Heat Capacity of Chiral and Racemic Molecule-Based Magnets

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In the field of molecule-based magnets, chiral magnets are of considerable interest from the standpoints of the magnetic, optical, and dielectric properties.

The crystal structures of newly synthesized anti-ferromagnet, $[W(CN)_8]_4[Cu(pn)H_2O]_4[Cu(pn)]_2 \cdot 2.5H_2O$(pn=1,2-diaminopropane), abbreviated as WCpn, are classified into two groups; one is the racemic compound (*rac*-WCpn), the other is a group of chiral compounds (*S*- and *R*-WCpn). According to the magnetic susceptibility measurements, the temperature of the anti-ferromagnetic phase transition, T_N, of *S*- and *R*-WCpn is higher than that of *rac*-WCpn [1]. In this symposium, we report the heat capacity of the presented compounds and discuss the difference between the chiral and racemic compounds.

Figure 1 shows C_p/T vs T curve for *S*-WCpn and *rac*-WCpn at 0T. *S*-WCpn exhibits a shoulder at 7.4 K along with a main peak at 7.8 K. The temperature of the main peak corresponds to the transition temperature determined by the magnetic susceptibility measurement, T_{NS}, and the main peak is also observed in *rac*–WCpn at $T_{N\,rac}$~7.2 K. On the other hand, a shoulder is absent in the racemic compound. The shoulder of *S*-WCpn depends on the magnitude and direction of the magnetic field. These observations indicate that this shoulder is ascribed to a kind of subsequent ordering characteristic of the chiral structure of the *S*-WCpn compound.

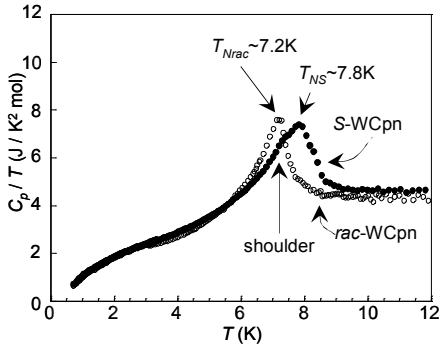

Figure 1
C_p/T vs T curve of *rac*-WCpn and *S*-WCpn.

[1] H. Higashikawa *et al.*, *Chem. Lett,* **36** (2007) 1022.