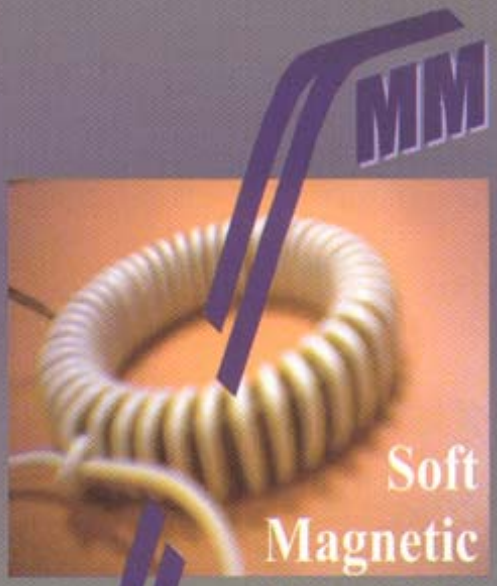

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MAGNETIC STRUCTURE AND MÖSSBAUER STUDY ON Fe-Cr-BASED SELENIDE

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Sample of $FeCr_2Se_4$ has been studied with X-ray (XRD), neutron diffraction, vibrating sample magnetometer (VSM), and Mössbauer spectroscopy. The crystal structure of $FeCr_2Se_4$ has a monoclinic (space group *I2/m1*) phase, with the lattice constants a = 6.2593 Å, b = 3.6122 Å, c = 11.7806 Å, and β = 90.73°, respectively. Neutron diffraction patterns were observed from 4 K to room temperature. The magnetic super structure peak disappeared above Néel temperature. This result is in agreement with the VSM results. The magnetizations were recorded from 70 to 300 K. Temperature dependence of magnetic moment curve showed an anomalous antiferromagnetic system. The magnetic moment decreased with increasing temperature up to 130 K, and then it indicated a cusp-like maximum value at 223 K, we determined it as Néel temperature. In the paramagnetic behavior region, magnetic moment curve was fitted with Curie-Weiss law. Weiss temperature θ was determined to be –382 K. The Mössbauer spectra were obtained various temperatures, from 4.2 K to room temperature. Mössbauer spectrum shows a severe line broadening at 4.2 K, and it gives a direct evidence of a large quadruple interaction in this material, compared to magnetic dipole interaction. The Mössbauer spectrum consists of a doublet at room temperature, denoting a distorted monoclinic symmetry.

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