(PS 33)

Fermi surface and magnetic properties of $5f$-itinerant antiferromagnets $UTGa_5$ (T: Ni , Pd and Pt)

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$UTGa_5$ (T: Ni , Pd and Pt) has the $HoCoGa_5$-type tetragonal crystal structure (P4/mmm). We succeeded in growing the high-quality single crystal of $UTGa_5$ by the Ga self-flux method, and measured the magnetic susceptibility, neutron scattering and de Haas-van Alphen (dHvA) effect. From the dHvA experiment, it was clarified that the $5f$-electrons are itinerant and Fermi surfaces consist of nearly cylindrical Fermi surfaces. The magnetic susceptibility showed a weak-temperature dependence and a small anisotropy, consistent with an itinerant character of the $5f$ electrons. We observed the antiferromagnetic ordering at 86K , 31K and 26K in $UTGa_5$(T : Ni , Pd and Pt), respectively. From the neutron scattering experiment, $UPdGa_5$ and $UPtGa_5$ are found to possess the same magnetic structure with $Q = [0 , 0 , 1]$, and magnetic moments of 0.33 μ_B/U and 0.24 μ_B/U, respectively [1,2]. On the other hand, $UNiGa_5$ has a magnetic moment of 0.90 μ_B/U with $Q = [1/2 , 1/2 , 1/2]$ [1].

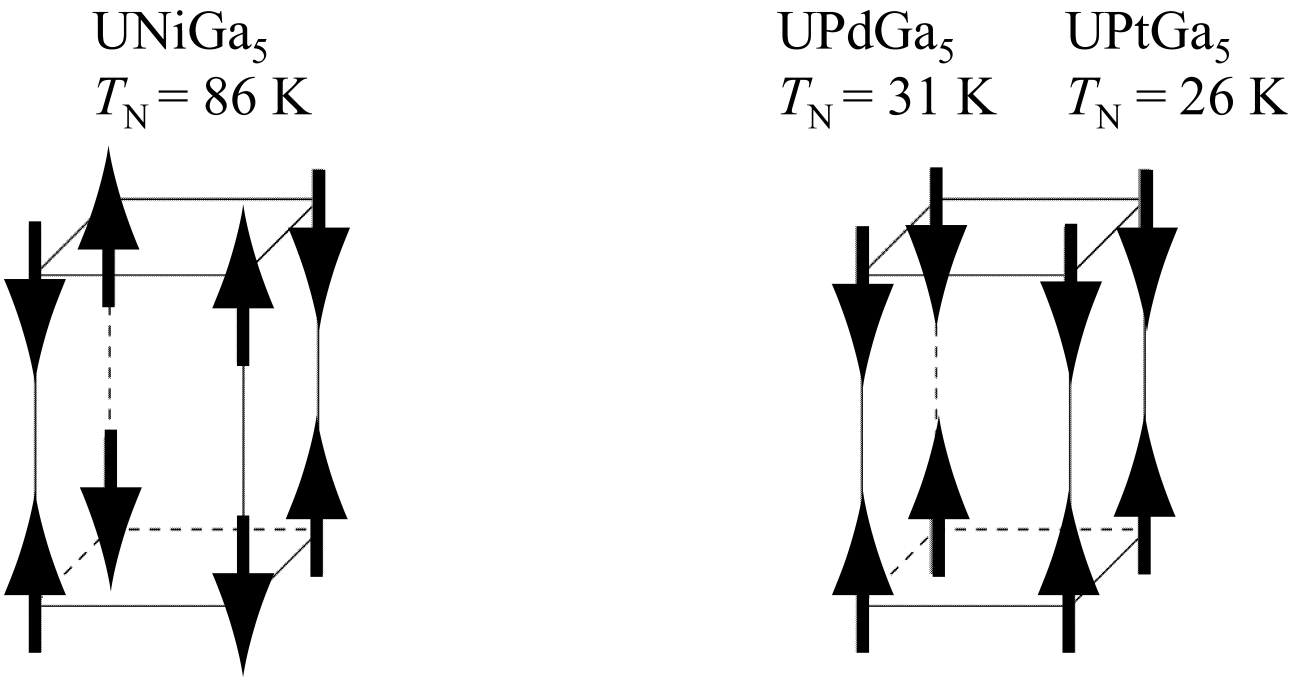

Figure 1: Magnetic structures in $UNiGa_5$, $UPdGa_5$ and $UPtGa_5$.

[1] Y. Tokiwa, Y. Haga, N. Metoki, Y. Ishii and Y. Ōnuki, J. Phys. Soc. Jpn. **71** (2002) 725.
[2] S. Ikeda, N. Metoki, Y. Haga, K. Kaneko, T D. Matsuda, A. Galatanu and Y. Ōnuki, J. Phys. Soc. Jpn. **72** (2003) 2622.