DC04

Elaboration and Characterization of Manganites $La_{0.7}Pb_{0.3-x}Na_xMnO_3$ (0<x <0.2)

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In this work we present magnetic and transport measurement as a function of the temperature of polycrystalline $La_{0.7}Pb_{0.3-x}Na_xMnO_3$ ($0 < x < 0.2$)

The perovskite structure of $La_{0.7}Pb_{0.3-x}Na_xMnO_3$ ($0 < x < 0.2$) have been elaborated by the sol-gel method. The influence of change in average cationic radius ($< r_A >$) and cation size disorder (σ^2) on the transport and magnetic properties of these compounds due to the presence of different cations on the A-site is studied. All samples crystallize in a rhombohedral $R\bar{3}C$ space group with a ~0.55 nm and c ~1.33 nm. The ferromagnetic transition T_C and metal - insulator transition temperature TMI is significantly affected by the replacement of Na^+ ions of Pb^{2+}. All the sample exhibit the canonical spin-glass behaviors.

The temperature dependence of magnetization of $La_{0.7}Pb_{0.3-x}Na_xMnO_3$ is consistent with spin wave excitation according to the Bloch $T^{3/2}$.

DC05

Size-Effects on Magnetic Properties of $La_{0.5}Ca_{0.5}MnO_3$ Manganite

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The finite-size effects induce a plethora of new phenomena in the solid state magnetism [1]. In particular, the reduction of the sample size down to the nanometer scale is capable of influencing the magnetic order in doped mixed valence manganites $R_{1-x}A_xMnO_3$ (R = La and rare earths, A = Ca, Sr, Ba etc) via the coupling between the spin subsystem and the lattice. The AC and DC magnetic measurements on the bulk and series of nanometer-sized (mean size from 13 to 26 nm) samples of $La_{0.5}Ca_{0.5}MnO_3$ in the temperature interval 5-300 K and at external magnetic fields $H \leq 5$ T were employed to probe such effects. It appears that the bulk compound demonstrates a complex magnetic behavior, i.e., successive ferromagnetic (FM) and antiferromagnetic (AFM) transitions upon cooling in accordance to data of ref. [2]. Note that the magnetic ordering in bulk was found to be very sensitive to the sample stoichiometry, which is also compatible with the results [2]. At the same time, the nano powders show FM order, exclusively, in the entire temperature interval. However, such FM state appears to be strongly frustrated just below the corresponding temperature of FM transition (Curie point). The results obtained are discussed in the frame of known data on size-induced suppression of unstable AFM ground state in the other x = 0.5 manganites [3]. The surface magnetic disorder and inter-particle interactions [4], characteristic of nano-powders, are suggested to be responsible for the above noted strong frustration of their FM order. It is shown also that the AC susceptibility versus frequency dependences are determined by respective influence of the coexisting FM and AFM orderings in bulk and by surface and core FM like phases in nano-powders. Thus, both bulk and nano $La_{0.5}Ca_{0.5}MnO_3$ demonstrate the complex interplay of different interactions responsible for their magnetic ordering.

This work is supported by the ISF under contract number 845/05.

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