

Anti-site disorder driven changes in magnetic properties of polycrystalline bulk $\text{Sm}_2\text{NiMnO}_6$ double perovskite

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Abstract. Cation ordered double perovskite $\text{RE}_2\text{NiMnO}_6$ (RE: rare-earth) is commonly believed to show two distinct magnetic phase transitions, one at $T = T_C$ because of Ni-O-Mn ferromagnetic (FM) super exchange interaction and another at $T = T_d$ due to polarization of RE paramagnetic spins opposite with respect to Ni-Mn network [1, 2]. In present work, we have investigated the structural, electronic and magnetic properties of anti-site disordered $\text{Sm}_2\text{NiMnO}_6$ (SNMO) double perovskite. The presence of intrinsic local B-site disorder results in an additional antiferromagnetic (AFM) coupling, mediated via Ni-O-Ni and Mn-O-Mn bond pairs [3-5]. As a consequence, we have observed field dependent inverted cusp like trend in temperature dependent magnetization, thermal irreversibility in cooling - warming paths of susceptibility, two step reversibility in magnetic isotherms, non-monotonicity in thermal evolution of coercivity and remanence behaviors. These results suggest the presence of competing FM-AFM phases over a wide range of temperature values ($T_d < T < T_C$) in SNMO.

References:

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