# THE EFFECT OF DIFFERENT MOLARITY ON CUO THIN FILMS USING SOL GEL DIP COATING METHOD

**This thesis is presented in partial fulfillment for the award of Bachelor of Engineering (Hons.) Electronics**

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# ACKNOWLEDGEMENT

Foremost, I would like to acknowledge the project supervisor, Ir Dr Hashimah Hashim for the continuous support of my study and research, for her patience, motivation, enthusiasm, and immense knowledge. Her guidance helped me in all the time of research and writing of this thesis. I could not have imagined having a better advisor.

I would like to thank to the supportive and helpful colleagues Nasiha Sakinah Anuar and Fatimah Zulkifli for their encouragement. Besides that, thank you to the staff and members of NANO-Electronic Centre (NET), Faculty of Electrical Engineering and Nano-Scietech Centre (NST) for technical support throughout the research.

I take this opportunity to express my sincere thanks to all my friends for their kindness and moral support during my study and research.

Last but not least, my deepest appreciation to my beloved parents and also to my family for their encouragement and support to me in completing this project.

And my gratitude to one and all who, directly or indirectly have lent their helping hand in this research.

# ABSTRACT

The thesis is about the effect of different molarity on copper (II) oxide (CuO) thin films using sol-gel dip-coating technique. The CuO thin films were deposited on glass substrate by sol-gel process dip-coating method. The objective of the research was to investigate the effect of the different molar concentration on the surface of morphology and electrical optical properties of the thin films. The molar concentration of CuO thin films used for this experiment was 0.3M, 0.35M, 0.4M, 0.45M and 0.5M. These concentrations were prepared using sol-gel method where the solutions were formed by dissolving the copper (II) acetate powder in the solution, the mixture of isopropyl, diethanolamine (MEA) and polyethyleneglycol (PEG). The samples were dried for five minutes at 250°C and annealed in furnace for one hour at 450°C. Field Emission Scanning Electron Microscopy (FESEM) was used to characterize the surface morphology of the samples. The films surfaces of the samples were smooth and the grains were evenly distributed. The measurement of the average grain size of the samples were taken from the FESEM images and tabulated. UV-Vis spectrometer was used to obtain the measurement of transmittance and the absorption of the samples. The transmittance and absorbance were measured within the wavelength range of 300nm to 800nm. From the obtained measurement, the graph of both parameters were plotted. From the graph, the absorption is decreases as the molarity is increased. The transmittances of the samples were increased as the concentration of the solution increase. The solar simulator was used to measure the electrical properties. The current and voltage were directly proportional to each other. The resistivity and conductivity were calculated using formula using the I-V measurement from the solar simulator. The graphs of both resistivity and conductivity were plotted against the molar concentarion. As the molar concentration increases, the resistivity was decreases. The conductivity was opposed the resistivity which it is increases as the molar concentration increased. The different molar concentration is one of the factors that should be taken in order to make good devices.

# TABLE OF CONTENT

# CHAPTER 1

# INTRODUCTION

## 1.1 INTRODUCTION

This thesis consists of six chapters which are introduction, literature review, methodology, result and discussion, conclusion and future recommendation.

Chapter one is about the summarization of the whole thesis. It consists of background of study, problem statement, objectives of this study and scope of work. The background of study is about the discussion on the effect of different molar concentration on CuO thin films in term of structural, optical and electrical properties. Next, problem statement, objectives and scope of work is determined by the background of study.

Chapter two present the literature review of overall discussion on CuO thin films, sol-gel technique, dip-coating method and molar concentration.

Chapter three is the methodology of this thesis. It describes on the experimental method and procedure to ensure the overall process flow is cleared and comprehended by the reader about the experiment is conducted.

Chapter four discusses on the result findings of the experiment on the characterization on the CuO thin films with different molar concentration. The theory and formula of the experiment are related with the findings in form of images, graph and table to yield the experiment successfully.

Conclusion is on chapter five which has a brief description on the experiment findings and short discussion on the effect of different molarity on structural, optical and electrical properties and its relationship related with the relevant past research.