

## High-quality single crystal growth and the magnetism on $Ce_3Sn_7$

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The crystal structure of  $Ce_3Sn_7$  is orthorhombic but is close to tetragonal :  $a=4.524\text{\AA}$ ,  $b=25.742\text{\AA}$ ,  $c=4.610\text{\AA}$ , which is a superstructure based on the cubic  $AuCu_3$ -type  $CeSn_3$ .  $Ce_3Sn_7$  is an antiferromagnet with a Néel temperatures of 5.3K. Bonnet *et al.* reported that there are two kinds of Ce sites : magnetic and non-magnetic.<sup>1)</sup> Two Ce sites of three Ce sites in  $Ce_3Sn_7$  possess magnetic moments of  $0.36\mu_B/Ce$  oriented along the [001] direction (c-axis). A remaining Ce site does not have a magnetic moment as in  $CeSn_3$ .

In order to clarify the electronic state we have grown a single crystal and have measured the electrical resistivity, magnetic susceptibility, high-field magnetization, thermal expansion coefficient and de Haas-van Alphen effect, together with the resistivity under pressure.

The single crystal was grown by the Czochralski method. The residual resistivity ratio was about 240. Figure 1 shows the high-field magnetization in magnetic fields up to 50T, together with the previous data up to 18T.<sup>1)</sup> The present magnetization is well explained on the basis of the crystalline electric field (CEF)-scheme mentioned above.

With increasing pressure, the Néel temperatures of 5.3K increases, has a maximum at 1.2GPa, decreases with further increasing pressure and becomes zero about 3.1GPa.

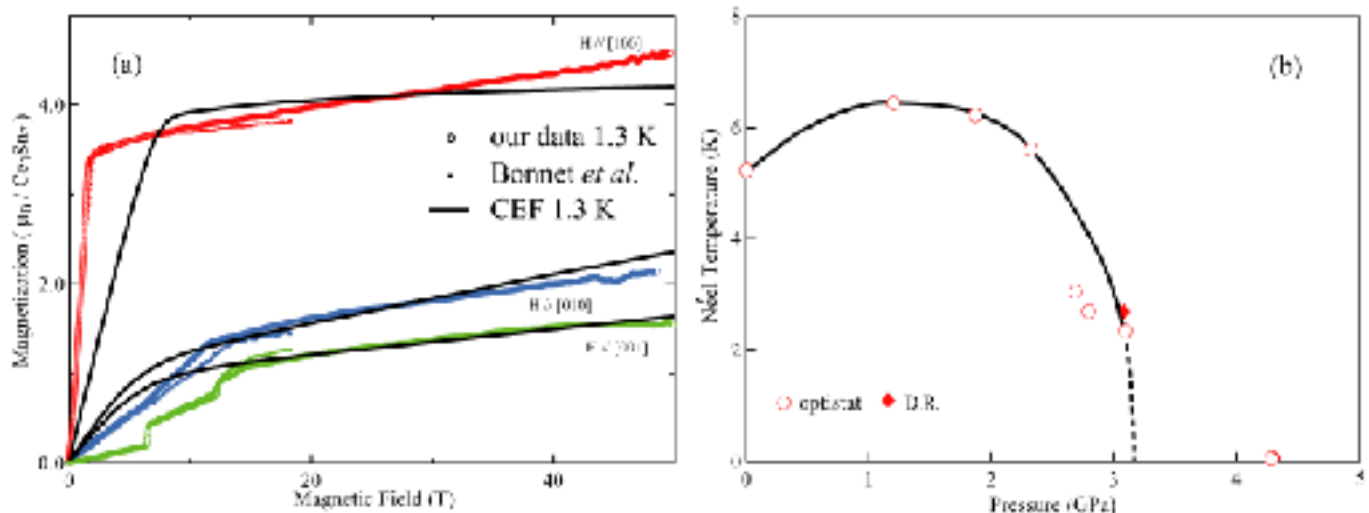


Figure 1: (a) Magnetization and (b) the relation between the Néel temperature and pressure in  $Ce_3Sn_7$

1) M.Bonnet *et al.*; J. Magn. Magn. Mater. **132** (1994) 289-302