Magnetoresistance of PrB_6 and GdB_6

M. Anisimov[a], A. Bogach[a], V. Glushkov[a], S. Demishev[a], N. Samarin[b], N. Shitsevalova[b], V. Filipov[b], A. Kuznetsov[c], and N. Sluchanko[a]

[a]A.M. Prokhorov General Physics Institute of RAS, 38 Vavilov street, Moscow 119991, Russia
[b]Institute for Problems of Material Science of NAS, 3 Krzhizhanovskii street, Kiev 03680, Ukraine
[c]Moscow Engineering Physics Institute, 31 Kashirskoe Shosse, Moscow 115409, Russia

The comprehensive study of transverse magnetoresistance (MR) has been carried out on the high quality single crystals of PrB_6 ($T_N \approx 6.7K$) and GdB_6 ($T_N \approx 15.5K$) in the wide range of temperatures 2-40K and magnetic fields up to 8T. The data obtained allow to establish the crossover of MR from negative ($T > T_N$) to positive ($T < T_N$) regime. The maximal value of positive MR does not exceed $\sim 151\%$ and $\sim 11.7\%$ for PrB_6 and GdB_6 respectively. The analysis of the curves $\Delta\rho(H)/\rho$ allows to separate three contributions to MR of RB_6 (R-Pr, Gd) [1]. In addition to the (i) negative contribution ($\sim H^2$) interpreted in the framework of Yosida model[2], (ii) a linear ($\sim H$) and (iii) nonlinear ferromagnetic components were also observed. According to the procedure of [3] where these contributions were naturally interpreted for $CeAl_2$ in terms of spin-polaron model, the (ii), (iii) components should be ascribed to the ferromagnetic nanodomains (spin-polarized 5d-states) embedded in the metallic matrix of RB_6 (R-Pr, Gd).

[1]M.A.Anisimov, A.V.Bogach, V.V.Glushkov et al., JETP **109**, 815 (2009).
[2]K. Yosida, Phys. Rev. **107**, 396 (1957).
[3]N.E. Sluchanko et al., JETP **98**, 793 (2004).