

PREPARATION OF $(\text{Bi}_{0.8}\text{Pb}_{0.2})_2\text{Sr}_2\text{Ca}_2\text{Cu}_3\text{O}_y$ SUPERCONDUCTORS AND DETERMINATION OF SOME PHYSICAL PROPERTIES AT ROOM TEMPERATURE.

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A RESEARCH REPORT SUBMITTED FOR PARTIAL FULFILLMENT
OF THE SPECIAL DEGREE COURSE

IN

PHYSICS

FACULTY OF SCIENCE

EASTERN UNIVERSITY, SHRI LANKA.

501/40537623
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SEPTEMBER 1999.

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DATE *10.09.1999*

ABSTRACT

More and more ceramic materials have been recently found to be superconducting at higher and higher transition temperatures. Ceramic superconductors are widely used in the research because of their higher critical temperature and low cryogenic experimental cost.

Bi-based superconductor is one of the main ceramic stable superconductors which has higher transition temperature and is widely used in investigation of physical properties.

This project is focussed on preparation of $(\text{Bi}_{1.6}, \text{Pb}_{0.4})\text{Sr}_2\text{Ca}_2\text{Cu}_3\text{O}_Y$ superconductor and determination of some physical properties. Bi-based superconducting samples with composition $(\text{Bi}_{1.6}, \text{Pb}_{0.4})\text{Sr}_2\text{Ca}_2\text{Cu}_3\text{O}_Y$ were prepared by Solid State Reaction technique. A pelletizer was designed and constructed using locally available materials to make superconducting sample in pellets form.

An apparatus based on Forbes method was designed and constructed for the measurement of thermal conductivity of the sample. The thermal conductivity obtained for glass and rubber are within the agreeable limits. The thermal conductivity of the Bi-sample was found to be $0.157324 \text{ Wm}^{-1} \text{ }^\circ\text{C}^{-1}$.

An experiment with calorimeter was designed to measure the specific heat of the sample. The specific heat values obtained for aluminium and brass are within the agreeable limits. The specific heat of the Bi-sample was found to be $444.379 \text{ JKg}^{-1} \text{ }^\circ\text{C}^{-1}$.

A locally made apparatus based on Guoy's method was used for the measurement of magnetic susceptibility of sample. Magnetic susceptibility of the sample was found to be $1.3284657 * 10^{-3}$ and the sample was identified as paramagnetic.

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