COMPARISON OF SINGLE STEP ANNEALING, DOUBLE STEP ANNEALING AND MULTISTEP ANNEALING FOR OXIDE GROWTH ON SILICON BY USING DRY OXIDATION TECHNIQUES

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ABSTRACT

The oxide layer grown on silicon, or silicon dioxide (SiO_2), was important and played a crucial role in the development of semiconductor fabrication. Thermal oxidation was a method to produce a layer of oxide (usually SiO_2) on the surface of a wafer. This technique forced an oxidizing agent to diffuse into the wafer at high temperature and react with it. The rate of oxide growth can be predicted by the Deal-Grove Model. In this project, the dry thermal oxidation process was studied as the technique of diffusing the oxidizing agent. The thickness of SiO_2 layer can grow by using single step oxidation, double step oxidation and multiple step oxidation method. Flimetrics is used to measure the thickness silicon dioxide layer that grown.

CHAPTER 1

INTRODUCTION

1.1 Background

Silicon was an element with properties of both metals and non-metals (metalloid). It is located in group 4 at the periodic table shown in Figure 1.1. Silicon dioxide (SiO_2) was one of the most commonly encountered substances in both daily life and in electronics manufacturing. Crystalline silicon dioxide in several forms: quartz, cristobalite, tridymite was an important constituent of a great many minerals and gemstones, both in pure form and mixed with related oxides. Beach sand was mostly SiO_2. The fabrication of SiO_2 into glass usually by the addition of natron sodium oxide, the whole of planar electronics processing and the modern IC industry has been made possible by the unique properties of SiO_2. The only native oxide of a common semiconductor which was stable in water and at elevated temperatures act as an excellent electrical insulator, a mask to common diffusing species, and capable of forming a nearly perfect electrical interface with its substrate.