DEPOSITION OF ZINC OXIDE ON N-TYPE SILICON WAFER

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ABSTRACT

DEPOSITION OF ZINC OXIDE ON N-TYPE SILICON WAFER

ZnO was produced by using sol-gel spin coating methods. Zn sol was prepared by dissolved Zn $(NO_3)_2$ in absolute C_2H_5OH. Then, the mixture was stirred until form homogeneous solution. There are several processes needed in substrate preparation. The wafer was cleaned by immersed it into BOE to remove any contaminants on the surface. Then, Al was deposited into the surface by using PVD as an electrical contact. Next, wax was used and applies it at all edge of the wafer as a shielding during coated Zn sol on the wafer by using spin coating. After that, sample was annealed at different temperature which is 280 °C, 290 °C and 300 °C. The surface morphology, chemical composition and electrical junction ZnO thin film grown was characterized by using SEM, EDX analysis and I-V characteristic. From the SEM analysis, the ZnO thin film was formed smooth surface at temperature 280 °C. At this temperature, EDX analysis was showed that it was detected only ZnO layer, therefore ZnO thin film at this time is thicker compared to other annealing temperature and no impurities appear. However, ZnO thin film grown at 290 °C and 300 °C produced very thin layer because electromagnetic radiation can penetrate until to the Si surface. From the I-V characterization, all ZnO thin film performed as a diode since it is as I-V characteristics of P-N junction diode.

CHAPTER 1

INTRODUCTION

1.1 Background

Semiconductors are materials with electrical conductivity between good conductors and good insulators. Nowadays, many researcher study the semiconductors compound in variety of fields and they are interesting in classification of semiconductors in II-VI compounds semiconductors because their application in opto-electronics. In this project, I used Zinc Nitride to produce Zn precursor using sol-gel method. Then, ZnO form after annealing process by coating the Zn precursor into the N-type silicon wafer. ZnO is called an II-VI semiconductor because Zn and O_2 to be found at the 2^{nd} and 6^{th} groups of the periodic table and it is one of the hardest materials in II and IV compound semiconductors and have a variety of properties which make the ZnO known as accepted compound in researches. The ZnO properties such as wide band gap (3.37 eV), large exciton binding energy (60 meV) and have a large melting point of 1975 °C. Besides, ZnO also known as N-type wide band gap but now, many researchers was investigate and make an experiment to produce ZnO in P-type, but the development to produced it still few. According to Davood Raoufi & Taha Raoufi, ZnO