

Electrical transport and magnetic properties of CoTiSb

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Heusler alloys have attracted renewed interest recently as promising smart materials, such as half metals, thermoelectric materials, and ferromagnetic shape memory alloys. Half metals are ferromagnets where the conduction electrons have 100 % spin polarization, and may play an important role in the new field of spintronics. Ishida et al.[1] have predicted that several Heusler and half-Heusler alloys are half metals. The structure of the half-Heusler alloys contains empty sites. This leads to a propensity to produce a gap in the energy bands. Therefore, half-Heusler compounds are often semiconductors and can be half-metals, and often exhibit peculiar properties.

CoTiSb is a half-Heusler alloy. It has been reported that CoTiSb is semiconducting with an almost temperature independent magnetic susceptibility. Considering that CoTiSn is known to be a ferromagnetic metal, CoTiSb is close to ferromagnetism. Therefore, it is interesting to investigate the transport and magnetic properties in this materials.

We have measured electrical resistivity of polycrystalline half-Heusler alloys, CoTiSb. The result is shown in figure 1. Our results of the temperature dependence of the electrical resistivity above 10 K are in agreement with the previous results [2]. The temperature dependence is not simple, but the behavior of the resistivity, on the whole, is semiconducting. However, we find a resistivity drop with decreasing temperature below 8 K. The decrease of the resistivity continues down to 2 K. The origin of the resistivity drop is unclear and more study is required.

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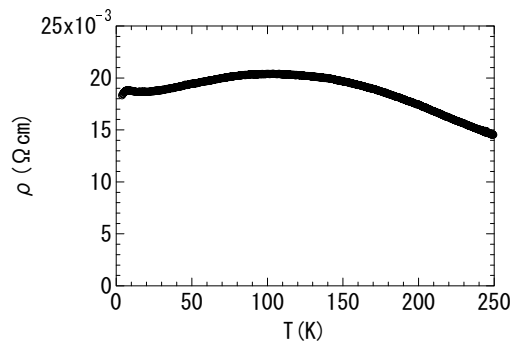


Figure 1: Electrical resistivity of CoTiSb.

[1] S. Ishida, T. Masaki, S. Fujii, S. Asano, *Physica B* **245** (1998) 1.

[2] Y. Xia, V. Ponnambalam, S. Bhattacharya, A. L. Pope, S. J. Poon, T. M. Tritt, *J. Phys.: Condens. Matter* **13** (2001) 77.