

## **Superconducting properties of bulk $\text{Bi}_{1.6}\text{Pb}_{0.4}\text{Sr}_2\text{Ca}_{2-x}\text{Cd}_x\text{Cu}_3\text{O}_{10}$ system prepared via conventional solid state and coprecipitation methods**

### **ABSTRACT**

The effect of Cd doping on the superconducting properties of BSCCO system with nominal starting compositions of  $\text{Bi}_{1.6}\text{Pb}_{0.4}\text{Sr}_2\text{Ca}_{2-x}\text{Cd}_x\text{Cu}_3\text{O}_{10}$  ( $x = 0.00\text{--}0.10$ ) was studied. The preparation methods used to prepare the samples are the conventional solid-state oxide powder (SSR) and the coprecipitation (COP) techniques. Resistivity versus temperature measurements ( $R\text{--}T$ ) showed that all doped samples exhibited metallic behaviour. For the SSR samples, existence of a two step feature was observed at  $x = 0.07$  indicating the presence a lower temperature 2212 phase together with the higher temperature 2223 phase. This behaviour resulted in the shifting of the  $\text{TC}(R=0)$  towards lower temperature. However, the COP samples showed better superconducting properties probably due to higher homogeneity resulted from mixing of sub-micron particles during sintering. The  $R\text{--}T$  curve did not display any two step features due to the single phase nature of the samples. This is confirmed by the XRD data where Bi-2212 phase was minor. In addition, small amount of doping ( $x = 0.02$  in COP and SSR samples) enhanced the phase formation and  $\text{TC}(R=0)$ .

**Keyword:** Superconductor, Cd substitution, Phase formation