THE ELECTRCAL CHARACTERISTICS OF P-N JUNCTION FABRICATED ON P-TYPE SILICON WAFER BY USING SOLID DOPANT

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TABLE OF CONTENTS

ABSTRACT

THE ELECTRCAL CHARACTERISTICS OF P-N JUNCTION FABRICATED ON P-TYPE SILICON WAFER BY USING SOLID DOPANT

This project was carried out to investigate the electrical characteristic of P-N junction fabricated on p-type Silicon wafer by using solid dopant. During this project, one can be familiar with the material such as solid dopant and the measurement equipment that been used. Thus this knowledge can be applied for further carrier in industry. This project was chosen in order to optimize the temperature to obtain a better technique of fabricated the P-N junction. Here, a solid n-type dopant will be used such as phosphorus to be doped into the p-type Silicon wafer. By adding the dopant into Silicon wafer, the sheet resistance can be altered and these values can be measured by the four point probe. During diffusion, two different variables were observed. The first variables involve changing the time variation with constant temperature and the second variables was changing the temperature and variation with constant time. It can be concluded that the diodes has been successfully fabricated on this project and sample 6 is the better one. The optimized P-N junction is when undergo diffusion at 1050^0C at time 60 minutes. The control on temperature and time on diffusion process was very important in order to ensure the p-n junction was fabricated with good electrical characteristic.

CHAPTER 1

INTRODUCTION

1.1 Background of the Study

Semiconductor was the material with electrical conductivity between good conductor and good insulator. The most important about the properties of semiconductor was its conductivity can be controlled by a process of adding impurities that called as doping.

1.1.1 Energy Band

All material formed by the atoms and every atoms has their orbit structure. The electron that orbits of the atom were called shells and the outermost shell was called as valence shell. Electron at the valence shell cannot conduct the electric current. When an electron escapes from the nucleus and leaves the valance shell, it will become the free electron and can conduct the electric current. Thus, when many atoms that bond together to make solid materials, their orbit will overlap and this will form energy bands. The electrons at the conducting band can move freely inside the solid material so it can conduct