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Pressure-induced superconductivity in $CeNiGe_3$

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An antiferromagnetic compound $CeNiGe_3$ has Néel temperature of $T_N = 5.5$ K. As reported in ref.[1], T_N initially increases with pressure P up to about 3 GPa. Then it decreases with further increasing pressure and seems to become zero at a critical pressure $P_c \sim 6.0$ GPa. The steeply decrease of the resistivity was found below 0.48 K in a wide pressure region from 4 to 10 GPa, which is maybe superconducting transition. The failure in the observation of zero resistivity implies that applying pressure damages the sample.

We have measured the electrical resistivity of poly crystal $CeNiGe_3$ under high pressure and magnetic field. In this time, we changed a pressure-transmitting medium from NaCl to daphne oil (7373) to obtain further hydrostatic pressure. As a result, we succeeded in observing zero resistivity. We present the phase diagram of the superconducting phase under pressure in Fig. 1 and under magnetic field in Fig. 2. We observed zero resistivity in pressure region from 1.9 to 3.5 GPa and from 5.9 to 7.3 GPa. The coefficient A has a maximum around 7 GPa, which is a characteristic of magnetic critical point. T_c and H_{c2} have a maximum around $P_c \sim 7$ GPa. The large pressure dependence of H_{c2} is unusual.

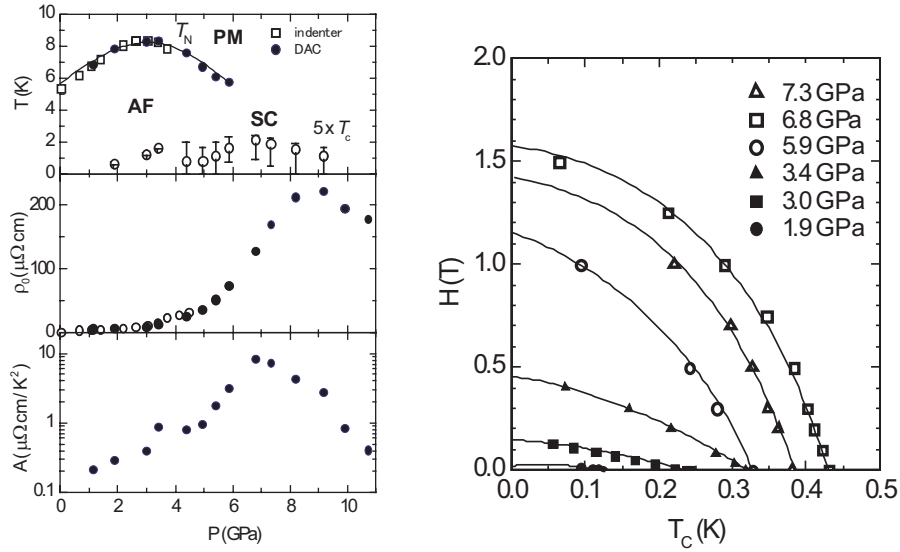

Figure 1: (left): $P - T$ phase diagram of $CeNiGe_3$. In the top figure, the bottom (top) of error bars indicate the offset (onset) temperature of supersonductivity, respectively. (right): P-dependence of H_{c2}.

[1] M. Nakashima *et al.,* J. Phys.: Condens. Matter **16** (2004) L255-L262.