

Anti-Site Disorder Effects on the Magnetic Properties of $\text{Sm}_2\text{NiMnO}_6$ Thin Films

Authors : Geetanjali Singh, R. J. Choudhary, Anjana Dogra

Abstract : Here we report the effects of anti-site disorder, present in the sample, on the magnetic properties of $\text{Sm}_2\text{NiMnO}_6$ (SNMO) thin films. To our best knowledge, there are no studies available on the thin films of SNMO. Thin films were grown using pulsed laser deposition technique on SrTiO_3 (STO) substrate under oxygen pressure of 800 mTorr. X-ray diffraction (XRD) profiles show that the film grown is epitaxial. Field cooled (FC) and zero field cooled (ZFC) magnetization curve increase as we decrease the temperature till $\sim 135\text{K}$. A broad dip was observed in both the curves below this temperature which is more dominating in ZFC curve. An additional sharp cusplike shape was observed at low temperature ($\sim 20\text{ K}$) which is due to the re-entrant spin-glass like properties present in the sample. Super-exchange interaction between Ni^{2+} -O- Mn^{4+} is attributed to the FM ordering in these samples. The spin-glass feature is due to anti-site disorder within the homogeneous sample which was stated to be due to the mixed valence states Ni^{3+} and Mn^{3+} present in the sample. Anti-site disorder was found to play very crucial role in different magnetic phases of the sample.

Keywords : double perovskite, pulsed laser deposition, spin-glass, magnetization

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