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ABSTRACTS

CR-01. Neutron and Mössbauer studies of FeCr_2Se_4 . *J. Kang*¹, *S. Kim*¹, *B. Lee*² and *C. Kim*¹ *1. Department of Physics, Koomin University, Seoul, South Korea; 2. Department of Physics, Hankuk University of Foreign Studies, Yongin, Kyungki, South Korea*

Sample of FeCr_2Se_4 has been studied with x-ray diffraction, neutron diffraction, vibrating sample magnetometer, and Mössbauer spectroscopy. Neutron diffraction patterns were observed from 4 K to room temperature. The crystal structure of FeCr_2Se_4 at room temperature has a monoclinic (space group $I2/m$), with the lattice constants $a = 6.267 \text{ \AA}$, $b = 3.617 \text{ \AA}$, $c = 11.822 \text{ \AA}$, and $\beta = 90.69^\circ$, respectively. Below the Néel temperature ($T_N = 223 \text{ K}$), the magnetic peaks and the crystal peaks were detected together. Also, the magnetic superstructure peak of reflection, for $2a \times b \times 2c$ magnetic unit cell, develops rapidly with decreasing temperature, denoting the C-type ordering of magnetic ions. We interpret an abnormal antiferromagnetic behavior below 130 K as the predominance of the ferromagnetic interaction in competition between the ferromagnetic and the antiferromagnetic interaction in C-type ordering. The Mössbauer spectra were obtained at various temperatures from 4.2 to 295 K. Magnetic hyperfine and quadrupole interactions at 4.2 K have been fitted, yielding the following results: $H_{\text{hf}} = 80.0 \text{ kOe}$, $\theta = 55^\circ$, $\phi = 43^\circ$, $\eta = 1.0$, and $\Delta E_Q = \frac{1}{2} e^2 q Q (1 + \frac{1}{3} \eta^2)^{1/2} = 1.63 \text{ mm/s}$. It gives a direct evidence that the quadrupole interaction FeCr_2Se_4 is larger than that of the magnetic dipole interaction. Also the spectrum of a doublet line at 295 K shows that the local symmetry around Fe ion in monoclinic lattice is distorted. The charge state of Fe ion in the FeCr_2Se_4 is ferrous.