DA03

Low temperature magnetic properties of $NdMnO_{3+\delta}$

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The temperature and field dependencies of *dc* magnetization of ceramic $NdMnO_{3+\delta}$ compound were performed. The specimen was manufactured by standard methods from proper oxides and electrolytic manganese and represents a compact tabletwith 6 mm diameter and 1.2 mm in thickness. The measurements were performed by inductive technique in temperature region 0.5-100 K in magnetic field up to 2T.

Strong heat irreversibility of magnetization in FC and ZFC regimes in small magnetic fields was found. Two peculiarities in the vicinity of 11 K and 53 K were found on temperature dependencies M(H) in all used external magnetic fields both in FC and ZFC regimes. The singularity of magnetization near 53 K in small fields less then 1000 Oe appears as relatively narrow pea, typical for phase transition in spin claster state. The peak temperature linearly grows up to 78 K with growing the measuring field from 35 Oe to 1000 K. It must be noted that in case of small doping by La for $Nd_{0.9}La_{0.1}MnO_{3+\delta}$ sample this growing falls to 2 K. In filds higher theh 1kOe the peak vanishes and a phase transition in ordered FM state has smeared out view and is independent on applied magnetic field.

In low temperature region in the M(T) curves in ZFC regime at temperatureabout 11 K sharp peak of magnetization is observed. This anomaly we associated with a phase transition in antiferromagnetic state. In FC regime this peak is essentially smeared. The peak position and its amplitude don't depends on magnetic field value but it become wider with field growing.

In field depends of magnetization M(H) measured at 0.5 K a jump of magnetization in 13 kOe. This jump is smeared with a temperature growing higher ten 11 K. Thus the temperature and magnetic field growing leads to breaking down an antiferromagnetic ordering of spins Mn in $NdMnO_{3+\delta}$.

DA04

Effects of A-site ionic size variation on the magnetic and transport properties of $(Pr_xSm_{1-x})_{2/3}Sr_{1/3}MnO_3$ ($0 \leq x \leq 1$)

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The effects of average A-site inoic sizeon magnetic and transport properties have been studied in $(Pr_xSm_{1-x})_{2/3}Sr_{1/3}MnO_3$ ($0 \leq x \leq 1$) manganites with fixed carrier concentration. Rietveld refinement of x-ray powder diffraction suggests that these compounds crystallize in an orthorhombic distorted structure with a space group *Pnma*. An effect of average A-site ionic radius ($\langle r_A \rangle$) with the Pr substitution has been clearly observed in the continuous changes of magnetic transition temperature (T_C) and metal - insulator transition temperature (TMI) and is consistent with the previously reported ρ-$\langle r_A \rangle$ phase diagram [1]. The magnitude of resistivity above T_{MI} increases a little bit with decreasing $\langle r_A \rangle$ but the temperature dependence of resistivity is very similar for all the samples. This implies that the nature of the conduction mechanism in the non-metallic regime above T_{MI} is same and difference simply reflects a reduction in the hopping integral between the adjacent Mn^{3+} and Mn^{4+} sites. The reduction in the hopping integral is accounted by the variation in the Mn-O-Mn bond angle related to the average A-site ionic size effect. The MnO_6 octahedron gradually becomes more symmetric with the increase of $\langle r_A \rangle$ which enhances the double exchange mechanism resulting in the reduction of resistivity. Even though there has been taken several theoretical attempts to understand the conduction mechanism in manganites but the small polaron correlated model has been successfully used by us in different manganite systems [2]. On the other hand, the rare earth ions Sm^{3+} and/or Pr^{3+} are the magnetic ions which contribute towards antiferro/ferri-magnetic ordering with respect to the ordered Mn moments. The saturation magnetization value of the highly Pr-doped samples is larger than the theoretical value of 3.7 μ_B/f.u. as estimated from Mn-moments only. For x<5/6, remarkably, the temperature dependent magnetization shows an antiferromagnetic transition behavior by the rare earth magnetic moments below 50 K.We have established a phase diagram on the basis of above studies as shown in Fig. 1. The observed magnetic and transport properties can be understood on the basis of internal chemical pressure arising from the variation of the A-site ionic size.

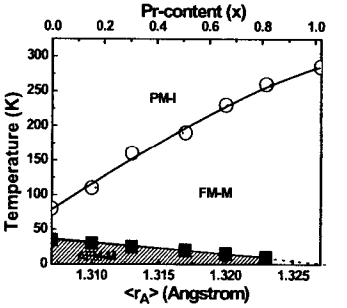

Fig. 1. Phase diagram with Pr^{3+} content and <rA>, closed square and open circle are T_N and T_C respectively.

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