Magnetic-field-induced anisotropy of hybridization gap in $CeOs_4As_{12}$

T. Cichorek[a], L. Bochenek[a], R. Wawryk[a], Z. Henkie[a], R.E. Baumbach[b], M.B. Maple[b]

[a]Institute of Low Temperature and Structure Research, Polish Academy of Sciences, Wroclaw, Poland

[b]Department of Physics, University of California, San Diego, USA

9.7 cm

Previous measurements of electrical resistivity, magnetization, specific heat and thermoelectric power on high-quality single crystals of the filled skutterudite compound $CeOs_4As_{12}$ (bcc structure) revealed its semiconducting behavior that apparently originates from a hybridization between $4f$ and conduction electrons [1]. No substantial sample dependence accompanied by a lack of the low-lying phase transition allowed for detailed low-temperature ($T \gtrsim 0.07\,\mathrm{K}$) and high-magnetic field ($B \leq 14\,\mathrm{T}$) studies of a directional dependence of the electrical resistivity $\rho(T)$: At $T \lesssim 20\,\mathrm{K}$ and for $i \parallel B$, we found remarkable dissimilarities along the [001] and [111] directions, indicative of an anisotropic suppression of energy gap(s). Additionally, differences observed between the transverse and longitudinal magnetoresistivity cannot be ascribed to the Lorentz force and thus, provide a further evidence for magnetic-field-induced anisotropy of hybridization gap in $CeOs_4As_{12}$. Finally, we note a well-defined T^2 dependence of the resistivity below around $T = 1.3\,\mathrm{K}$ and in $B \geqslant 7\,\mathrm{T}$ that also highlights strongly correlated electron phenomena in $CeOs_4As_{12}$.

[1] R.E. Baumbach *et al*, PNAS 105, 17307 (2008).

13.4 cm

Subject category :

1. Strongly Correlated Electrons and High Temperature Superconductivity

Presentation mode :
oral

Corresponding author :
T. Cichorek

Address for correspondence :
Institute of Low Temperature and Structure Research
Polish Academy of Sciences
50-422 Wroclaw, Okolna 2, Poland

Email address :
T.Cichorek@int.pan.wroc.pl