Synthesis of ErBa2Cu3O7-δ superconducting ceramic material via co precipitation and conventional solid state routes

ABSTRACT

High temperature superconductors (HTSC) of microcrystalline ceramic material ErBa2Cu3O7-ŭ (ErBCO) have been successfully synthesized via chemical co-precipitation (COP) using metal acetate precursors, and physical mixtures of oxides and carbonates, by conventional solid state route (SSR). The COP sample requires 27 hours for the heat treatment while the SSR sample needs 72 hours. We compare the superconducting properties of ErBCO produced from both methods. Resistivity versus temperature measurements (R-T) showed that all samples exhibit very good metallic behaviour. The transition temperature, TC(R=0) for the COP samples were was found to be at 91.4 K while it occurs at 90.9 K for the SSR sample sintered at 920°C. X-ray diffraction (XRD) data showed a single phase of an orthorhombic structure for all the samples. Scanning electron micrographs (SEM) showed grains of sizes Ò 40ε m were randomly distributed in all the highly compacted samples. However, the sample prepared via COP exhibited smaller pores in comparison to those in the SSR sample. COP method simplifies the preparation, and gives good quality sample with shorter time of preparation as compared to the quality of sample prepared by conventional solid state route.

Keyword: High temperature superconductors (HTSC); ErBa2Cu3O7-ŭ; Co-precipitation; Solid state route