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The Conformation of Polymers Dispersing Single-Walled Carbon Nanotubes in Water. YAEL DROR, YACHIN COHEN, Technion, Israel, WIM PYCKHOUT-HINTZEN, Fz. Juelich, Germany — Amphiphilic polymers have been used to disperse single-walled carbon nanotubes (SWCNT) in water. The polymer conformation around the nanotube surface is important for understanding the nature of the interactions leading to successful dispersions. Two extreme cases are "tight wrapping" of the polymer around the nanotube and "loose adsorption" of solvated polymer coils on the nanotube surface. We studied aqueous dispersions of SWCNTs with an alternating copolymer of styrene and sodium maleate (PSSty) by small-angle neutron scattering (SANS) and cryo transmission electrons microscopy (cryo-TEM). Dispersion of long, isolated nanotubes and thin bundles was revealed by cryo-TEM. The SANS patterns (at different solvent contrasts) were evaluated by a modification of Pedersen's "cylindrical block copolymer micelle" model, depicting the nanotube-polymer complex as composed of a thin core, the radius of which is about 20 A thus containing about 3-4 nanotubes, surrounded by a thick corona of water-swollen polymer coils with a radius of gyration of 150-170 A. Long-term stabilization is achieved by the steric barrier provided by the adsorbed polymer coils reinforced by electrostatic repulsion due to charged groups distributed along the polymer.

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