Magnetic structure of RCoSn (R=Tb, Ho and Er)

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RTX (R: rare earths, T: transition metals, X: metalloids) compounds crystallize in the epsilon-TiNiSi-type orthorhombic structure. We have shown that the crystalline electric field effect plays an dominant role in their anisotropic magnetic behaivior. The temperature dependence of magnetic susceptibility is well explained by the systematic variation of CEF parameters in TbTX compounds, TbNiSn, TbPdSn and TbRhGe[1]. The easy axis of magnetization is the b-axis in these three compounds. Recently, we have found that it is the a-axis in the isostructural compound TbCoSn. The sign of second order CEF parameters of the compound have opposite sign to other TbTX. In the present report, we show preliminary experimental results of single crystal neutron diffraction on TbCoSn to examine its magnetic strucure.

Single-crystalline TbCoSn ingots were grown by a Czochralski method using a tetra-arc furnace in purified Ar atmosphere. The neutron diffraction measurements were performed at T1-1:HQR spectrometer installed at JRR-3M.

The SQUID magnetic susceptibility shows that antiferromagnetic ordering takes place at TN = 20.2 K. Below TN, an anomaly indicative of another magnetic transition is observed at 4 K for the three principal axes. The specific heat measurement also indicates the two magnetic phases.

The magnetic reflection is observed in the a*-b* reciprocal lattice plane below TN as shown in Fig.1. The magnetic structure appears to be represented by the wave vector (0 0.25 0). The analysis is in progress.

References

[1] Specific heat and high field magnetization of a TbPdSn single crystal, Yoshikazu Andoh, Do Thi Kim Anh, Hiroyuki Hoshino, Go Nakamoto, Makio Kurisu, and Shinji Kawano, Physica B, 373 (2006) 150-153.

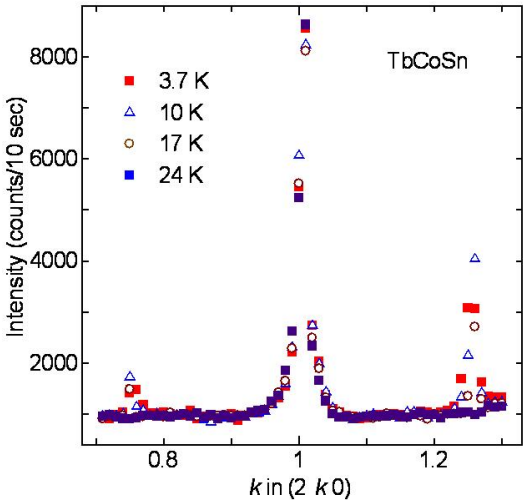

Fig. 1. Fig.1 Magnetic and nuclear reflections in a*-b* plane of TbCoSn.