CURRENT VOLTAGE MEASUREMENT OF NANOSTRUCTURED ZINC OXIDE IMMERSE AT DIFFERENT TIME FOR HUMIDITY SENSOR APPLICATIONS

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ABSTRACT

This paper focus on current-voltage (IV) measurement of nanostructured Zinc Oxide (ZnO) immersed at different time for humidity sensor application. ZnO thin films were prepared using sol-gel method and deposited by spin coating technique. Different immerse times have been optimized to study the effects on the structural properties of nanostructured ZnO. Immerse time at 1 hour, 6 hour, 16 hour and 24 hour was observed. The surface, structural morphology, optical and electrical properties of the thin film were characterized using Scanning Electron Microscopy (SEM), X-ray diffractometer (XRD), UV-Vis spectroscopy and I-V measurement respectively. Results from SEM indicate that different immerse times would result different nanostructured ZnO surface morphologies. The XRD spectra indicate different growth orientation with high crystallinity of nanostructured ZnO. UV-VIS spectra indicate that immerse at different time affect the absorption and transmitting of light. I-V characterization shows the films, exhibit ohmic contact and the resistivity decreased when the relative humidity increased. The result indicates that nanocrystalline of ZnO can be obtained at immerse time between 6 hours until 16 hours. The results suggest that surface morphology, porosity, and electrical properties of Zinc Oxide could be affected by varying immerse time for humidity sensor.

Keyword: I-V characterization, Zinc Oxide (ZnO), Nanostructured, Humidity Sensor

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CHAPTER 1

INTRODUCTION

1.1 Overview of Zinc Oxide

Zinc oxide chemical compound, ZnO, that is nearly insoluble in water but soluble in acids or alkalies. It occurs as white hexagonal, wurtzite type crystals having 6mm of symmetry or a white powder commonly known as zinc white. Zinc oxide occurs in nature as the mineral zincite. Crystalline zinc oxide exhibits the piezoelectric effect and is thermochromic, changing from white to yellow when heated. Zinc white is used as a pigment in paints; less opaque than lithopone, it remains white when exposed to hydrogen sulfide or ultraviolet light. It is also used as filler for rubber goods and in coatings for paper. ZnO has versatile properties in optoelectronic devices, sensors, lasers, transducer and photovoltaic devices. Zinc Oxide also known as calamine zincum oxydatum is a high efficient photoluminescence material due to its large exciton binding energy which means bright light emission characteristic for ultraviolet (UV) light emitters, gas sensors, transparent electronics and surface acoustic wave device application [1].

Figure 1: Zinc Oxide

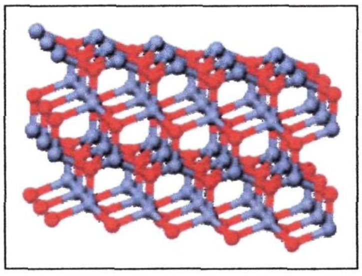

Figure 2: Structure of Zinc Oxide