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Magnetic properties of the layered structure compound Ce3Os4Al12

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, electronic, and magnetic properties. R3T4X12 type of compounds are of particular interest among intermetallics because the crystal structure contains layers as well as triangular and distorted Kagomé lattice features. In this work, we have synthesized a polycrystalline Ce3Os4Al12 sample by argon arc-melting technique. The Rietveld crystal structure refinement of powder X-ray diffraction patterns with a full-profile refinement confirm that Ce3Os4Al12 crystallizes in the hexagonal Gd3Ru4Al12-structure type with space group P63/mmc. The temperature (T) dependent dc-magnetic susceptibility ⊠(T) and specific heat data reveals that the compound undergoes a ferromagnetic type ordering below 6 K. The ⊠ (T) data obey the modified Curie-Weiss law above 6 K, with the calculated effective magnetic moment μeff = 0.54 μB/Ce, which is less than one quarter of the trivalent free-ion value for the Ce ion of 2.54 μB. The obtained positive paramagnetic Weiss temperature (⊠p = 5.33 K) indicates the dominant presence of ferromagnetic interactions in the high temperature region. 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 occurrence of long-range magnetic order and the magnetic order parameter.

Apply to be considered for a student ; award (Yes / No)?

Yes

Level for award;(Hons, MSc, PhD, N/A)?

PhD

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