

Magnetic properties of CuCrZrSe_4

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Abstract

We report on structural and magnetic properties of the spinel compound CuCrZrSe_4 . Rietveld refinement of the powder x-ray diffraction patterns reveals the normal spinel structure AB_2Se_4 ,

where the Zr^{4+} and Cr^{3+} ions occupy the B sites, while the Cu^{1+} ions are located on A sites. The magnetic susceptibility reveals a Curie–Weiss law above 250 K with a ferromagnetic Curie–Weiss temperature $\theta_p = 115$ K and an effective paramagnetic moment $m_{\text{eff}} \mu_{\text{eff}} = 3.75 \mu_B$ per Cr^{3+} ion corresponding to a g value $g = 1.94$ in fair agreement with electron spin resonance (ESR) measurements. Below 100 K the magnetization deviates from the Curie–Weiss behaviour and splits into field-cooled (FC) and zero-field-cooled (ZFC) branches. A second anomaly in the magnetization close to 10 K, which is also visible in the ESR parameters, indicates the transition into a spin-glass state due to the random distribution of Zr and Cr ions on the B site. This is supported by the frequency dependence of the anomaly detected by AC susceptibility measurements [1].

References

[1] K Belakroum, Z. Ouili Journal. JMMM 334 130–135 (2013)