THE SENSITIVITY PROPERTIES OF ZNO/SNO_2 FOR THIN FILM HUMIDITY SENSORS

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ABSTRACT

A humidity sensor is produced by deposited two layers of thin films on glass substrate. The bottom layer was Zinc Oxide (ZnO) and the top layer was Tin Oxide (SnO_2) using a Physical Vapor Deposition (PVD) and Thermal Chemical Vapor Deposition (TCVD) process respectively. The properties of nanostructure ZnO/SnO_2 thin film for humidity sensors are presented. The humidity sensor thin film will absorbs the humidity in the air and causing current flow through it. In this project, has been focused on the electrical and structural properties of ZnO/SnO_2 thin film. The effects of variation of temperature from 400^oC until 550^oC on the ZnO/SnO_2 thin film properties have been investigated. This project involves 3 processes which are thin film preparation, deposition and characterization. The thin films were characterized using Current-Voltage (I-V) Measurement for electrical properties. The surface morphology has been characterized by Field Emission Scanning Electron Microscope (FESEM). The result of I-V measurement showed that electrical properties of ZnO/SnO_2 optimum at temperature of 400^oC. The FESEM characterization on the thin film shows that the nanoparticles size of ZnO/SnO_2 increasing as the temperature increase.

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CHAPTER 1

1.0 INTRODUCTION

1.1 PROJECT OVERVIEWS

Sensor is the device that measures a physical quantity and converts it into a signal which can be read by a person using an instrument. Sensor that has a great variety of types nowadays is established in process industries, agriculture, medicine etc, [1,2,3] still the development of sensing materials with high sensing capabilities are proceeding at an extraordinary rate.

Humidity can be described as the amount of water vapor consists in the air. There are many devices that can be used in order to measure humidity in the air. The device that can be used to measure the humidity is called psychrometer and hygrometer. So, humidity sensor is a device that consisting of special material that's its characteristics will change due to the amount of humidity in the air. Humidity sensing in the air become significant nowadays because it helps people to maintain the humidity in the air. Plus, it also and can be used as a device that can flow a current through it due to relative humidity. Humidity sensors had been studied continuously and use intensively. There are some examples of application that had applied humidity sensor on their system. Some of them are air conditioning, agriculture, chemical and food industry, civil engineering and electronic processing. There are three main operating principles of humidity sensors which are capacitive, resistive, and thermal conductive. But in this project, the operating principle of resistive had been studied. How much is the sensitivity of the sample in this project was depended on the resistance of each samples. For the past 10 years scientist