

Abstract Submitted
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Current induced transport properties in bulk YBCO and BSCCO

GEORGE ZIMMERMAN, Boston University, Emeritus — Simultaneous measurement of the electrical resistivity magnetic susceptibility as a function of current density of YBCO and BSCCO superconducting material reveals a resistivity maximum which is also reflected in the susceptibility. In addition to anomalies which appear at temperatures between 85K and 140K, the susceptibility seems to be affected by the electrical current up 200K. The electrical current, of density between 8 and 400 A/cm² seems to induce a lowered resistivity, which suggests a first order phase transition, possibly meta-stable, and persists despite the repeated cycling between 77K and 300K. The YBCO samples are bulk polycrystalline sintered rods with a density of 5.4 gm/cm³. They were prepared by sintering and annealing from a powder. Most were 10 to 15 years old. The magnetic susceptibility shows a broad transition between 60K and 90K. The details of the measurements as a function of temperature, current density, and low magnetic field, and differences between YBCO and BSCCO will be described along with possible implications as to the nature of the pseudo-gap and other competing theories.

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