

다양한 계면활성제를 이용한 고순도 단일벽 탄소나노튜브의 수계 분산

곽정춘, 김영수, 이내성
세종대학교

Dispersion of Highly Pure Single-Walled Carbon Nanotube in Aqueous Solution of Various Surfactants

Jeung-choon Goak, Myoung-su Kim, Nae-sung Lee
Sejong Univ.

Abstract : Practical application of single-walled carbon nanotubes (SWCNTs) qualified as a promising material has been limited by either poor dispersion or their insolubility in aqueous or organic media due to formation of bundling by relatively high surface energy. Thus, major attention to overcome this issue has been paid at surface modification of CNTs by functionalization, but this introduces defects to the sidewall of CNTs, consequently perturbing the inherent electronic and optical properties. Therefore, using surfactants is a general approach to disperse SWCNTs with lower damages by which bundled nanotubes could be dispersed up to the level of individuals or small bundles. Here, we have investigated various surfactants for their efficiency in dissolving purified SWCNTs produced by arc discharge in deionized water. To compare the surfactants respectively, we have determined the least amount of each surfactant to suspend the nanotubes under optimized experimental conditions(CNT amount, sonication power, and centrifugation speed, etc.) set on the basis of the most common surfactant (sodium dodecyl sulfate, SDS) and discussed the qualitative and quantitative characterization of SWCNT dispersions by UV-Vis absorption spectroscopy. Quantitative aspect about nanotube dispersion was that in particular N-methyl-2-pyrrolidone (NMP) and sodium dodecylbenzene sulfonate (NaDDBS) were found to be effective in dispersing individual tubes.

Key Words : Single-walled carbon nanotube, dispersion, surfactants, UV-Vis spectroscopy