Magnetic and structure properties of Cd doping Bi-2223 superconductor

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Abstract
In this paper, Bi$_{1.64-x}$Pb$_{0.36}$Cd$_x$Sr$_2$Ca$_2$Cu$_3$O$_y$ (BPCSCCO) superconductor with $x = 0.0, 0.02, 0.04$ and $0.06$ is made by the solid state reaction method. The magnetic susceptibility measurements were performed using AC susceptometer. The microstructure and morphology of the samples have been studied by X-ray diffraction, scanning electron microscope and energy dispersive X-ray. The results show that the partial substitution of Pb for Bi in the Bi-based superconductor increases the volume fraction of Bi-2223 phase. We also found that by doping of Cd, the high $T_c$ phase is promoted and stabilized in the Bi-Pb-Sr-Ca-Cu-O system. The results of the X-Ray diffraction patterns and magnetic susceptibility measurements show that the low amount of Cd and long annealing time enhance the fraction of Bi-2223 phase. The maximum value volume fraction of Bi-2223 phase for sample with annealing time of $270$ hours and $0.04$ of Cd doping is obtained.

Keywords: magnetic susceptibility, Bi-based superconductor, doping, cadmium

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