

E 1 - 02

Preparation and characterization of Bi-based superconductors and attainment of low temperature as low as 55K using liquid nitrogen

Three Bismuth based superconducting samples with the composition $\text{Bi}_{0.7} \text{Pb}_{0.3} \text{SrCaCu}_{1.5} \text{O}_y$ were prepared using different solid state reaction techniques.

The Bi_2O_3 , PbO , SrCo_3 , CaCo_3 and CuO powders of 99% purity were used as starting raw materials. The powders were mixed with the nominal cation ratio Bi: Pb: Sr: Ca: Cu = 0.7: 0.3: 1: 1: 1.5 and then mixed well using dry grinding, wet grinding ball milling methods. The powders were calcined at 820°C and pellets of diameter 13 mm and thickness 1-2 mm were prepared from the calcined powder under 300 Kg cm^{-2} pressure. The samples were then sintered at different appropriate temperatures.

The resistance measurements at low temperatures were performed on three samples using resistivity probe. The samples prepared by dry grinding, wet grinding and wets ball milling methods have shown the superconducting transition Temperatures T_c at 112 K, 115 K and 110 K respectively. T_{c0} of three samples were found to be 70 K, 80 K and 68 K respectively. For further characterization XRD analysis were also performed on these tree samples.

In this work, we developed a technique and successfully achieved temperature as low as 55 K while the resistivity probe was in liquid nitrogen.