Flux Pinning Property and Peak Effect in Y-123 Bulk Superconductor with Changed Oxygen Content

D. Yoshimi, M. Migita, E. S. Otabe, T. Matsushita
Kyushu Institute of Technology, 680–4 Kawazu, Iizuka 820–8502, Japan

Melt-processed Y-123 bulk superconductors have a broad peak in $J_c(B)$ at medium fields in the medium range of temperature. It has been revealed that oxygen deficient regions with lower T_c are relevant to the peak effect. To confirm the effect of the oxygen content for the peak effect, the specimen without addition of Pt and 211 phase particles, which showed a pronounced peak effect, was annealed at 550 °C for 100 h in a flowing oxygen atmosphere of 1 atm. A DC magnetization measurement was performed on this specimen at various temperatures using a SQUID magnetometer to estimate the critical current density for the specimen. The temperature range of the peak effect in the annealed specimen moved to 20-65 K, while that was 40 to 87 K before the annealing. At the same time the critical current density decreased especially at high fields with the reduction in the irreversibility field, and the peak effect became less pronounced. This variation is partly ascribed to the reduction in the critical temperature. These results are compared with the theoretical prediction of the flux creep-flow model.

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Mr. Daisuke Yoshimi
c/o Prof. Matsushita
Department of Computer Science and Electronics
Kyushu Institute of Technology
680–4 Kawazu, Iizuka 820–8502, Japan

tel&fax: +81-948-29-7683
e-mail:yoshimi@aquarius10.cse.kyutech.ac.jp