

## Enhanced Ferrimagnetism in $\text{Zn}_{1/2}\text{Fe}_{1/2}\text{Cr}_2\text{S}_4$

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We have synthesized  $\text{Zn}_{1/2}\text{Fe}_{1/2}\text{Cr}_2\text{S}_4$  and studied it by using with X-ray diffraction, magnetic susceptibility and Mössbauer spectroscopy measurements. The crystal structure was found to be a cubic spinel with space group  $Fd\bar{3}m$  by using a Rietveld refinement of X-ray diffraction data. The lattice constant of  $\text{Zn}_{1/2}\text{Fe}_{1/2}\text{Cr}_2\text{S}_4$  was determined to be  $a_0 = 9.992 \text{ \AA}$ . The magnetization curves followed a Curie-Weiss law, with a positive  $\theta_{cw} = 107 \pm 1 \text{ K}$  showing a ferrimagnetic behavior. The Néel temperature ( $T_N$ ) of  $\text{Zn}_{1/2}\text{Fe}_{1/2}\text{Cr}_2\text{S}_4$  was determined to be 105 K. The Mössbauer spectra of  $\text{Zn}_{1/2}\text{Fe}_{1/2}\text{Cr}_2\text{S}_4$  were obtained at various temperatures ranging from 4.2 to 300 K. The magnetic anomaly observed below  $T_N$  is caused by a weakening of the spin-orbit coupling. The isomer shift value of the sample at room temperature was 0.65 mm/s, which means that the charge state of the Fe ions was ferrous in character.

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