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Neutron diffraction and magnetic properties of $Sr_2Fe_{1-x}Cr_xMoO_6$

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A single phase of the polycrystalline $Sr_2Fe_{1-x}Cr_xMoO_6$(x=0.0,0.1) powders have been prepared by a solid-state reaction method. The chemical composition of the samples was confirmed to be stoichiometric by Rutherford backscattering spectrometer analysis. The crystal structure for the $Sr_2Fe_{0.9}Cr_{0.1}MoO_6$ was determined to be tetragonal structure at room temperature, and the lattice constants were a_0=5.5789 Åand c_0=7.9129 Å,respectively. The lattice volume of the Cr doped sample was smaller than the pure sample.The neutron diffraction patterns of $Sr_2Fe_{1-x}Cr_xMoO_6$(x=0.0,0.1) have been taken with various temperature from 10 K to 473 K. The crystal symmetry is cubic ($Fm\bar{3}m$) in the paramagnetic phase (above T_C), but changes into tetragonal ($I4/mmm$) in the ferrimagnetic phase (below T_C). The Curie temperature of the Cr doped sample was 415 K slightly smaller than 425 K for the pure sample. The magnetoresistance ratio ($\Delta\rho/\rho_0$) of the $Sr_2Fe_{0.9}Cr_{0.1}MoO_6$ was 14.9 % at 77 K under the applied field with 1 T. As the temperature increased towards T_C, the Mössbauer spectra showen line broadening and 1, 6 and 3, 4 line width differences due to the anisotropic hyperfine field fluctuation. The field fluctuation frequency factor and the anisotropy energy were determined as 8.2 $\Gamma/\hbar$ and 143.52 erg/cm^3 for T = 260 K that is associated with the large line broadening.

Subject Categories : Magnetic fluctuations and excitations in strongly correlated electron systems Session Preference : Poster