Poster Presentation

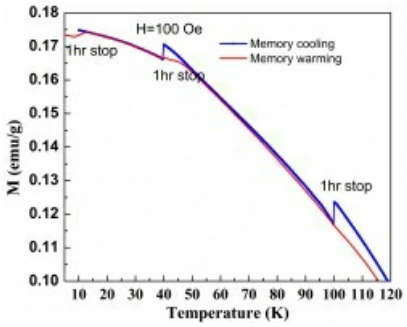
MS097.P05

Structural and magnetic memory effect in a layered perovskite $SrLaMn_{0.5}Co_{0.5}O_4$

Ranjana Rani Das[1], Santhosh P.N.[1]
[1]*Indian Institute Of Technology Madras, Chennai, India*
E-mail: ranjanaiitm@gmail.com

In recent years a lot of attention have been paid to the double perovskite compounds, owing to their room temperature ferromagnetism and multiferroics behavior.1 However, ferromagnetic insulators are rare in nature and even rarer to find with high curie temperatures. The attention towards the layered structure is comparatively limited with two transition metals. As well, there are very few reports which discuss in details magnetic ground state structure of the layered perovskites compared to the double perovskite systems. We have investigated the structural and magnetic properties of the single layered Ruddlesden-Popper compound SrLaCo0.5Mn0.5O4. System was characterized using X-ray diffraction, scanning electron microscope, transmission electron microscope and Raman spectrometer. From TEM, we have observed the single crystalline nature of each particle in this sample. We have performed magnetic measurement from room temperature to lowest temperature of 5 K. Rietveld refinements at room temperature confirmed the tetragonal crystal structure with space group I4/mmm. In temperature dependent magnetization studies, two distinct transitions are seen of Tc1~150 K and Tc2~ 50 K respectively both in Zero Field Cooled and Field Cooled protocols. First transition corresponds to the ferromagnet to paramagnetic and later one belongs to spin glass transition. According to Goodenough-Kanamori rule, the competitive super-exchange interactions between Co and Mn ions provide the multiple magnetic phases in this system. Spin glass transition was confirmed from ac susceptibility measurement vs. temperature plot, in which the peak at 50 K shifted with respect to frequencies. From Raman spectroscopy at different temperature ranges 85-300 K, we have confirmed that there is no structural transition present from room temperature to 85 K and we have also observed the spin phonon coupling around ~150 K. ZFC and FC memory effects are also observed below the spin glass transition. No memory effect is observed near the dominatingly magnetic ordered regions.

[1] R.I.DASS et. al. (2003), Physical Review B 67 (1), 014401(1-9)



Keywords: Spin glass, ferromagnetism and memory effect