IMPACT OF RADIATION DEFECTS AND CHEMICAL SUBSTITUTIONS ON THE FLUX PINNING IN Hg-BASED SUPERCONDUCTING SINGLE CRYSTALS

A. Wiśniewski[a], R. Puźniak[a], R. Szymczak[a], J. Karpiński[b]

[a] Institute of Physics, Polish Academy of Sciences,
Al. Lotników 32/46, 02-668 Warsaw, POLAND

[b] Laboratorium für Festkörperphysik ETH, CH-8093 Zürich, SWITZERLAND

9.7 cm

We have compared and contrasted the vortex state properties of single crystals of $(Hg,M)Ba_2Ca_{n-1}Cu_nO_{2n+2+x}$ with n = 1 or 3, M = Pb or Re, and different oxygen content. Magnetization measurements were performed for magnetic field perpendicular to CuO_2 planes. The influence of extended neutron defects for vortex pinning also was determined. We found that flux pinning properties were essentially unchanged by partial replacement of Hg with Re or Pb. On the other hand, introduction of radiation defects changed significantly both irreversible and reversible properties of vortex state. The character of the irreversibility line (IL) changed, giving evidence that the system of "pancake vortices" became more three-dimensional. The significant reduction in the superconductive mass anisotropy parameter γ was observed after irradiation. It was found that the oxygen content is very relevant for flux pinning properties, affecting not only T_c but also anisotropy parameter γ. It was shown that the position of the IL depends very strongly on γ.

13.4 cm

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Corresponding author :
A. Wiśniewski

Address for correspondence :
Dr A. Wiśniewski
Instytut Fizyki PAN
Al. Lotników 32/46
02-668 Warszawa

Email address :
wisni@ifpan.edu.pl