

**EFFECT OF SINTERING TEMPERATURE ON
 $Tl_{0.85}Cr_{0.15}Sr_2CaCu_2O_{7-8}$ SUPERCONDUCTOR SYNTHESIZED
BY CO-PRECIPITATION METHOD.**

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ABSTRACT

EFFECT OF SINTERING TEMPERATURE ON $Tl_{0.85}Cr_{0.15}Sr_2CaCu_2O_{7.8}$ SUPERCONDUCTOR SYNTHESIZED BY CO-PRECIPIATION METHOD.

The $Tl_{0.85}Cr_{0.15}Sr_2CaCu_2O_{7.8}$ superconductor was able synthesized from Tl-free precursor using co-precipitation method. The metal oxalates powders strontium (Sr), calcium (Ca) and copper (Cu) were calcined at 850°C for 20 hours after precipitation method was done. Then, Tl_2O_3 and Cr_2O_3 were added to precursor to form a sample. The samples were sintering at 960°C , 980°C and 1000°C for 4 minutes in flowing oxygen. Next, the sample was characterized to determine the critical temperature and microstructure of the samples. The zero-resistance temperature, T_c -zero for sample sintered at 960°C, 980°C and 1000°C for 4 minutes were 88.8K, 90.8K and 92.0K . The grain size , grain connectivity and microstructure change with the increasing temperature. The average grain size at 960°C was 0.55 μm , at 980°C was 0.79 μm and at 1000°C was 1.55 μm .Based on this study, it show that when the temperature increased, the critical temperature (T_c) and the grain size of all samples also increased linearly follow the increased of the sintering temperature. We can conclude that the sample with higher sintering temperature show better grain connection which leads to better electrical properties.

CHAPTER 1

1.1 INTRODUCTION

Superconductors, materials that have no resistance to the flow of electricity, are one of the last great frontiers of scientific discovery. The first study described superconductor was done by Kemeligh Onnes in 1911, who noted that the resistance of a frozen mercury rod abruptly dropped to zero when cooled to the boiling point of helium (4.2 Kelvin). A microscopic theory for conventional superconductivity was proposed in 1957 by Bardeen, Cooper and Schrieffer and is known as BCS theory. The theory followed studies by Cooper of the "Cooper pair" where it was found that under certain conditions the ground state of energy of a pair of electrons is lower than that of the two free electrons. The central result of the BCS theory is this energy gap of which the critical temperature, the thermal properties and the magnetic properties are a consequence. (Richarson,KA.1996). The theory accounts well for the equilibrium properties of conventional or low T_c superconductors and thus values for T_c , B_c , the specific heat and the penetration depth can be accurately derived. The recent study of the system for Tl-1212 are YBCO and MgO. The Tl-1212 phase showed a low critical temperature, T_c around 70 K and increased up to 110 K when Cr was added on the Tl site (Imad Hamadneh *et al.* 2005) . Thallium is a metal obtained as a by-product in the production of sulfuric acid by roasting of pyrite, and also in the smelting of lead and