NANOCOMPOSITES AND NANOMATERIALS

Crystal structure and magnetic properties of double perovskites

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Complicated magnetic perovskites with general formula $A_2B'B''O_6$ (where A= La; Pr; Sr; Ba and etc.; B' and B'' = W; Co; Mn; Fe; Mo and etc.) have unique physical properties: high spin polarization of electron conducting and high tunnel magnetoresistance effect in low magnetic fields at room temperatures [1, 2] and high values of the Curie temperature. All this physical properties are useful for practical using in spin devices (spintronic) for creating of spin valve and magnetic fields detectors.

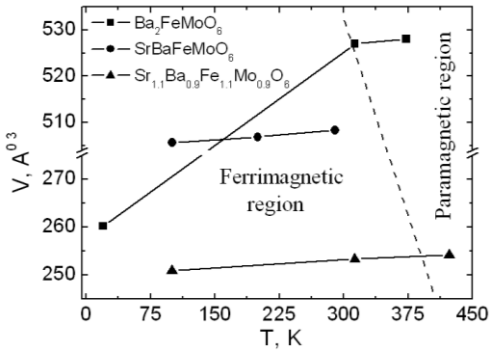

Fig.1. Dependences of volumes of unit cells versus temperature of double perovskites.

The influence of spin effect in these materials depends from degree of polarization and density of states at Fermi level which is depended from both valence state and average size of B' and B'' cations. The main aim of the work is definition of temperature influence and substitution of barium by strontium ions to structural features and magnetic properties of double perovskites: $Sr_{2-x}Ba_xFeMoO_6$ (x = 2 and 1) and $Sr_{0.9}Ba_{1.1}Fe_{1.1}Mo_{0.9}O_6$. All samples were prepared by solid state method at temperature 1200^0C in a continuous stream H_2/Ar during 10 h.

The crystal and magnetic structures were investigated at the High Resolution Fourier Diffractometer HRFD) [3] at the IBR-2 pulsed nuclear reactor in Dubna.

According to neutron diffraction all investigated samples are homogeneous. The substitution of Ba by Sr ions leads to changes of crystal structure: cubic (Fm-3m)→ orthorhombic (Fmmm)→ tetragonal (I4/m). The volume of unit cell (see Fig.1) and the Curie temperature decreases as the concentration of strontium ions are increased.

Reference.

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