STUDY THE EFFECT OF DEPOSITION PARAMETER ON THE PREPARATION OF ZnO THIN FILMS BY USING DIP-COATING TECHNIQUE

NOR ZAITY BINTI ZAKARIA

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Assoc. Prof. Dr. Saifollah Bin Abdullah
Supervisor
Faculty of Applied Science
Unversiti Teknologi MARA
40450 Shah Alam
Selangor

Assoc. Prof. Dr. Mohammad Rusop Bin Mahmood
Co-Supervisor
Institute of Science
Unversiti Teknologi MARA
40450 Shah Alam
Selangor

PM. Md. Yusof Tweeran
Project Coordinator
Faculty of Applied Sciences
Unversiti Teknologi MARA
40450 Shah Alam
Selangor

Dr. Muhd Zu Azhan Bin Yahya
Head of Programme
B. Sc. (Hons.) Physics
Faculty of Applied Sciences
Unversiti Teknologi MARA
40450 Shah Alam
Selangor

Date: 28/4/08

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ABSTRACT

STUDY THE EFFECT OF DEPOSITION PARAMETER ON THE PREPARATION OF ZnO THIN FILMS BY USING DIP-COATING TECHNIQUE

Zinc oxide (ZnO) thin films has attracted many research on it due to it interesting properties such as higher exciton binding energy (60 meV) and also it's potential application in electronic devices, optoelectronic devices, solar cells, cosmetics and so on. In this research, the objectives of this experiment are to determine the parameter on the preparation of ZnO thin films, to produce ZnO thin films by using dip-coating technique and also to determine the structural and the optical properties of ZnO thin films. To produce ZnO thin films, the silicon substrate was used to deposit ZnO thin film and was immersed in the sol-gel solution for 30 seconds. The speed of the dip coater was varied. Then the samples were heat at 180°C for 15 minutes. And then the samples were annealed at 600°C for 1 hour. After that, the ZnO thin film was characterized using Photoluminescence Spectrometer, and Scanning Electron Spectrometer. The photoluminescence result show the ultra-violet(UV) emission at 380nm which is near band edge emission peak and the green -yellow emission band which is at 450nm-500nm. The scanning electron microscope shows the distribution of grains and also the size of the particle. The sample at withdrawal speed at 300mm/min shows the most uniform distribution of grains.

CHAPTER 1

INTRODUCTION

1.1 Background

ZnO is a II-VI semiconductor with direct band gap (3.37 eV at room temperature) and it has higher excitonic binding energy (60 meV) which is much larger than other semiconductor materials such as GaN (26meV) and ZnSe (22 meV) that is suitable for applications in low- voltage and short wavelength optoelectronic devices. ZnO film has been investigated in recent years as transparent conducting oxide (TCO) (Zhong , (2004) , A.Umar (2006), O.A. Fouad(2005))

Thin films are thin material layers ranging from fractions of a nanometer to several micrometers in thickness. The main applications that have benefit from thin film construction are electronic semiconductor devices and optical coatings. One of the use of thin film is thin film has been used as computer memory. Ceramic thin films are also in wide use. The advantage of ceramic materials such as high hardness and inertness make this thin coating useful for protection of substrate of materials against corrosion, oxidation and wear. (Wikipedia)

Due to it special properties; electrical and optical, ZnO thin films has been investigated as the functional materials for some electronic and optoelectronic devices. ZnO thin films can