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Magnetic properties of a distorted Kagomé lattice: Gd3Os4Al12

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R-T-X (R= rare-earth, T= Transition element and X = p-block element) ternary intermetallic compounds have drawn considerable attention for their diversity of structural and magnetic properties. The rare-earth family of R3T4X12 type is of particular interest among intermetallics because the structure contains layers as well as triangular and distorted Kagomé lattice features. In this work, we have synthesized the Gd3Os4Al12 compound by arc-melting technique. The powder X-ray diffraction spectra with a full-profile refinement confirm that Gd3Os4Al12 crystallizes in the hexagonal Gd3Ru4Al12-structure type with space group P63/mmc. The temperature (T) dependent dc-magnetic susceptibility (⊠) reveals that the compound undergoes ferro- to antiferromagnetic orderings below 30 K. They are consistent with the phase transitions observed in the specific heat data. The (T) data obey the Curie-Weiss law above 180 K, with the calculated effective magnetic moment μeff = 7μB/Gd, which is slightly smaller than the trivalent free-ion value for the Gd ion of 7.9 μB. The obtained positive paramagnetic Weiss temperature indicates the presence of strong ferromagnetic interactions. The study may contribute towards a better understanding of the physics in Kagomé structure compounds, since in a frustrated lattice system such as this there are strict constraints imposed upon the magnetic order parameter.

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