

Anomalous interaction behaviors in Ga-doped for chromium based sulphur spinel

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Samples of $\text{FeGa}_x\text{Cr}_{2-x}\text{S}_4$ ($x = 0.1, 0.3$) have been studied with Mössbauer spectroscopy, X-ray diffraction, magnetization, and magnetoresistance (MR). The Mössbauer spectra of the samples consist of the two doublets at room temperature. Fe ions migrate from the tetrahedral (A) site to the octahedral (B) site with increase of Ga substitutions. The electric quadrupole splitting of the A sites in Mössbauer spectra for the samples $x = 0.1$ and $x = 0.3$, at 295 K, are 0.30 and 0.83 mm/s, respectively. It gives a direct evidence that Ga ion stimulate asymmetric charge distribution of Fe ions in the A site.