TEMPERATURE DEPENDANT OF MONOETHANOLAMINE FOR CARBON NANOTUBES GROWTH VIA FLOATING CATALYST METHOD

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ABSTRACT

For this final year project, I will investigate the temperature dependant of monoethanolamine (MEA) for Carbon Nanotubes (CNTs) growth by using floating catalyst chemical vapor deposition (FCCVD) method. The specific objectives include preparation of catalyst using alcohol (MEA) solvent with metal element (Ferrocene), to prepare CNTs in powder form by using palm oil precursor in CVD and to characterized the CNTs by using field emission scanning electron microscopy (FESEM), Raman spectroscopy & Fourier Transform Infrared (FTIR) spectroscopy. The method used was FCCVD method to synthesized CNTs on alumina boats based on natural precursor. The palm oil was used as the carbon source, MEA as solvent of Ferrocene, Ferrocene as metal element and Argon gas as the carrier gas which the purpose is to expel air from the tube. The purpose of mister atomizer was to vapor up the carbon gas into the reaction chamber of CVD. The effect of temperature of MEA on deposition time of CNTs will be investigated. The CNTs that has been synthesized was characterized by using FESEM to determine the surface morphologies. Raman spectroscopy has been used to characterized composite films of crystalline diamond, noncrystalline diamond and graphitic structures of CNTs while FTIR was used in structural determination of molecules. It can be summarized that the deposition temperature, catalyst size and flow rate of palm oil with Argon gas was highly affected in determining the quality of CNTs. The higher the deposition temperature and the catalyst size, the bigger the diameter of the CNTs. CNTs can be grown continuously if the flow rate of the carbon source and argon gas was continuous.

CHAPTER 1

INTRODUCTION

1.1 Background and problem statement

1.1.1 Nanotechnology

Nanotechnology can be briefly described as the design, characterization, production and application of materials, devices and systems by controlling shape and size of the nanoscale [1]. The nanoscale itself considered to cover the range from 1 to 100 nanometres [1]. History of nanotechnology originated from Richard Feynman's lecture "There's Plenty of Room at the Bottom" in 1959. He proposed machines making the components for smaller machines that operates at the macroscale. It is a new technology which expected to grow more rapidly and become a priority to be developed in advance product [2]. The technology values impact the human life through precise production, military, aerospace, communication networks and devices, medical, and other aspects in modern society and sustainability The original properties that emerge as materials reach the nanoscale open the door to innovations and at the same time may pose new risks to workers, consumers, the public, and the environment. An