THE EFFECT OF DEPOSITION TIME ON THE STRUCTURAL PROPERTIES OF ZnO NANORODS PREPARED BY SOL-GEL IMMERSION METHOD

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Final Year Project Report Submitted in
Partial Fulfillment of the Requirements for the
Degree of Bachelor of Science (Hons.) Physics
in the Faculty of Applied Sciences
Universiti Teknologi MARA

MAY 2009

ACKNOWLEDGEMENTS

First of all, thank to Allah S.W.T the Beneficent, The Merciful, who gives me a lot of patience, strength and enough time to accomplish this thesis.

In particular, to my supervisor Prof. Dr. Saifollah Abdullah and my co-supervisor Assoc. Prof. Dr. Mohamad Rusop Mahmood and my senior, PhD student, Puan Zuraida Khusaimi thanks for your guide, advice and patience throughout this research.

Besides that, I would like to thank all my family members, lecturers, friends and all postgraduate students on their support, guidance and understanding during the completion of this thesis.

Thank you also to Mr. Azlan Jaafar, Mr. Mohd. Suhaimi Ahmad, Ms. Nur Edayu Mohd. Arshad, and Mr. Hayub for technical assistance during this research.

Finally, thanks to all of you because with the support, guide and advice this thesis successful completed on the time

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ABSTRACT

THE EFFECT OF DEPOSITION TIME ON THE STRUCTURAL PROPERTIES OF ZnO NANORODS PREPARED BY SOL-GEL IMMERSION METHOD

ZnO nanorods were successfully grown on Au coated Si substrate and Si bare substrate. The growth was using sol-gel immersion method at different deposition time which is 2, 4, 6, 8, 10 and 12 hours. In the presence of Au, growth rate of nanorods is much faster as it performs as a catalyst by decreasing the growth time of ZnO nanorods to half compared to growth on Si substrate without Au coated. Using Scanning Electron Microscope (SEM), changes in growth of nanorods at different deposition time was captured and the structural properties were discussed. Besides that, the optical property was also studied using photoluminescence spectrometer (PL) and had been discussed.

CHAPTER 1

INTRODUCTION

1.1 Background

Nanotechnology is a field of applied science and technology which the purpose is to control matter on the atomic and molecular scale, normally 100 nanometers or smaller, and the production of devices or materials that lie within that size range [1]. Although nanotechnology is a new thing in science research, the development of its central concepts happened over a longer period of time [2]. It comes from many knowledge branches such as applied physics, materials science, interface and colloid science, device physics, supramolecular chemistry (which refers to the area of chemistry that focuses on the non-covalent bonding interactions of molecules), self-replicating machines and robotics, chemical engineering, mechanical engineering, biological engineering, and electrical engineering[1].

In nanotechnology, nanorods are one of the morphology of nanoscale objects. At least one its dimension ranges from 1–100 nm. They may be synthesized from metals or semiconducting materials. Standard aspect ratios (length divided by width) are 3 - 5. Nanorods are produced by direct chemical synthesis [3].

There are many applications of nanorods, starting from display technologies (the reflectivity of the rods can be changed by changing their orientation with an applied