Ferromagnetic ordering of ternary compound YbPtP

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The magnetic phase transitions in Yb compounds usually occur at very low temperatures. In many cases, the transition temperatures of them are observed at a few Kelvin. We reported here that ternary compound YbPtP shows a ferromagnetic ordering with a high transition temperature, T_C = 14.4 K. The physical properties of *R*PtP (*R* = Rare-earth) have been investigated only for CePtP and EuPtP up to now. CePtP has a quasi-two dimensional character and shows an anisotropic magneto-resistance [1]. EuPtP exhibits successive charge ordering transitions accompanied by the structural phase transitions [2].
The powder sample of YbPtP has been prepared using the Pb-flux method. It is confirmed that YbPtP crystallizes in the reported hexagonal structure (space group *P*-6*m*2) [3]. In the scanning electron microscopy (SEM) studies, the samples can be considered as the aggregation of microscopic single crystals, the average crystallite size of 10 μm. The magnetic susceptibility follows the Curie-Weiss law above 100 K. The effective Bohr magneton is estimated to be 4.39 μ_B, which agrees well with the theoretical one of 4.53 μ_B for the Yb^{3+} ion. We also synthesized GdPtP, TbPtP and DyPtP in order to investigate the de Gennes scaling. The magnetization measurements revealed that GdPtP, TbPtP and DyPtP undergo transitions to the ferromagnetic state at 70 K, 50 K and 27 K, respectively. These transition temperatures are roughly proportional to the de Gennes factor; however, in this scheme the magnetic ordering temperature for YbPtP should be 1 K or less. The actual T_C of 14.4K is over 10 times higher than the expected value.

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