

Magnetodielectric Studies of Substituted $\text{La}_2\text{NiMnO}_6$ Double Perovskites

Authors : Pravin M. Tirmali, Sagar M. Mane, Snehal L. Kadam, Shriniwas B. Kulkarni

Abstract : The $\text{La}_2\text{NiMnO}_6$ has been extensively studied for its ferromagnetic and magneto-dielectric properties. The $\text{La}_2\text{NiMnO}_6$ double perovskite is modified by partial substitution at B site by Fe transition metal. The $\text{La}_2\text{Ni}_{1-x}\text{Fe}_x\text{MnO}_6$ powder samples were synthesized by hydroxide co-precipitation method. The precipitate was dried and fine grinded to form powder and pellet samples (2cm dia.) using hydraulic press. The powder and pellet samples of $\text{La}_2\text{Ni}_{1-x}\text{Fe}_x\text{MnO}_6$ were calcined at high temperature 1200°C to form a pure and stable composition. The nano polar regions (NPR) around Ni^{2+} or Mn^{4+} ions due to the cationic antisite disorder gives dielectric relaxation through their mutual interaction. The magneto-dielectric behavior is observed in substituted $\text{La}_2\text{NiMnO}_6$ shows Maxwell-Wagner and Debye relaxation due to grain boundary, interface and antisite defects. The magneto-dielectric properties of substituted $\text{La}_2\text{NiMnO}_6$ pellet sample were probed by Impedance spectroscopy measurements. The structural and magnetic investigations were also carried out by XRD, FESEM and VSM measurements of substituted $\text{La}_2\text{NiMnO}_6$ of powder samples. The synthesized $\text{La}_2\text{Ni}_{1-x}\text{Fe}_x\text{MnO}_6$ powder samples are polycrystalline and ferromagnetic in nature. The $\text{La}_2\text{Ni}_{1-x}\text{Fe}_x\text{MnO}_6$ samples exhibit ferromagnetic disorder with transition temperature near room temperature.

Keywords : $\text{La}_2\text{NiMnO}_6$, nano polar regions (NPR), antisite defects, magnetodielectric

Conference Title : ICNMS 2018 : International Conference on Nanotechnology and Materials Sciences

Conference Location : Zurich, Switzerland

Conference Dates : January 15-16, 2018