

Fabrication of BSCCO Thick Film with Modified Ultrasonic Spray Pyrolysis (USP) Method and their Transport Properties

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Abstract

In this work “Modified Ultrasonic Spray Pyrolysis (MUSP)” method was used to prepare Bi-2223 polycrystalline films. Initially Bi-2223 powders were prepared by solid state reaction technique. After an appropriate heat treatment, powders were ball-milled to reduce the grain size to nano scale. Then powders were mixed with ethanol and atomized with 2.4 MHz ultrasonic nebulizer system. Two different single crystal substrates, MgO(100) and SrTiO₃(100), were used for fabrication of superconducting films. The films were then heat treated at air atmosphere up to 860⁰C with different durations and heating ramps. The structural, electrical and magnetic properties up to 9 T of the films having thicknesses between 800 nm to 1.2 µm were investigated. Nearly all of the films showed two step superconducting transition temperatures. The best films showed a T_c at 112 K and 92 K with a sharp drop to the zero resistance state at ~89 K. However the J_c results obtained showed very promising information for large scale applications.

Keywords: BSCCO film, Modified USP, Thick Film