DOPING CHARACTRISTICS OF ZINC OXIDE THIN FILMS DEPOSITED BY THERMAL CHEMICAL VAPOUR DEPOSITION

Thesis is presented in partial fulfilment for the award of the Bachelor of Electrical Engineering (Hons)

UNIVERSITI TEKNOLOGI MARA

NOR SYAZWANI ROSLEY

Faculty of Electrical Engineering

UNIVERSITI TEKNOLOGI MARA

40450 SHAH ALAM

SELANGOR, MALAYSIA

ACKNOWLEDGEMENT

First and foremost, I would like to state my greatest gratitude to ALLAH S.W.T for giving me this opportunity to complete my research and thesis.

I would like to express my deep and sincere gratitude to my supervisor, Mrs. Rosmalini Ab. Kadir, my co-supervisor Associate Prof. Dr. Mohamad Rusop Mahmud. Their wide knowledge and logical way of thinking have been of great value for me. Their understanding, encouragement and personal guidance have provided a good basis for the present thesis.

I wish to express my warm and sincere thanks to PHD and Master Students especially Mrs. Salina Mohamad and Mr. Mohamad Hafiz Mamat for their sharing of knowledge and information. I gratefully acknowledge NANO-SciTech Centre and Solar Cell Laboratory technicians, Mr. Azlan and Mr. Suhaimi for their assistance in the lab.

Special thanks to Miss Nur Amalina, Mr. Saifuddin, Miss Fazlinashatul, Mr. Zulhelmi, and my laboratory colleagues for their help, motivation, kindness, and support during my studies. Finally, I would like to express my deepest thank to my beloved family for their love and endless support.

ABSTRACT

Nitrogen (N)-doped Zinc Oxide (ZnO) films were deposited on glass substrate by thermal chemical vapour deposition (CVD) process. Nitrogen gas with different flow rate was used as a dopant source. The effects of varying the carrier gas flow rate to the Zinc Oxide thin film electrical properties were investigated. In this experiment, it is found that NST N-doped ZnO thin film with 60 bubbles/min of nitrogen gas flow rate has optimum electrical properties with high conductivity. The types of metal contact used were gold-gold (Au-Au), gold-platinum (Au-Pt), gold-palladium (Au-Pd). Au-Au contact with lowest resistivity obtained was observed as the best metal contact.

TABLE OF CONTENTS

CHAPTER 1

INTRODUCTION

1.1 PROJECT OVERVIEW

Over the past decades, the semiconductor materials are widely used in the production of electronic devices. Semiconductor technology refers to the development and innovation of the applications of the semiconductor in various applications, such as blue and ultraviolet (UV) light emitters, solar cell window, photovoltaic device, gas sensor, and surface acoustic wave device. Most commonly semiconductor used are silicon and germanium. The domination of silicon (Si) in semiconductor industry is due to its maturity of its fabrication technology. However, Si preparation is not easy and very costly. Thus, research has been made to find alternative materials that are more suitable for device applications. Moreover, the indirect band gap properties of Si limited its usage to optoelectronic devices [1].

The need for new materials for electronic devices applications has led to the research in wide band gap semiconductor. The wide band gap semiconductor becomes a very promising material due to its inherent properties such as larger band gap, higher breakdown voltage, and higher electron mobility