CONTROL ID: 2098093
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Abstract Details

PRESENTATION TYPE: Invited Speaker
CURRENT SYMPOSIUM: VV. Science and Technology of Superconducting Materials
KEYWORDS: Composition & Microstructure/Material Type/oxide, Performance/Functionality/superconducting, Performance/Functionality/dopant.
Abstract

TITLE: Effect of O doping and cation composition on Jc in polycrystalline Bi-2212 conductors with various textures
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ABSTRACT BODY:
Abstract Body: Bi-2212 is the only HTS that despite of a very strong structural and electronic anisotropy can be fabricated in the form of almost isotropic practical conductors with rather high critical current densities Jc such as melt processed Bi-2212 round wires, one of the most promising candidates for high-field magnet applications, and melt cast processed Bi-2212 bulk, a very reliable material for applications in fault current limiters, current leads and magnetic shields. Though the materials aspects and physics of the critical currents in these conductors were extensively studied, basic understanding of how high supercurrents flow in the absence of long-range texture is still lacking. To address this connectivity issue, we studied the microstructure development, Tc and Jc dependence on the oxygen doping state in Bi-2212 bulk rods, flat tapes and round wires of variable cation composition $Bi2.00 +zSr2.85 – xCaxCu2.00O8 + d$ (nominal $z = 0, 0.08, 0.15$; $0.80 \leq x \leq 1.22$; $0.175 \leq d \leq 0.256$). We confirmed that changes in cation composition strongly affect the optimum oxygen doping state do (maximum Tc) that increases with increasing Ca contents. We also found that optimizing Jc needs a temperature dependent overdoping, and Jc is a rather strong function of d even at low temperatures, which suggests a significant effect of changes in condensation energy on the flux pinning. The consequences of these observations for optimized conductor processing and next experiments addressing the connectivity issue in polycrystalline Bi-2212 are discussed.
(no table selected)