Transport properties of the filled skutterudites $LnFe_4As_{12}$ (Ln = La, Ce, Pr)

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Electrical resistivity, thermoelectric power, and thermal conductivity are presented for single crystals of the arsenide filled skutterudites $LnFe_4As_{12}$ (where Ln = La, Ce, Pr). Whereas an itinerant-electron weak ferromagnetism below $T_C = 5.3$ K was recently reported for $LaFe_4As_{12}$ [1], a long-range ferromagnetic order ($T_C = 18$ K) exists in $PrFe_4As_{12}$. The latter leads to e.g., a sharp drop of the electrical resistivity and a slope change of the thermoelectric power. Furthermore, magnetization isoterms at $T = 2$ K revealed a change in the easy axis from [100] to [111] for $B > 0.5$ T. Additionally, Pr-based compound displays the dimensionless figure of merit equal to 0.015 at low temperatures. On the other hand, two different types of the low-temperature dependency of the electrical resistivity was found for $CeFe_4As_{12}$. This holds especially true for a pronounced negative coefficient of the resistivity for some of the single crystals investigated. Down to about 160 K, all the $CeFe_4As_{12}$ samples display virtually the same metallic character.

[1] S. Tatsuoka et al., J. Phys. Soc. of Japan, 77, No. 3 (2008) 033701.

9.7 cm

13.4 cm

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