Quantitative Estimation of Functional Groups on Single-Walled Carbon Nanotube Surfaces

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Fully covalent functionalization was used to form a covalent linkage by directly attach the nitrophenyl groups on the carbon skeleton of CoMoCAT (6,5) nanotubes with different concentrations of 4-nitrobenzene diazonium tetraflouroborate salt that evaluated by UV/vis/NIR and Ramman spectra. Functionalized and nonfunctionalized SWNTs with many layers of the mixer gradient density prepared in centrifuge tubes were centrifuged to match positions and desities to define exactly density for each sample. From that we the first time independent calculate the number of diazonium per carbon atom. Establishing linear relation between the number of functional groups per carbon atom and the disorder mode (D peak, 1289 cm-1) to the tanential mode (G peak, 1582 cm-1) ratio from measuring Raman spectra made a foundation to simply and reliably quantitative estimation of functional groups attached on each carbon nanotube. Afterward, researching and predicting the reaction of covalent fuctionalization on carbon nanotubes will become more easily and quickly that sets up hard basis for more various application in disverse useful fields in our life.