EFFECTS OF ANNEALING TEMPERATURE AND TIME ON THE P-TYPE SILICON WAFER WITH BORON & PHOSPHORUS DOPANTS

NURUL NADIA BINTI CHE MANAF
(2007288868)

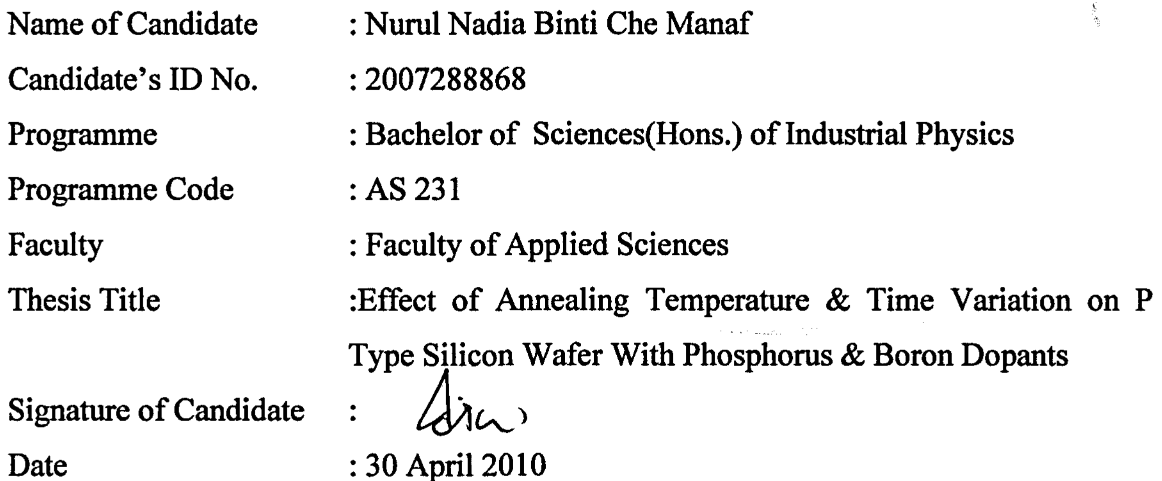
BACHELOR OF SCIENCE (HONS) INDUSTRIAL PHYSICS
FACULTY OF APPLIED SCIENCES
UNIVERSITI TEKNOLOGI MARA

MAY 2010

Candidate's Declaration

I declare that the work in this thesis was carried in accordance with the regulations of MARA University of Technology. It is the original result of my own work except those cited in references. This thesis has not been submitted to any other academic institution for any other degree or qualification.

In the event that my thesis be found to violate the conditions mentioned above, I voluntarily waive the right of conferment of my degree and agree be subjected to the disciplinary rules and regulations of the MARA University of Technology (UiTM).



Name of Candidate : Nurul Nadia Binti Che Manaf
Candidate's ID No. : 2007288868
Programme : Bachelor of Sciences(Hons.) of Industrial Physics
Programme Code : AS 231
Faculty : Faculty of Applied Sciences
Thesis Title :Effect of Annealing Temperature & Time Variation on P Type Silicon Wafer With Phosphorus & Boron Dopants
Signature of Candidate :
Date : 30 April 2010

ACKNOWLEDGEMENTS

In the name of Allah, Most Gracious, Most Merciful. Praise is to Allah, the Cherisher and Sustainer of the worlds. First of all is thank you to Allah that has given me the strength and knowledge in completing this final year project. Not to forget my dedicated Research's Supervisor En. Azlan Bin Zakaria for all his greatest supervision, guidance, and patience in helping me making this study a success. Besides that, I also want to thanks all hardworking and friendly assistant laboratory of Semiconductor Lab for their vital technical support in this project. In addition, I also would like to say thank you to all my friends that help me through the research officially or not. Moreover, thank you to my parents and family that have support me for all this time. May Allah bless all of us.

Thank you for your kindness.
Nurul Nadia Binti Che Manaf

ABSTRACT

This project is study on annealing of temperature and time variation on P type silicon wafer by using dopants of Phosphorus and Boron. The properties that being analyses are sheet resistivity and conductivity of sample after diffusion process. Conductivity is a property which describes the ability of a material to conduct current while sheet resistivity is a measure of resistance of thin film that has a uniform thickness. It is commonly used to characterize materials made by semiconductor doping, and is one of the most important properties to determine the conductivity. This project study is about the effect of sample after added dopant onto the P type wafer. Dopants type that used in this project is dopant of P type and N type which are Phosphorus and Boron. The dopant being added onto desired wafer surface by using spin on dopant. After completing the spin on dopant process, the testing samples undergo diffusion process which is to introduce the dopant into silicon surface by using high temperature. Then, dopants can diffuse into the silicon substrate, which changes the conductivity of semiconductor. After diffusion process was completed, the testing samples undergo four point probes testing to determine the sheet resistivity of the sample.

TABLE OF CONTENT

CONTENT — Page

	DECLARATION	ii
	ACKNOWLEDGEMENTS	iv
	ABSTRACT	v
	TABLE OF CONTENT	vi
	LIST OF TABLES	vii
	LIST OF FIGURES	ix
	LIST OF EQUATIONS	x
	LIST OF GRAPH	xi
CHAPTER 1	INTRODUCTION	
	1.1 Background Of Project	1
	1.2 Project Objective	2
	1.3 Problem Statement	2
	1.4 Scope Of Project	4
	1.5 Significant Of The Project	4
CHAPTER 2	LITERATURE REVIEW	
	2.1 What is Semiconductor?	4
	2.2 Type of Semiconductor	5
	2.2.1 Intrinsic Semiconductor	5
	2.2.2 Extrinsic Semiconductor	6
	2.3 Energy Band Diagram Of Semiconductor	8
	2.4 Carrier Concentration In Semiconductor	11
	2.5 Dopant	12