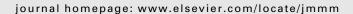


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Investigation of magnetic properties on spin-ordering effects of FeGa₂S₄ and FeIn₂S₄



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ABSTRACT

We have studied crystal and magnetic properties of chalcogenides $FeGa_2S_4$ and $FeIn_2S_4$ with X-ray diffractometer (XRD), magnetic property measurement system (MPMS), magnetometer, physical property measurement system (PPMS), and Mössbauer spectrometer. The crystal structure has 2-dimension triangular lattice structure with P-3m1 of $FeGa_2S_4$, while $FeIn_2S_4$ has inverse spinel with space group Fd3m. The AC magnetic susceptibility measurements show that $FeGa_2S_4$ is an insulating spin glass material, exhibiting geometrical frustration, unlike in the antiferromagnetic [AFM] metallic spin glass $FeIn_2S_4$. From hysteresis (M-H) curves at 4.2 K, $FeGa_2S_4$ has spin-flop behavior with an angle of 120° of triangle, as against linear slope of $FeIn_2S_4$ due to anti-parallel spin. The gap energy by splitting of $^5T_{2g}$, Δ_1 and electric quadrupole splitting ΔE_Q of $FeIn_2S_4$ are much higher than that of $FeGa_2S_4$ at 4.2 K because $FeGa_2S_4$ is geometrically frustrated magnet having degenerate ground state at low temperature.

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