diffraction patterns of Hg_2MnTeO_6 collected at 100 K.

Two different extended exchange pathways between the Mn^{2+} cations.

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