

Abstract Submitted
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Magnetic and Structural Properties of the Solid Solutions

$CuAl_{2(1-x)}Ga_{2x}O_4$ THOMAS BULLARD, UES, Inc., CHARLES EBBING, The University of Dayton Research Institute, TIMOTHY HAUGAN, The Air Force Research Laboratory - RQQM — We have synthesized the antiferromagnetic spinel solid solution $CuAl_{2(1-x)}Ga_{2x}O_4$. The majority of the solution displays irreversibility in the FC-ZFC DC susceptibility, a frequency dependence of the temperature of the cusp in the AC susceptibility, memory effects and slow relaxation dynamics as a result of changing magnetic field. We quantitatively compare to similar systems in the literature to distinguish between spin glass, cluster glass, and superparamagnetic behavior. Diffraction and Curie-Weiss results suggest a rearranging of the Cu^{2+} atoms as Al is replaced with Ga and offers a possible explanation for the quantitative differences in spin/cluster glass behavior within the solution. We also examine the irreversibility line distinguishing the stability regions in the H-T plane for each solution member and find the de Almeida and Thouless line fits well to our results.

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