Carbon Nanotube-Protein Conjugates from Ambient Exchange Reactions

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Abstract

Water-soluble functionalized single-walled (SWNT) and multiple-walled (MWNT) carbon nanotubes were reacted with bovine serum albumin (BSA) protein in ambient aqueous solutions for the preparation of SWNT-BSA and MWNT-BSA conjugates. The reaction conditions were designed for thermodynamically favorable transformation from ester to amide linkages. Results from electron microscopy, optical spectroscopy, NMR, and gel electrophoresis analyses show that the conjugate samples from the ambient exchange reactions indeed contain both carbon nanotubes and BSA protein and that the protein species are intimately associated with the nanotubes.