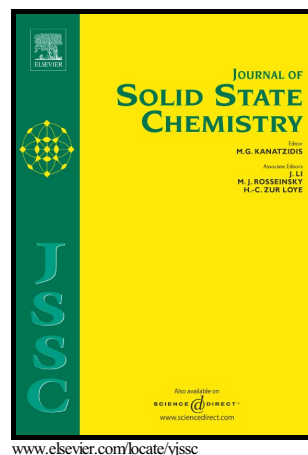


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Antiferromagnetism and Metamagnetism in $\text{ErFeCuGe}_4\text{O}_{12}$

Diming Xu¹, Maxim Avdeev^{2,3} and Peter D. Battle^{1,*}

1. Inorganic Chemistry Laboratory, Oxford University, South Parks Road, Oxford, OX1 3QR, U. K.
2. Australian Nuclear Science and Technology Organisation, Lucas Heights, NSW 2234, Australia
3. School of Chemistry, The University of Sydney, Sydney, NSW 2006, Australia

* to whom correspondence should be addressed: peter.battle@chem.ox.ac.uk

Abstract

Polycrystalline $\text{ErFeCuGe}_4\text{O}_{12}$ has been prepared in a solid-state reaction. It adopts a tetragonal crystal structure; space group $P4/nbm$ with $a = 9.6416(1)$, $c = 4.7532(1)$ at room temperature. The Er^{3+} cations are in square-antiprismatic coordination and the Fe^{3+} and Cu^{2+} cations are disordered over one six-coordinate site. The magnetic moments of the three cations adopt an antiferromagnetic arrangement on cooling below 20 K in $H = 0$ kOe. The magnetic structure consists of ferromagnetic (001) sheets with the spin direction in neighbouring sheets alternating between $[001]$ and $[00\bar{1}]$. At 5 K the ordered moment of Er^{3+} was determined by neutron diffraction to be $7.90(3) \mu_B$ and the mean moment of Fe^{3+} and Cu^{2+} was $2.43(2) \mu_B$. The magnetic structure is unchanged in an applied field of 10 kOe but in fields ≥ 20 kOe the compound begins a metamagnetic transition to a ferromagnetic structure with all atomic moments aligned along $[001]$.

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