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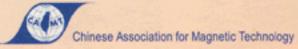
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MAGNETIC AND ELECTRON TRANSPORT PROPERTIES IN Coo, Feo, Cr.S.

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Sample of $Co_{0.1}Fe_{0.9}Cr_2S_4$ has been studied with Mössbauer spectroscopy, x-ray, SQUID magnet ometer and magnetoresistance (MR). The crystal structure was determined to be cubic spinel w ith its lattice constant a_0 =9.999 Å. The Mössbauer spectra were recorded from 4.2 K to room t emperature. The asymmetric line broadening is observed and considered to be dynamic Jahn-Te ller distortion. The unusual reduction of magnetic hyperfine field below 100 K may be explain ed in terms of cancellation effect between the mutually opposite orbital current field (H_L) and F ermi contact field (H_C). Isomer shift value of the sample at room temperature was 0.58 mm/s, which means that charge state of Fe ions was ferrous in character. The Curie temperature (T_C) was 178 K. The MR peak was observed at 192 K about 10 % at an applied field 2 T. The a ctivation energy above the Curie temperature was calculated to be 50 meV. The conduction me chanism of Mn perovskites is accompanied with electron hopping between heterogeneous Mn³⁺ and Mn⁴⁺ but in this sample there is no heterovalance in iron ions. The three strengths of sup erexchange interactions J_{A-B} , J_{A-A} , and J_{B-B} were calculated to be -10.5, 4.5, and 7.6 k_B, respectively. The conduction mechanism in this sample was completely different from double exchange which was characteristic of Mn perovskites.

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¹A. P. Ramirez, R. J. Cava, and J. Krajewski, Nature 386, 156 (1997).

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1. Spin Dependent Transport

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