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THE CHARGE STRUCTURE AND INTERACTION MECHANISM ON In-DOPED SULPHUR SPINEL

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Synthesis of the sample was accomplished by the direct reaction of the high-purity elements Fe, Cr, In, and S in an evacuated quartz tube. The crystalline and magnetic properties were researched by x-ray diffraction (XRD), VSM, and Mössbauer spectroscopy. The XRD patterns for samples with nominal composition $\text{FeIn}_x\text{Cr}_{2-x}\text{S}_4$ ($x=0.1, 0.3$) reveal that both samples are single phase with spinel structure. The crystal structure at room temperature is determined by the Rietveld method. It is found that the space group is $Fd3m$ and resulting lattice parameters are $a_0=10.029, 10.093 \text{ \AA}$, for the $x=0.1$ and 0.3 , respectively. The Néel temperature is decreased with increasing non magnetic In substitution as consequence of reduction of superexchange interaction for increased lattice size. The Mössbauer spectra were measured from 4.2 K to room temperature. The asymmetric line broadening is observed for the sample $\text{FeIn}_x\text{Cr}_{2-x}\text{S}_4$ and considered to be dynamic Jahn-Teller relaxation. The charge state of Fe ions is ferrous in character.

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Oral Poster Invited Talk

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