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Program
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 FeIn$_x$Cr$_{2-x}$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 Fd$ar{3}$m and resulting lattice parameters are $a_0=10.029$, 10.093 Å, 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 FeIn$_x$Cr$_{2-x}$S$_4$ and considered to be dynamic Jahn-Teller relaxation. The charge state of Fe ions is ferrous in character.

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