MAGNETIC BEHAVIOUR AND ELECTRONIC STRUCTURE OF THE COMPOUNDS R_2PdSi_3 (R = Ce, Nd, Tb-Er)

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9.7 cm

The magnetic behaviour of the ternary intermetallics, R_2PdSi_3 (R=Ce,Nd,Tb-Er), have been investigated by magnetization, electrical resistivity (ρ), neutron diffraction and XPS photoemission measurements. The neutron diffraction data reveal that these compounds crystallize in an AlB_2-type hexagonal structure and that these alloys exhibit different magnetic structures below respective magnetic transition temperatures. For Ce_2PdSi_3 the Ce moments order in a sinusoidally modulated antiferromagnetic structure below 2.5 K, without extending to the entire crystal, apparently exhibiting cluster magnetism. The Nd magnetic moments in Nd_2PdSi_3 exhibit ferromagnetic ordering below 17 K. In Tb_2PdSi_3, a complex situation is observed: in the temperature range 1.5 to (T_N=)25 K, there is a coexistence of the ferromagnetic spiral (about 75 % of magnetic moment) and spin-glass (about 25 %). For Dy, Ho and Er alloys, below T_N(7.5, 8 and 7 K respectively), sinusoidaly modulated structures are observed and there are upturns in ρ below T_N indicative of the opening up of magnetic Brillouin-zone boundary gaps in these compounds. While for Ce, the magnetic moment lies in the basal plane, for other compounds, it is parallel to the c-axis. There are distinct features in the magnetization and data near magnetic transition temperatures. The valence band and the core level photoemissions of 4d of rare earth metal, 3d Pd, 2s and 2p Si have been investigated.

13.4 cm

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