

Effect of Ag₂O addition on the intergranular properties of the superconducting Bi-(Pb)-Sr-Ca-Cu-O system

ABSTRACT

The effect of Ag₂O addition on the Bi_{1.84}(Pb)_{0.34}Sr_{1.91}Ca_{2.03}Cu_{3.06}O₁₀ system has been investigated in terms of ac susceptibility, phase evolution, critical current density and critical temperature. It was found that as the amount of Ag₂O addition increases, the intergranular critical current density decreases in our samples (Bi_{1.84}Pb_{0.34}Sr_{1.91}Ca_{2.03}Cu_{3.06}O₁₀) fabricated by ammonium nitrate technique. The analysis for comparison is based on the suppression degree of the diamagnetic behaviour with respect to fields, rapid or slow shift of the summit in $J_c(T)$ to lower temperature with increasing field amplitude and the sharpness of the transition of $J_c(T)$ for intergranular component for the same field amplitude. We also qualitatively discuss experimental results in the framework of the critical state model. The room temperature XRD diagram indicates the presence of large amount of high-T_c (2223) phase. The percentage of Bi-2223 phase in the phase mixture was estimated from the intensities of high-T_c (2223) and low-T_c (2212) phase peaks as 78% for the pure BSCCO sample. Among the Ag₂O-added BSCCO samples studied, the one in which 5 wt% Ag₂O was added shows the highest rate of Bi-2223 formation as 92%. The SEM analysis reveals some morphological changes induced by silver addition.

Keyword: Ag₂O; Bi-(Pb)-Sr-Ca-Cu-O system; Intergranular critical current density