Properties of manganites $La_{1-c+x}Sr_{c-x}Mn_{1-x}Me^{2+}{}_xO_3$ depending on electron configuration of substituting divalent ions

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We have studied the role of electron configuration of substituting divalent ions on the properties of perovskites $La_{1-c+x}Sr_{c-x}Mn_{1-x}Me^{2+}{}_xO_3$, where Me=Mg, Zn, Ni. The substituents were chosen taking into account that $Mg^{2+}(2p^6)$ ion has completely filled *p*-electron shell, while $Zn^{2+}(3d^{10})$ has completely filled *d*-shell; they have similar ionic radii (0.072 and 0.074 nm) and are diamagnetic. $Ni^{2+}(3d^8)$ has a spin magnetic moment of 2 μ_B and ionic radius 0.069 nm, while the moment of $Mn^{3+}(3d^4)$ ion is 4 μ_B, its radius is 0.0645 nm. The system of chemical compositions was designed so that the hole concentration (in formula units) is independent of substituent amount, if the content of oxygen remains constant. Several sets of coefficients c, x were chosen near phase boundary "orthorhombic-rhombohedral structure", where properties are most sensitive to composition. It was found that Curie point, saturation magnetization, and temperature dependence of resistivity vary with substituting element in manganites having identical values of c, x. For example, saturation magnetization of Mg-substituted samples with x=0.075 and c=0.15 - 0.19 is greater than of Zn-substituted one, but Curie point is roughly the same. Manganites containing Ni exhibit maximum values of magnetization and Curie point. Magnetoresistance of some Zn-substituted samples reaches -1300% at 9.2 kOe.

9.7 cm

13.4 cm

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