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한국원자력연구소
Korea Atomic Energy Research Institute

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이중 페롭스카이트 $Sr_2Fe_{1-x}Cr_xMoO_6$ (x=0.0, 0.1)의 중성자 및 뫼스바우어 연구

NEUTRON AND MÖSSBAUER STUDIES FOR DOUBLE PEROVSKITE $Sr_2Fe_{1-x}Cr_xMoO_6$ (x=0.0, 0.1)

안근영(ahngy@phys.kookmin.ac.kr)[1], 김지훈[1], 박승일[1], 김철성[1], 김성백[2], 이창희[2]

[1]국민대학교, [2]한국원자력연구소

요 약 문

We found the structure of the $Sr_2Fe_{0.9}Cr_{0.1}MoO_6$ to be tetragonal, with lattice constants a_0=5.5789 and c_0=7.9129 . The magnetoresistance magnitude ($\Delta\rho/\rho_0$) was 14.9 % and 1.4 % at 77 K and 300 K, respectively, under the applied field with 1 T. The Curie temperature of the Cr doped sample (T_C = 415 K) was slightly smaller than that of the pure sample (T_C = 425 K). Neutron diffraction patterns of $Sr_2Fe_{1-x}Cr_xMoO_6$(x=0.0, 0.1) have been taken at various temperatures ranging from 10 to 473 K. The crystal symmetry is cubic (*Fm3m*) in the paramagnetic phase (above T_C), but changes into tetragonal (*I4/mmm*) in the ferrimagnetic phase (below T_C). Mössbauer spectra of the $Sr_2Fe_{0.9}Cr_{0.1}MoO_6$ have been taken at various temperatures ranging from 15 to 415 K. As the temperature increased towards T_C, the Mössbauer spectra showed line broadening and 1, 6 and 3, 4 line width differences because of anisotropic hyperfine field fluctuation. The Mössbauer spectra indicated that an anisotropic field fluctuation of $+H$ (P_+ = 0.85) was greater than $-H$ (P_- = 0.15). We calculated the temperature dependence of anisotropy energy from its relaxation rate. The field fluctuation frequency factor and the anisotropy energy were calculated as 8.2 Γ/h and 143.52 erg/㎤, respectively, using the relatively accurate data for T = 260 K that is associated with the large line broadening. We interpreted of effect of Cr (t^3_{2g}) doping as a decrease in the anisotropy energy.