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Thermodynamic Properties of (Pr,Gd)OsGa₄ Intermetallic Compounds

Polycrystalline samples of PrOsGa₄ and GdOsGa₄ were prepared by arc-melting technique using high-purity elemental constituent elements. They were melted on a water-cooled copper plate under ultra-high pure argon atmosphere. The Rietveld crystal structure refinement of powder X-ray diffraction patterns with a full-profile refinement confirms that both samples crystallize in the hexagonal CeOsGa₄-structure type with space group Pmma (number 51). The structure exhibits two types of two dimensionally alternating layers that are slightly puckered, having OsGa₃ layer sandwiched between Pr(Gd)Ga layers. Here, we present the physical properties of these compounds through temperature (T) dependent magnetic susceptibility $\chi(T)$ and magnetization M(B), heat capacity Cp(T), and electrical resistivity ($\rho(T)$). They consistently reveal that the compounds undergo an antiferromagnetic type ordering below 16 K. The $\chi(T)$ data obey the Curie-Weiss law above 50 K. The study may contribute towards a better understanding of the physics of this class of materials.

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