

The effect of silver doping on the properties of $\text{Bi}_{1.6}\text{Pb}_{0.4}\text{Sr}_2\text{Ca}_2\text{Cu}_3\text{O}_8$ superconductor

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Abstract: In this research, the effect of silver doping on 2223 phase of ceramic superconductor $\text{Bi}_{1.6}\text{Pb}_{0.4}\text{Sr}_2\text{Ca}_2\text{Cu}_3\text{O}_8$ (BSCCO) has been investigated. To synthesis the samples, we used solid-state reaction method and two different doping methods, namely, doping samples during making processes (batches No.1) and doping samples after making superconductor (batch No.2). With doping Ag to BSCCO, the critical temperature T_c (mid) increases (batch No.1) and also the resistance of the normal state for all samples decreases. For batch No.1 samples, the J_c decreases from pure sample with increasing of Ag doping up to 2% but it increases to maximum value by increasing Ag doping in 5 and 15 percent. The J_c in batch No.2 decreases from pure sample to 5% Ag of doped samples and then increases by increasing Ag doping up to 20% and finally decreases to 60%. The SEM images of samples have shown that all surfaces are porous and the grains are platelike. The EDX analysis confirms that the primary elements in our samples are Bi, Pb, Sr, Ca, Cu, and Ag. The XRD patterns indicated that the silver peaks form separate phase. Also by adding Ag to BSCCO, the BSCCO peaks slightly shifted. Therefore, the lattice parameters slightly change, but the structure of samples has been left orthorhombic.

Keywords: Ceramic Superconductor, $\text{Bi}_{1.6}\text{Pb}_{0.4}\text{Sr}_2\text{Ca}_2\text{Cu}_3\text{O}_8$, Silver doping, Microstructure, J_c , T_c , SEM, XRD