Transport Properties of the Iron-Oxypnictide Superconductor $PrFeAsO_{1-y}$ in High Magnetic Fields

T. Kida[a,d], M. Kotani[a], M. Ishikado[b,d], H. Eisaki[c,d], and M. Hagiwara[a,d]

[a]KYOKUGEN, Osaka University, 1-3 Machikaneyama, Toyonaka, Osaka 560-8531, Japan
[b]Japan Atomic Energy Agency, Ibaraki 319-1195, Japan
[c]AIST, Tsukuba, Ibaraki 305-8568, Japan
[d]JST-TRiP, Chiyoda-ku, Tokyo 102-0075, Japan

We report the resistively determined upper critical field H_{c2} of the iron-oxypnictide superconductor $PrFeAsO_{1-y}$ ($y \sim 0.15$), which exhibits superconductivity at $T_c = 44$ K.[1] The resistivity $\rho(H,T)$ was measured with a typical four-probe method in static magnetic fields of up to 14 T and in pulsed magnetic fields of up to 52 T. With increasing magnetic fields, the superconducting transition width of the $\rho(T)$ curve for $H \parallel c$ becomes broader than that for $H \parallel ab$. This behavior is likely to be due to dissipation associated with thermally activated vortex motion. The $H_{c2}(T)$ curves for both $H \parallel ab$ and $H \parallel c$ exhibit a pronounced upward curvature below T_c, and are very different from the conventional one-band Werthamer-Helfand-Hohenberg (WHH) behavior. This result suggests that the iron-oxypnictide superconductor is a multiband system, being consistent with band calculations and angle resolved photoemission spectroscopy (ARPES) results. We demonstrate the results of the two-band analysis for $H_{c2}(T)$ and discuss the anisotropy of H_{c2} on some kinds of iron-based superconductors.

[1]M. Ishikado, S. Shamoto, H. Kito, A. Iyo, H. Eisaki, T. Ito, and Y. Tomioka, Physica C **469**, 901 (2009).