Magnetic and electronic properties of NpPdSn

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9.7 cm

A new compound NpPdSn was prepared and studied by X–ray diffraction, magnetization, heat capacity, electrical resistivity, thermoelectric power and Hall effect measurements, performed in the temperature range 2-300 K and in magnetic field up to 14 T. The crystal structure [ZrNiAl-type (s.g. *P62m*), a = 7.5076 Å and c = 4.0954 Å] was determined from single–crystal X–ray data. The compound orders antiferromagnetically at 19 K and exhibits a Curie–Weiss behavior with $\mu_{eff} = 2.66\ \mu_B$ and Θ_p = -47 K. The total splitting of the neptunium $^5I_4$ multiplet is of the order of 250 K with a doublet as the ground state. Below T_N the specific heat and the electrical resistivity are governed by electron–magnon scattering with a spin–waves spectrum typical of anisotropic antiferromagnetic systems. Above T_N the resistivity shows Kondo-like response to the applied magnetic field. Enhancement of the low–temperature specific heat ($\gamma \sim 90$ mJ/mol K^2) points to the presence of conduction electrons with high effective masses. The Seebeck coefficient exhibits a behaviour expected for scattering of conduction electrons on a narrow quasiparticle band near the Fermi energy. All the bulk properties show temperature variations similar to systems with strong electronic correlations. It suggest that NpPdSn may be classified as new Np-based antiferromagnetic Kondo lattice, one of the very few known amidst transuranium-based intermetallics.

13.4 cm

Subject category :

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