Fluctuation-induced conductivity in melt-textured Pr-doped YBa$_2$Cu$_3$O$_7$-$\delta$ composite superconductor

In this study, the effects of thermal fluctuations on the electrical conductivity in melt-textured YBa$_2$Cu$_3$O$_7$-$\delta$, Y$_{0.95}$Pr$_{0.05}$Ba$_2$Cu$_3$O$_7$-$\delta$ and (Y$_{0.95}$Pr$_{0.05}$Ba$_2$Cu$_3$O$_7$-$\delta$)$_{0.95}$-(Pr$_{0.05}$Ba$_2$Cu$_3$O$_7$-$\delta$)$_{0.05}$ composite superconductor were considered. The composite superconductor samples were prepared through the top seeding method using melt-textured NdBa$_2$Cu$_3$O$_7$-$\delta$ seeds. The resistivity measurements were performed with a low-frequency, low-current AC technique in order to extract the temperature derivative and analyze the influence of the praseodymium ion on the normal superconductor transition and consequently on the fluctuation regimes. The results show that the resistive transition is a two-step process. In the normal phase, above the critical temperature, Gaussian and critical fluctuation regimes were identified, while below the critical temperature, in the regime near the approach to the zero-resistance state, the fluctuation conductivity diverges as expected in a paracoherent-coherent transition.

General information
Publication status: Published
Organisations: Department of Energy Conversion and Storage, Universidade Estadual de Ponta Grossa, Universidade Tecnologica Federal do Parana
Corresponding author: Monteiro, J. F. H. L.
Pages: 343-355
Publication date: 2018
Peer-reviewed: Yes

Publication information
Journal: Phase Transitions
Volume: 91
Issue number: 4
ISSN (Print): 0141-1594
Ratings:
BFI (2018): BFI-level 1
Scopus rating (2018): CiteScore 1 SJR 0.293 SNIP 0.598
Web of Science (2018): Impact factor 1.026
Web of Science (2018): Indexed yes
Original language: English
DOIs:
10.1080/01411594.2017.1402180
Source: FindIt
Source ID: 2396640643
Research output: Contribution to journal › Journal article – Annual report year: 2018 › Research › peer-review