

**EFFECT OF HUMIDITY ON ELECTRICAL PROPERTIES OF
NANOSTRUCTURED ZINC OXIDE THIN FILMS**

This thesis is presented in partial fulfillment for the award of the
Bachelor of Electrical (Hons.)Engineering
UNIVERSITI TEKNOLOGI MARA



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NOVEMBER 2009

ACKNOWLEDGEMENTS

I would like to thank my project supervisor Dr Zulfakri Mohamad and his wife, co-supervisor Assoc. Prof. Dr. Mohamad Rusop for their guidance and valuable time throughout the process of this final year project. My greatest gratitude also for master and PHD students, En. Musa, En. Hafiz and En. Zainizan for their advice and idea to complete this project and also to En. Shuhaimi and En. Azlan, the lab technician for their technical support. Not forgotten, a special thanks to my family for their moral support and “doa”. Most special thanks to all my friends for their time and support, especially to Raja Umi Kalsom Binti Raja Mohd Radzi and Chempaka Binti Mohd Din, who are always helpful and not lacking of ideas in making this project works.

ABSTRACT

This paper focuses on the effect of humidity on electrical properties of nanostructured Zinc Oxide thin film prepared by using sol-gel method by changing the concentrations of the solution. Molarities of 0.002, 0.004 and 0.006 mol of Zinc Acetate solution was observed. The surfaces and electrical properties of the ZnO were characterized using Scanning Electron Microscopy (SEM), and I-V measurement respectively. Results from SEMs indicate that ZnO nanorods are formed with average size between 364nm to 75nm with different molarities. Results from the I-V measurements indicate that 0.004M concentration is the suitable solution for humidity sensor applications since the ability of the ZnO nanorods to adsorb of the moisture molecules by the nanostructured ZnO at the surface of the samples.

Keywords: Nanostructure, Zinc Oxide Thin Film, Sol-gel method, Humidity Sensor, I-V measurement.

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CHAPTER ONE

INTRODUCTION

1.1 PROBLEM STATEMENT

The most important specifications to keep in mind when selecting a humidity sensor are high sensitivity, accuracy, resistance to chemical and physical contaminants, reproducibility, low operation temperature, low cost and long-term stability. So far, there is no material that can fulfill all those requirements. Zinc Oxide semiconductor is one of the materials that very sensitive to many sorts of gases and humidity. The gas sensing involves the absorption of oxygen on the oxide surface. Therefore, ZnO is the most favorable materials for humidity sensor. It was found that the resistances of the films decrease with increasing relative humidity. At room temperature, resistance change of more than four and two orders of magnitude were observed when ZnO nanobelt and nanorod devices were exposed respectively to a moisture pulse of 97% relative humidity^[1]. Therefore, in order to obtain the most sensitive humidity sensor, the resistance of nanostructured ZnO thin films is needed to investigate. In this study, the ZnO thin films are deposited onto glass substrate using Zinc Acetate dehydrate, 2-Methoxyethanol as solvent and monoethanolmine (MEA) as a stabilizer. Scanning Electron Microscopy (SEM) is used to characterize the structural properties of ZnO structure. I-V probe is used to characterize electrical properties and the effect of the different in molarities of the solution is investigated.

1.2 OBJECTIVES

1. To prepare the nanostructured Zinc Oxide using sol gel methods
2. To investigate the effect of humidity on electrical properties of nanostructured Zinc Oxide thin films by using I-V measurement
3. To obtained the sensitive humidity sensor