

Effect of plasma post-treatment on the surface characteristic of carbon nanotubes

Student: Yao-Tsung Yeh

Advisor: Chang-Ping Chou

Degree Program of Automation and Precision Engineering

National Chiao Tung University

Abstract

This thesis studies the effect of plasma post-treatment on the surface characteristic of carbon nanotubes. The first topic is the 300W CF_4 plasma to study the structure and surface quality after growth of carbon nanotubes. The second topic focuses on the 300W CF_4/O_2 plasma after growth of carbon nanotubes. The third topic uses CF_4 and CF_4/O_2 to carbon nanotubes which in via after plasma post-treatment. Surface shape and quality a variation. Portion analysis includes scanning electron microscopy (SEM), transmission electron microscopy (TEM), atomic force microscopy (AFM) are used to determine surface roughness and image surface topography. Element bonding is measured by Fourier - transform infrared spectroscopy (FTIR). X-ray Photoelectron Spectroscopy (XPS) Thermal Desorption Spectroscopy (TDS).

After H_2 plasma pre-treatment, Ni catalyst layer becomes island-like because of thermal energy and etching effect of H_2 plasma and these island-like Ni particle plays an important role in the subsequent growth

of carbon nanotubes. If the size of Ni catalyst particle is small, the diameter of carbon nanotubes is also small. The structure of carbon nanotubes use CF_4/O_2 plasma shorten the length of carbon nanotubes. Interconnection will introduce carbon nanotubes instead of traditional metal in the future and We report an approach to shorten the length of carbon nanotubes .And the course of getting rid of the non-brilliant quality carbon is benefited quite to some extent.However,the carbon is in charge of passing the electric thick liquid of CF_4 treatedly,Have not had obvious changes to surface form.