FABRICATION OF UV PHOTOCONDUCTIVE SENSOR USING ALUMINIUM DOPED ZNO NANOROD ARRAYS ANNEAL IN DIFFERENT ENVIRONMENT

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ABSTRACT

Aluminium doped Zinc Oxide (ZnO) nanorod arrays anneal in different environment and different oxygen flow rate were fabricated of Al doped ZnO nanorod arrays prepared using sonicated sol-gel immersion. The FESEM are used to measure the substrate of the optical properties which surface morphology and thickness which has been seen that the thickness nearly to 600 nm and the diameter on the top surface of the nanorod is around 40 to 60 nm. The optical transmittance and absorbance was measure using UV-vis-NIR. Nanohole occur during the air annealed much more than oxygen annealed and vacuum annealed. The characteristic of the Al doped ZnO nanorod arrays seem give good performance according to the sensitivity under UV photoconductive sensor. These experiment are study that the oxygen occur through the increasing the flow rate compare to the other environment such as air and vacuum which annealed in oxygen give more sensitivity of the fabricated substrate due to expose of light from the UV photoconductive sensor.

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CHAPTER 1

INTRODUCTION

1.1   BACKGROUND OF STUDY

Nowadays, metal oxide semiconductor already used in many application including solar cells [1], gas sensor [2], light-emitting diodes [3]. Zinc oxide (ZnO) is one of the metal oxide semiconductor area studies due to the chemical and physical properties which ZnO have wide band-gap energy of 3.3 eV and a large exciton binding energy of 60 meV at room temperature. Beside, ZnO also has many advantages such as cheaper, easy to fabricated, alternatively potential of emerging other than GaN in optoelectronic applications [4].

ZnO nanorod arrays based ultra-violet (UV) photoconductive sensor is seen interesting due to physical and chemical properties that had been told early and nanorod arrays itself have a potential photodetectors infrastructure because nanoscale feature of arrays and nanorod surface area that asymmetric response to an incident light of UV photoconductive sensor that could be improve the sensor performance. There are some of techniques can be used to prepared ZnO nanorod arrays such as chemical vapor deposition (CVD) [5], metalorganic chemical vapor deposition (MOCVD) [6], pulsed laser deposition (PLD) [7] and sol-gel [8]. Sol-gel has define as the preparation process material due to condensation and polymerization which this technique has some