

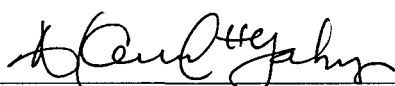
**EFFECTS OF Mg SUBSTITUTION AT Sr SITE ON
SUPERCONDUCTIVITY OF
 $\text{Tl}_{0.5}\text{Pb}_{0.5}\text{Sr}_{2-x}\text{Mg}_x\text{Ca}_{0.8}\text{Yb}_{0.2}\text{Cu}_2\text{O}_{7-\delta}$ (x=0.0-1.0)
CERAMICS**

SUHADIR BIN SHAMSUDDIN

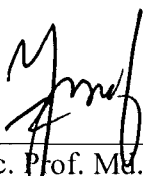
**Final Year Project Report Submitted in
Partial Fulfillment of the Requirements for the
Degree of Bachelor of Science (Hons.) Physics
in the Faculty of Applied Sciences
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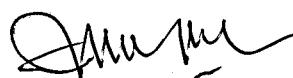
This Final Year Project Report entitled “Effects of Mg substitution at Sr site on superconductivity of $Tl_{0.5}Pb_{0.5}Sr_{2-x}Mg_xCa_{0.8}Yb_{0.2}O_{7-\delta}$ ($x=0.0-1.0$) ceramics” was submitted by Suhadir Shamsuddin, in partial fulfillment of the requirements for the Degree of Bachelor of Science (Hons.) Physics, in the Faculty of Applied Science, and was approved by



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ABSTRACT

EFFECTS OF Mg SUBSTITUTION AT Sr SITE ON SUPERCONDUCTIVITY OF $\text{Tl}_{0.5}\text{Pb}_{0.5}\text{Sr}_{2-x}\text{Mg}_x\text{Ca}_{0.8}\text{Yb}_{0.2}\text{Cu}_2\text{O}_{7-\delta}$ ($x=0.0-1.0$) CERAMICS

In this project, Mg substituted Tl1212 type phase high temperature superconductor with nominal starting compositions of $\text{Tl}_{0.5}\text{Pb}_{0.5}\text{Sr}_{2-x}\text{Mg}_x\text{Ca}_{0.8}\text{Yb}_{0.2}\text{Cu}_2\text{O}_{7-\delta}$ ($x=0.0-1.0$) were synthesized using conventional solid-state synthesis method. Power X-ray diffraction (XRD) patterns showed all samples consist of major 1212 phase and minor 1201 phase. Temperature-dependent resistance measurement on ($x=0.0$) showed metallic normal state behavior. Substitution of Mg caused deterioration of superconductivity and gradual change of normal state resistance from semi-metallic behavior ($x=0.2-0.8$) to semiconductor-like behavior ($x=1.0$). The ($x=1.0$) sample was non-superconducting. The best superconducting behavior of the series was observed for $\text{Tl}_{0.5}\text{Pb}_{0.5}\text{Sr}_2\text{Ca}_{0.8}\text{Yb}_{0.2}\text{Cu}_2\text{O}_7$ with $T_{c \text{ zero}}$ and $T_{c \text{ onset}}$ are 92K and 103K respectively. Results of critical temperature (T_c) measurements, microstructure investigation using scanning electron microscope (SEM) and power X-ray diffraction (XRD) analysis are presented. The effects of Mg substitution are discussed in terms of lattice parameter which is decrease on both a -lattice and c -lattice parameter and the concepts of an average Cu valence as well as the changing in normal state behavior.