

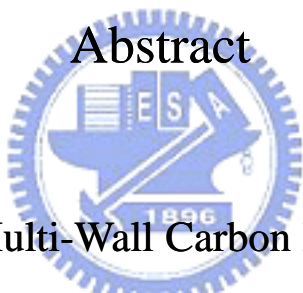
The application of SERS to detect Single Bio-Molecule

Student: Yao-Chen Chen

Advisor: Chia-Fu Chen

Institute of Material Science and Engineering National Chiao
Tung University

Abstract



In this study, both Multi-Wall Carbon Nanotubes (MW-CNTs) and Carbon Nano-Flakes (CNFs) grew on Fe catalyst in Microwave Plasma Enhanced Chemical Vapor Deposition (MWPECVD) system. Both nanocarbon materials have high pores and more surface areas properties that adsorb more silver nanoparticles.

Surface-Enhanced Raman Scattering-active (SERS-active) silver nanoparticles were generated by Ion-Beam Sputtered Deposition (IBSD) method. And then using Raman spectrometer

detect single dye molecule Rhodamine 6G. The results support the SERS-effect that could achieve qualitative analysis. To test the concentration limitation of Rhodamine 6G and observe its lifetime.

As a result, coating silver nanoparticles 8 minutes on MW-CNTs has best SERS-effect and the concentration limitation detection of Rhodamine 6G is $1 \times 10^{-6} \text{M}$. However, for CNFs, 5 minutes silver nanoparticles coating time has best SERS-effect and the concentration limitation detection of Rhodamine 6G is $1 \times 10^{-7} \text{M}$. In addition, for lifetime measurement, both two different kinds of MW-CNTs and CNFs had been measuring after 40 days. It was found the Raman signals still exist but its strength became weaker.