P,T-DIAGRAMS FOR DOUBLE MANGANITES $RBaMn_2O_6$, R = Sm, Nd, Pr, La

Titova S.G., Sterkhov E.V.
Vatolin Institute of Metallurgy UB RAS
620016, Ekaterinburg, Amundsen st., 101

Rare-earth element R radius determines the physical properties for both disordered $RMnO_3$ and ordered (double) rare-earth manganites $RBaMn_2O_6$; this dependence reflects the size effect. An external pressure is another instrument to tune (to decrease) the lattice parameters. We have studied structure and properties (electrical resistivity, magnetization, heat capacity) for double manganites $RBaMn_2O_6$, R= Nd, Pr, La at temperature interval 100 – 300 K and external pressure range 0 – 5 GPa.

We investigated the structure of ceramic samples using powder diffraction with synchrotron (Elettra and VEPP-3) and neutron (IBR-2) radiation; the properties were studied using high-pressure chambers in Vereshchagin Institute of High Pressure Physics, RAS. The pressure influence on the metal-insulator (MI) transition and Néel temperature were obtained, the compressibility and thermal expansion coefficients were obtained for both conducting and the insulating phases. The Table summarizes the pressure dependences of Néel temperature (T_N) and the temperature of Metal-Insulator transition (T_{MI}).

Pressure dependences of Néel temperature (T_N) and the temperature of Metal-Insulator transition for $RBaMn_2O_6$, R= Nd, Pr, La

R-atom	Nd	Pr	La
T_N	↑	↑	Const
T_{MI}	↓	↓	Const

In the raw Nd – Pr – La radius of R-atom increases; and T_{MI} decreases in this sequence. We observe the same effect because of high pressure. Néel temperature (A-type order) decreases for Nd- and Pr- based compounds while pressure dependence demonstrates an opposite effect. Surprisingly, there is no influence of pressure on T_N and T_{MI} for La-based compound. Mixed magnetic (ferromagnetic and antiferromagnetic) and conducting (conducting and insulating) state may be responsible for such a behavior.

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