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ABSTRACTS

CS-17. Geometrical frustration effect of Cr ions in Mg-chromites by Mössbauer spectroscopy. *K. Choi*[1], S. Kim[1], B. Lee[2] and C. Kim[1]*1. Physics, Kookmin Univ., Seoul, South Korea; 2. physics, Hankuk University of Foreign Studies, Yongin, South Korea*

Chromites A Cr_2O_4 (A=Mg, Zn, Cd, and Hg) have non-magnetic A site and B site of most frustrated lattice by Cr^{3+} ions[1,2]. Zn Cr_2O_4 presents a very high Curie-Weiss temperature at -390 K and a first order anti-ferromagnetic transition 12.5 K, Mg Cr_2O_4 have similar temperature(T_N = 12K). We have substituted a small amount of Fe ions for Cr sites and investigated the magnetic behavior of Fe ions, on nano scale, using Mössbauer measurement. Polycrystalline $Mg_{1.98}{}^{57}Fe_{0.02}O_4$ compound was synthesized by sol-gel process. The crystal structure was found to be single-phase cubic spinel with space group of Fd3(-)m. The lattice constant a_0 and the internal structural parameter (x) of the oxygen were determined to be 8.336 Å and 0.260, respectively. The $A_{1.98}{}^{57}Fe_{0.02}O_4$ (A = Mg, Zn) Cr-Cr linkage has each bond length to be 2.945 Å and 2.947 Å, respectively. We have obtained a increased Néel temperature(T_N = 12 ~12. 5 K) for Mg, Zn chromites compared with Cd, Hg- chromites (T_N = 6 ~ 8 K). Mössbauer spectra of $Mg_{1.98}{}^{57}Fe_{0.02}O_4$ were taken from 4.2 to 295 K. bove the Néel temperature (T_N = 12 K) paramagnetic doublet is observed. The spectrum at room temperature consisted of doublet split with the electric quadrupole splitting of 0.39 mm/s. The isomer shift of doublet is 0.21 mm/s relative to the Fe metal that is consistent with the Fe3+ valence state. The magnetic properties and Mössbauer results can be explained by the B-B exchange interaction in $Mg_{1.98}{}^{57}Fe_{0.02}O_4$.