

The effect of sintering temperature variation on the superconducting properties of ErBa₂Cu₃O₇ superconductor prepared via coprecipitation method.

Abstract

The effect of heat treatment on the superconducting properties of ErBa₂Cu₃O_{7- δ} (ErBCO) ceramic materials has been studied. The nano-metal oxalate precursor was prepared using coprecipitation (COP) method. The prepared materials were subjected to calcination process at 900 °C for 12 h and then sintered under oxygen environment for 15 h at 920 °C, 930 °C, 940 °C, and 950 °C, respectively. All samples showed a metallic behavior and single-step transition in the R–T curves. The best zero critical current, $T_C(R=0)=91.4$ K, was for the sample sintered at 920 °C. XRD data showed single phase of an orthorhombic structure. As the sintering temperature increases, the formation of nonsuperconducting phases (impurities) was observed when the samples sintered above 920 °C. The formation of nano-oxalate powders via COP method is a very efficient procedure to produce high-quality superconductors with less processing temperature required.

Keyword: ErBa₂Cu₃O₇; Coprecipitation method; Metal oxalate precursor; Orthorhombic structure.