

Abstract Submitted
for the MAR08 Meeting of
The American Physical Society

Current induced properties in bulk YBCO above the transition temperature GEORGE ZIMMERMAN, Boston University, Emeritus — Simultaneous measurement of the electrical resistivity at high current densities and magnetic susceptibility of YBCO superconducting material reveals interesting behavior of the samples above the transition temperature. In addition to anomalies which appear at temperatures between 85K and 140K, the susceptibility seems to be affected by the electrical current up to 200K. The electrical current, of density between 8 and 400 A/cm² seems to induce the behavior, with a lowered resistivity, which suggests a first order phase transition, possibly meta-stable, and persists despite the repeated cycling between 77K and 300K. The samples of bulk polycrystalline cylindrical rods 1.22 mm diameter and between 6cm and 20 cm long have a density of 5.4 gm/cm³ and were prepared sintering and annealing from a YBCO powder. Most were 10 to 15 years old. At 77K most samples exhibit relaxation times of several minutes in their magnetic and resistive behavior. The details of the measurements as a function of temperature, current density, and low magnetic field, will be described along with possible implications as to the nature of the pseudo-gap and other competing theories.

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Date submitted: 26 Nov 2007

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