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

NUR AIN BT AMRAN

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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

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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 [$Zn(NO_3)_2 \cdot 6H_2O$] and Hexamethylenetetramine(HMT) [$C_6H_{12}N_4$] were used as precursor and a stabilizer. The solid Zinc Hexahydrate [$Zn(NO_3)_2 \cdot 6H_2O$] and Hexamethylenetetramine(HMT) [$C_6H_{12}N_4$] were dissolved in the ionized water and mixed .In this process, the ratio of [$Zn(NO_3)_2 \cdot 6H_2O$] and HMT is 1:1 for example Zinc Hexahydrate solution (0.05M) and Hexamethylenetetramine solution (0.05M). The concentration of [$Zn(NO_3)_2 \cdot 6H_2O$] 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 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°C for 1 hour, then the sample were annealed at 600°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 cyrstalnality increases with a higher concentration of zinc nitrate (Zn^{2+}). From the XRD result analysis, the 2θ 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 monocystalline 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.