Magnetic structure of single-crystalline RRhGe (R=Tb, Dy) compounds

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RTX (R: rare earths, T: transition metals, X: metalloids) compounds crystallize in the e-TiNiSi-type orthorhombic structure. The magnetic property is characterized as follows:

1. successive magnetic transitions below Neel temperature.
2. multi-step metamagnetic transitions in the ordered state along the easy magnetization b-axis.
3. incommensurate magnetic structure.

Recently, it has been revealed that RRhGe (R=Tb and Dy) compounds also possess successive magnetic transitions below the Neel temperature from magnetic and specific heat measurements.

The purpose of this study is to determine the magnetic structures of magnetically ordered phases for RRhGe (R=Tb and Dy) compounds.

Single-crystalline samples were grown by a Czhoralski method using a tetra-arc furnace in purified Ar atmosphere. The magnetic and specific heat measurements were performed by a SQUID magnetometer and a PPMS. The neutron diffraction measurements were performed at T1-1:HQR spectrometer installed at JRR-3M, JAEA.

Figure 1(a) shows the magnetization of DyRhGe compound as a function of temperature. It is found that antiferromagnetic ordering takes place at 22 K. The powder neutron diffraction patterns of DyRhGe compound at 3 K and 30 K are displayed in Fig. 1(b). The magnetic reflections are clearly observed at 14.6 and 26.8 deg at 3 K. Detailed analysis of the magnetic structure is now in progress.

![Figure 1](image_url)

Fig. 1. Magnetization as a function of temperature (a) and powder neutron diffraction patterns at 3 K and 30 K (b) for DyRhGe compound.