

Multi-step magnetic phase transition in CeRh_3Si_2 studied by means of specific heat measurements

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High-quality single crystal of a novel cerium silicide CeRh_3Si_2 , crystallizing in the orthorhombic ErRh_3Si_2 -type structure, was grown by Czochralski pulling method in a tetra-arc furnace and studied by means of specific heat measurements. Previous detailed magnetic susceptibility and electrical resistivity measurements [1] have revealed that the compound exhibits strong easy-plane magnetocrystalline anisotropy, orders antiferromagnetically at $T_N = 4.5$ K and undergoes another phase transition at $T_t = 4.2$ K. As inferred from the temperature dependence of the specific heat of CeRh_3Si_2 , $C(T)$, the magnetic ordering is very sensitive to applied magnetic field – the phase transitions at T_N and T_t split into four separate anomalies, which independently shift to lower temperatures with rising field. Above 1 T these anomalies merge into a single peak in $C(T)$, and finally disappear in a field of 2 T. The multi-step character of the magnetic ordering in CeRh_3Si_2 is very similar to that reported recently for the isostructural compound CeIr_3Si_2 [2] and may possibly be interpreted in the framework of incommensurate exchange field approach developed for CeSb [3].

[1] D. Kaczorowski, T. Komatsubara, *Physica B* 403 (2008) 1362

[2] Y. Muro, Y. Ohno, T. Okada, K. Motoya, *J. Magn. Magn. Mater.* 310 (2007) 389

[3] M. Date, *J. Phys. Soc. Jpn.* 57 (1988) 3682

9.7 cm

13.4 cm

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