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EFFECTS OF Cr DOPING ON MAGNETIC PROPERTIES OF ORDERED Sr_2FeMoO_6

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The single phase Cr-doped $Sr_2Fe_{1-x}Cr_xMoO_6$ (x=0, 0.03, 0.07, 0.1) powder has been prepared by a solid-state reaction method. The Cr-doped ordered $Sr_2Fe_{1-x}Cr_xMoO_6$ has been studied by the x-ray diffractometer, Rutherford backscattering spectrometer, Mössbauer spectroscopy and vibrating sample magnetometer. The crystalline structure of all Cr-doped $Sr_2Fe_{1-x}Cr_xMoO_6$ was tetragonal (*I4/mmm*) at room temperature, but the crystal symmetry changes into cubic (*Fm-3m*) above the Curie temperature, respectively. The lattice parameters for the $Sr_2Fe_{0.97}Cr_{0.03}MoO_6$ was a_0 = 5.5736 Å and c_0 = 7.9043 Å at room temperature. For the Cr-doping range increase, the saturation magnetization decrease and coecrivity force increase. In $Sr_2Fe_{0.97}Cr_{0.03}MoO_6$, the saturation magnetization and the coercivity were 38.06 emu/g and 10 kOe at 77 K . The magnetoresistance measurements were performed in the temperature range from 77 to 300 K. The MR shape for all samples at 77 K is characterized by a sharp MR response. The magnetoresistance magnitude ($\Delta\rho/\rho_0$) was 20 % and 2 % at 77 K and 300 K, respectively, under the applied field with 10 kOe. Mössbauer spectra measurements of the all ordered $Sr_2Fe_{1-x}Cr_xMoO_6$ (x=0, 0.03, 0.07, 0.1) have been taken at various temperatures ranging from 15 to 450 K. As the temperature increases toward to the Curie temperature, all Mössbauer spectra shown the line broadening and 1, 6 and 3, 4 line-width difference due to the anisotropic hyperfine field fluctuation. We have calculated anisotropy energy dependence on frequency factor and temperature from the relaxation rate. We interpreted of effect of Cr (t^3_{2g}) doping as a decrease in the anisotropy energy. The Curie temperature of the $Sr_2Fe_{0.93}Cr_{0.07}MoO_6$ was determined to be 450 K with the temperature dependence of the magnetization curve.

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