

**PREPARATION OF CARBON NANOTUBES USING ETHANOL
PRECURSOR BY SPRAY PYROLYSIS**

NUR RASHIDAH BT ABDUL RAZAK

**BACHELOR OF SCIENCE (Hons.) PHYSICS
FACULTY OF APPLIED SCIENCES
UNIVERSITI TEKNOLOGI MARA**

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ABSTRACT

PREPARATION OF CARBON NANOTUBES USING ETHANOL PRECURSOR BY SPRAY PYROLYSIS

The carbon nanotubes (CNTs) were prepared using the cheap, simple and easy handling method of spray pyrolysis CVD method. Ethanol precursor was used as a source of carbon and ferrocene as a catalyst. Argon gas was used as the carrier gas through the spray pyrolysis system. CNTs were synthesized at different deposition temperatures ranging from 700°C to 850°C. The observation of the characterization CNTs by Scanning Electron Microscopy (SEM) and Transmission Electron Microscopy (TEM) showed that at different temperatures, the characteristics of CNTs were different. The diameter of CNTs increases with increasing of temperature. The catalyst of ferrocene gives high yield of CNTs at temperature 700°C. At higher temperature up to 800°C, the catalyst can form the thicker tubes and large diameter of CNTs.

CHAPTER 1

INTRODUCTION

1.1 Carbon Nanotubes

Carbon Nanotubes (CNTs) are a recently discovered as the allotrope of carbon and take the form of cylindrical carbon molecules. CNTs can be viewed as sheets of graphite rolled into seamless cylinders with just a few nanometers in scale diameter and several microns long in scale lengths (D. Kongara, 2005). The arrangements of CNTs are in the form of thin and hollow tubes of carbon atoms.

The high resolution microscopy techniques have explored the structure of CNTs and these experiments have confirmed that CNTs are cylindrical structures based on the hexagonal lattice of carbon atoms that forms crystalline graphite. The bonding in CNTs is sp^2 with each atom joined to three neighbours atoms similar to graphite. The tubes can therefore be considered as rolled up graphene sheets which graphene is an individual graphite layer (M. Dresselhaus et al., 1998). CNTs naturally align themselves into ropes held together by Van der Waals forces. The bonding structure of CNTs is stronger than the sp^3 bonds that found in diamond. Therefore they provide the molecules with their unique strength.