PROPERTIES OF CARBON NANOTUBES PREPARED BY THERMAL CHEMICAL VAPOR DEPOSITION METHOD USING CAMPHORIC CARBON PRECURSOR

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ABSTRACT

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Carbon nanotubes (CNTs) were synthesized using ferrocene as a function of catalyst. The process was performed at the temperature range between 800°C-1000°C in a thermal chemical vapor deposition chamber. The catalyst was placed in a boat at furnace 2. Camphoric carbon was used as the carbon precursor and the argon was adopted as carrier gas. Different parameters such as temperature, time process, carrier gas flow and the amount camphor were investigated and the relationships with the total amount product were found. CNTs with different characteristics were observed by varying parameters. The synthesized CNTs were characterized by Scanning Electron Microscope (SEM), Transmission Electron Microscope (TEM) and High-Resolution Transmission Electron Microscope (HRTEM). Micro-Raman spectra of these synthesized CNTs were taken on the Raman spectrometer (Raman). Energy dispersive X-ray analysis was performed by X-ray micro analyzer (EDX) attached to the SEM unit.

CHAPTER 1

INTRODUCTION

1.1 Historical Background

It was long been known that the carbon fibers can be produced with a carbon arc and patents were issued from the process. In 1991, Sumio Iijima a researcher from NEC Laboratory in Tsukuba, Japan was observed that the carbon fiber were hollow (G.J.Yu et al., 2006). The feature of nanotubes is great interest to physicists because it permits experiments in one-dimensional quantum physics.

Nanotube is a member of the fullerene structural family, which is cylindrical with at least one end typically capped with a hemisphere of the buckyball. Their diameter is in order of a few nanometers and several centimeters in length (Chao Liu et al., 2004).

Nanotubes are composed entirely of sp^2 bond similar to those of graphite. This bonding structure, stronger than the sp^3 bound in diamond, provides the molecules with their unique strength. Nanotubes naturally align themselves into "ropes" held together by