DIAMETER-DEPENDENT SEPARATION OF SINGLE-WALLED CARBON NANOTUBES BY DENSITY GRADIENT ULTRACENTRIFUGATION

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We present a protocol to selectively isolate single-walled carbon nanotubes (SWNTs) using density gradient ultracentrifugation (DGU). SWNTs synthesized by the alcohol catalytic chemical vapor deposition (ACCVD) method were dispersed using *sodium deoxycholate* (DOC) and *sodium dodecyl sulfate* (SDS) as co-surfactant encapsulating agents. By changing the order in which surfactants were added and their respective concentrations we were able to separate the dispersed SWNTs into several colored layers. Each successive layer was found to contain SWNTs of increasing diameter, with the topmost violet layer containing more than 95% (6,5) SWNTs. Spectroscopic methods including optical absorbance, photoluminescence excitation (PLE), and resonance Raman spectroscopy were used to characterize the SWNTs before, during, and after DGU. These measurements helped clarify the sequence of events leading to the resulting diameter-dependent dispersion as well as the role of each surfactant in the DGU process. We expect this improved understanding will be helpful in obtaining higher purity extractions of single-chirality SWNTs.