

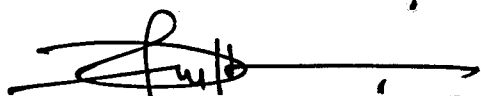
**THE STUDY OF BLUE LIGHT EMISSION FROM ZINC OXIDE (ZnO)  
NANORODS**

**NUR AIN BT AMRAN**

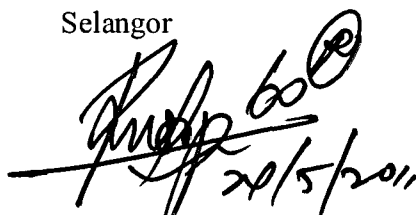
**Final Year Project Report Submitted in  
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This Final Year Project Report entitled “**The Study Of Blue Light Emission From Zinc Oxide (ZnO) Nanorods**” was submitted by Nur Ain Bt Amran, in partial fulfillment of the requirements for the Degree of Bachelor of Science (Hons.) Physics in the Faculty of Applied Sciences, and was approved by

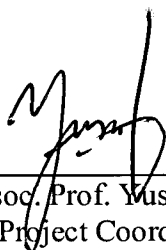


Prof. Dr. Saifollah bin Abdullah  
Supervisor  
~~B.Sc. (Hons.) Physics~~  
Faculty of Applied Sciences  
Universiti Teknologi MARA  
40450 Shah Alam  
Selangor

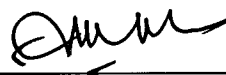


20/5/2011

Assoc. Prof. Dr. Mohamad Rusop bin Mahmood  
Co-supervisor  
~~B.Sc. (Hons.) Physics~~  
Faculty of Applied Sciences  
Universiti Teknologi MARA  
40450 Shah Alam  
Selangor



Assoc. Prof. Yusof bin Theeran  
Project Coordinator  
B.Sc.(Hons.) Physics  
Faculty of Applied Sciences  
University Teknologi MARA  
40450 Shah Alam  
Selangor



Dr. Ab. Malik Marwan Ali  
Head of Programme  
B.Sc.(Hons.) Physics  
Faculty of Applied Sciences  
University Teknologi MARA  
40450 Shah Alam  
Selangor

Date: 25 MAY 2011

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NUR AIN BT AMRAN

## TABLE OF CONTENTS

|  | page |
|--|------|
| ACKNOWLEDGEMENTS                                       | i    |
| TABLE OF CONTENTS                                      | ii   |
| LIST OF TABLE  | iii  |
| LIST OF FIGURES  | iv   |
| LIST OF ABBREVIATIONS                                  | vii  |
| ABSTRACT   | viii |
| ABSTRAK  | ix   |
| <br>   |      |
| CHAPTER 1 INTRODUCTION                                 |      |
| 1.1 Background of study                                | 1    |
| 1.2 Problem statement                                  | 5    |
| 1.3 Objective  | 5    |
| Significant of project                                 | 6    |
| <br>   |      |
| CHAPTER 2 LITERATURE REVIEW                            |      |
| 2.1 Zinc oxide (ZnO) nanostructures                    | 7    |
| 2.1.1 Zinc oxide nanostructure properties              | 7    |
| 2.1.2 Type of zinc oxide nanostructure                 | 7    |
| 2.1.3 Synthesis of zinc oxide nanorods                 | 8    |
| 2.1.4 Characterization of zinc oxide nanorods          | 11   |
| 2.2 Porous silicon substrate                           | 13   |
| 2.2.1 Structure properties of porous silicon substrate | 13   |
| 2.2.2 Synthesis of porous silicon substrate            | 14   |
| 2.3 Blue luminescence                                  | 15   |
| 2.3.1 Photoluminescence                                | 15   |
| 2.3.2 Blue luminescence                                | 15   |
| <br>   |      |
| CHAPTER 3 METHODOLOGY                                  |      |
| 3.1 Method   | 16   |
| 3.2 Materials and equipment                            | 17   |
| 3.3 Preparation of porous silicon                      | 17   |
| 3.3 Preparation of zinc oxide nanorods                 | 19   |
| 3.4 Characterization of zinc oxide nanorods            | 25   |
| <br>   |      |
| CHAPTER 4 RESULT AND DISCUSSION                        |      |
| 4.1 Result and discussion                              | 22   |
| 4.1.1 Photoluminescence spectrometer                   | 23   |
| 4.1.2 X-Ray Diffraction                                | 35   |
| 4.1.3 Scanning electron micrometer(SEM)                | 36   |

## ABSTRACT

### THE STUDY OF BLUE LIGHT EMISSION FROM ZINC OXIDE (ZnO) NANORODS

Zinc oxide nanorods is prepared by sol gel immersed method. The solid Zinc Hexahydrate  $[\text{Zn}(\text{NO}_3)_2 \cdot 6\text{H}_2\text{O}]$  and Hexamethylenetetramine(HMT)  $[\text{C}_6\text{H}_{12}\text{N}_4]$  were used as precursor and a stabilizer. The solid Zinc Hexahydrate  $[\text{Zn}(\text{NO}_3)_2 \cdot 6\text{H}_2\text{O}]$  and Hexamethylenetetramine(HMT)  $[\text{C}_6\text{H}_{12}\text{N}_4]$  were dissolved in the ionized water and mixed .In this process, the ratio of  $[\text{Zn}(\text{NO}_3)_2 \cdot 6\text{H}_2\text{O}]$  and HMT is 1:1 for example Zinc Hexahydrate solution (0.05M) and Hexamethylenetetramine solution (0.05M). The concentration of  $[\text{Zn}(\text{NO}_3)_2 \cdot 6\text{H}_2\text{O}]$  and HMT varying at 0.05M, 0.10M, 0.15M and 0.20M. Porous silicon (Psi) also was used as the substrate to growth the zinc oxide nanorods. The p-type Si(100) were used for the Psi formation. The electrolyte contains HF and ethanol with volume mixing ratio of 1:1. The current density is  $20 \text{ mA/cm}^2$  and etching time was 20 min. After etching, the samples were cleared by using dionized water and keep it in the oven to dry. Then, the Psi was immersed in the solution mention above to growth the zinc oxide nanorods in the water bath. Subsequently, the sample were taken out and put in the oven with temperature of  $150^\circ\text{C}$  for 1 hour, then the sample were annealed at  $600^\circ\text{C}$  in the furnace. Then, the samples were characterized by using photoluminescence spectrometer, scanning electron microscope (SEM) and X-Ray Diffraction. The SEM images showed that nanorods crystalnality increases with a higher concentration of zinc nitrate ( $\text{Zn}^{2+}$ ). From the XRD result analysis, the  $2\theta$  scan scan shows three dominant peaks at 31.820, 34.467 and 36.191 corresponding to ZnO (100),(002) and (101) planes and it also shows that ZnO is monocrystalline and possesses wurtzite hexagonal structure. Photoluminescence measurements showed that ZnO nanorods at difference temperature exhibit a strong ultra-violet (UV) at the orange light region and shifted to the red light region. At difference temperature, the peak intensity will decrease with increasing the temperature and for the peak wavelength, it will increase ith increasing the temperature.