TOWARD THE REALIZATION OF NARROW DIAMETER DISTRIBUTION IN AS-GROWN SINGLE-WALLED CARBON NANOTUBES

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Modifying electrical and optical properties of single-walled carbon nanotubes (SWNTs) has been obtained by structure controlling or chemical doping. Because of their intrinsic electrical property, those nanotubes have been given an emphasis on many applications. The direct synthesized SWNTs, however, are still lacked of structure controlling. In this study, we narrow SWNT diameter distribution with alternative of no-flow CVD using acetronitrile (CH_3CN) as the carbon feedstock. The Co/Mo binary catalyst was used as catalysts amd deposited on quartz substrate by a liquid dip-coating process. SWNTs were dispersed in D_2O with sodium deoxycholate (DOC) for further optical measurements. As for the results, the SWNT diameter seems to be dramatically small, and the diameter distribution was also narrowed, compared to that from alcohol. However, the vertical aligned morphology was achieved even at high temperature as 800°C. The small diameter peaks in RBM region with three different excitation wavelengths (488, 514, 633 nm) were, for acetonitrile sample, found to be about 240-300 cm^{-1}, indicating small diameter with narrow distribution. The small in mean diameter of as-grown SWNTs was rectified by UV-Vis-NIR optical absorption measurement, showing the absorption peak around 1000 nm which correspond to 0.8-1 nm in diameter. Additionally, the PLE map of dispersed SWNTs also showed a strong dominance of (6,5) nanotube.