

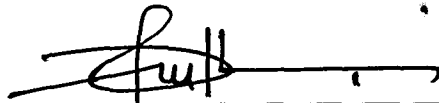
**PREPARATION AND OPTIMIZATION OF CARBON NANOTUBES (CNTs)
USING SILVER NANOPARTICLE CATALYST**

NORZAINI BINTI MOHD KADIR

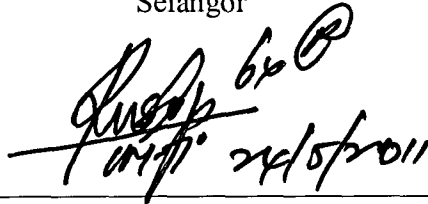
**Final Year Project Report Submitted in Partial Fulfillment of the Requirements for
the Degree of Bachelor of Science (Hons.)
Physics in the Faculty of Applied Sciences
Universiti Teknologi MARA Malaysia**

MAY 2011

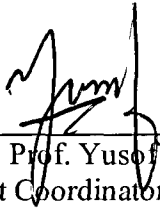
This Final Year Project Report entitled **“Preparation and optimization CNTs using silver nanoparticle catalyst”** was submitted by Norzaini Binti Mohd Kadir, in partial fulfillment of the requirements for the Degree of Bachelor of Science (Hons.) Physics in the Faculty of Applied Sciences, and was approved by



Prof. Dr. Saifollah bin Abdullah
Supervisor
~~B.Sc. (Hons.) Physics~~
Faculty of Applied Sciences
Universiti Teknologi MARA
40450 Shah Alam
Selangor



Assoc. Prof. Dr. Mohamad Rusop bin Mahmood
Co-supervisor
~~B.Sc. (Hons.) Physics~~
Faculty of Applied Sciences
Universiti Teknologi MARA
40450 Shah Alam
Selangor



Assoc. Prof. Yusof bin Theeran
Project Coordinator
B.Sc.(Hons.) Physics
Faculty of Applied Sciences
University Teknologi MARA
40450 Shah Alam
Selangor



Dr. Ab. Malik Marwan Ali
Head of Programme
B.Sc.(Hons.) Physics
Faculty of Applied Sciences
University Teknologi MARA
40450 Shah Alam
Selangor

Date : 25 MAY 2011

ACKNOWLEDGEMENTS

Upon completion of this project, I would like to express my gratitude to many parties. First of all, thanks to Allah S.W.T, the Almighty because of His blessings this thesis was completed on time. My heartfelt thanks goes to my supervisor, Prof. Dr. Saifollah bin Abdullah and my Co-supervisor, Assoc. Prof Dr Mohamad Rusop bin Mahmood because of his valuable comments, suggestions and precious advice, ideas and help during the process of preparing this thesis. Special dedications to my beloved parents, Mohd Kadir Bin Ismail and Medah Binti Ariffin, who have always supported me and are always there to listen and understand me whether emotionally and/or financially. I would also like to express my special thanks to my friends for their big support, help and understanding throughout the completion of this thesis. I also would like to give a lot of thanks to Ms. Noor Asnida Binti Asli, PHd student that always guides me during I am doing this project. Lastly, my gratitude goes to the lab assistants for all their help and support throughout the project lab works, especially Mr. Azlan, Mdm. Nurul Wahida and Mr. Fairuz.

TABLE OF CONTENTS :

	Page
ACKNOWLEDGEMENT	i
TABLE OF CONTENT	ii
LIST OF TABLES	iv
LIST OF FIGURES	v
LIST OF ABBREVIATION	vi
ABSTRACT	vii
ABSTRAK	viii
1.0 INTRODUCTION	
1.1 BACKGROUND OF THE STUDY	
1.1.1 Carbon Nanotubes (CNTs)	1
1.1.2 Camphor	3
1.1.3 Nanosilver Particles	3
1.2 PROBLEM STATEMENT	4
1.3 OBJECTIVES OF THE STUDY	4
1.4 SIGNIFICANT OF THE STUDY	5
2.0 LITERATURE REVIEW	
2.1 PARAMETERS AFFECTED THE CNTs GROWTH	
2.1.1 Effects of Reaction Temperature	6
2.1.2 Effects of Quartz Tube	8
2.1.3 Effects of carrier gas flow	8
2.1.4 Effects of Catalyst Weight	9
2.2 THE OPTIMIZATION OF CVD)	10
3.0 METHODOLOGY	
3.1 MATERIAL	
3.1.1 Chemicals	12
3.1.2 Apparatus	12
3.2 FLOW CHART OF RESEARCH METHODOLOGY	13
3.3 GENERAL DESCRIPTION OF SAMPLE PREPARATION	

ABSTRACT

PREPARATION AND OPTIMIZATION OF CARBON NANOTUBES (CNTs) USING NANOSILVER PARTICLE CATALYST

Carbon nanotubes (CNTs) is prepared by chemical vapor deposition (CVD) method using camphor as the source of carbon and silver nitrate (nanosilver) as the catalyst. Meanwhile, ferrocene are used to support the nanosilver to form the carbon nanotubes. The sample are prepared by using different amount of nanosilver as the catalyst but the amount of camphor powder, ferrocene, gas carrier flow rate, deposition time and others are fixed during the experiment. The nanosilver was varied by 0.5 ml difference for each sample. The optimum reaction temperature in this research are 800 °C. After the deposition time about 1 hour, the system are left to cooling down to room temperature. The sample then characterized by using Field Emission Scanning Electron Microscopy (FESEM) and Thermogravimetric Analysis (TGA). The FESEM are used to determine the surface morphology of the carbon nanotubes formed. Meanwhile, TGA are used to study the changes in mass of a sample as the temperature is varied. From this research, the optimum amount of nanosilver that give the high quality of carbon nanotubes is 1.0 ml of nanosilver which yield the CNTs that has the diameter of 0.056 μm , 0.058 μm and 0.059 μm . From TGA result, when using 1.0 ml silver nitrate the weight loss is greater (3.5 %) compared to the sample that use other quantity of silver nitrate. The greater the weight loss, the greater the purity of CNTs formed.