Towards surface enhanced Raman scattering of single-walled carbon nanotubes during chemical vapor deposition

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Abstract: We explore the possibility of using metal nano-particles to enhance the Raman scattering of single walled carbon nanotubes (SWCNTs) at high temperatures, with the aim of obtaining enhanced in situ Raman spectra of SWCNT during chemical vapor deposition (CVD). Particle position, metal type, film thickness, excitation wavelength are systematically optimized to meet the requirements for high temperature and in situ measurements. Au particles provide a weak but stable enhancement up to 1000°C, while the enhancement factors of Ag particles decrease at elevated temperatures due to morphology change and metal evaporation. After the morphology relating effects are eliminated, surface enhanced Raman scattering (SERS) of SWCNT is confirmed to be almost temperature independent in our SWCNT-Ag/Au system. Finally, in situ enhanced spectra with identifiable RBM peaks are obtained in a realistic CVD growth of SWCNTs.[1] Our recent progress on growth mechanism and structure control of SWCNT from ethanol will be also presented.[2-4]

Key words: SWCNT, in situ Raman, growth mechanism.

Reference:

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