Assessing the role of poly(ethylene glycol-*bl*-propylene sulfide) (PEG-PPS) block copolymers in the preparation of carbon nanotube biocompatible dispersions

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Zeta (ζ)-potential measurements. Zeta (ζ)-potential measurements were performed on a Zetaplus Analyzer (Brookhaven Instruments Corporation) at 25°C. The ζ -potential was determined from the measured electrophoretic mobility, μ , using the Smoluchowski approximation¹ ($\mu_e = \epsilon \zeta V / 4 \pi \eta D$, where μ_e is the electrophoretic mobility, ϵ the permittivity of the liquid, V is the applied voltage, η the viscosity of the liquid and D is the electrode separation). Each sample was centrifuged for 10 min at 4000 RPM before the analysis. As the initial SWNTs suspension was very concentrated we had to dilute the solution in order to measure the corresponding ζ -potential.

The stability of SWNT dispersions was monitored over months through UV-vis (see text) and ζ -potential measurements. The ζ -potential is often used as an index of the magnitude of electrostatic interaction among colloidal particles and is thus considered a measure of the stability of the colloidal solution.¹ Indeed, only particles with a ζ -potential less than -15 mV or more than 15 mV are expected to be stable from electrostatic considerations.² Nevertheless particles with ζ -potential in the range -15 - 15 mV may be sterically stabilized, for example through properly adsorbed non-ionic polymer chains, as is the present case. The present copolymers stabilize the nanotubes in solution primarily by steric and not electrostatic interactions as evidenced by the low (between -15 and -26 mV, see Table S1), and comparable with previously measured,¹ ζ -potential values.

1 White, B.; Banerjee, S.; O'Brien, S.; Turro, N. J.; Herman, I. P. *J. Phys. Chem. C* **2007**, *111*, 13684-13690.

2 Hiemez, P. C.; Rajagopalan, R. *Principles of Colloid and Surface Chemistry*, 3rd ed.; Marcel Dekker: New York, 1997.

Table S1. Stability of as obtained and 10-fold diluted SWNTs polymer aqueous dispersions and ζ -potential measurements of aqueous polymer dispersion and 10-fold diluted SWNT polymer dispersion over the time. Mean $\pm$ S.E.M.

SWNTs-Copolymer dispersion	% variation of SWNTs concentration after 1 month	% variation of SWNTs concentration in 10-fold diluted dispersion after 1 month	ζ -Potential of aqueous copolymer solution [mV]	ζ -Potential of 10-fold diluted SWNT dispersions [mV]	ζ -Potential of 10-fold diluted SWNTs dispersion after 1 month [mV]
E ₁₂₂ O ₄₄ E ₁₂₂ -0.4×CAC Film Hydration	-6	9	-22 $\pm$ 1	-17 $\pm$ 3	-18 $\pm$ 1
Pluronic P10 -2×CAC Film Hydration	-88	-28	-22 $\pm$ 2	-34 $\pm$ 1	-28 $\pm$ 1
E ₄₆ S ₁₃ E ₄₆ -1×CAC Film Hydration	-7	5	-24 $\pm$ 2	-26 $\pm$ 1	-25 $\pm$ 2
E ₄₆ S ₁₃ E ₄₆ -15×CAC Dilution THF→H ₂ O	2	3	-15 $\pm$ 3	-14 $\pm$ 1	-15 $\pm$ 1
E ₄₆ S ₁₃ E ₄₆ -1×CAC Dilution THF→H ₂ O	-2	9	-17 $\pm$ 3	-11 $\pm$ 3	-11 $\pm$ 2
E ₄₆ S ₂₈ E ₄₆ -5×CAC Film Hydration	2	6	-19 $\pm$ 2	-22 $\pm$ 2	-21 $\pm$ 1
E ₁₁₀ S ₁₈ -5×CAC Film Hydration	1	6	-17 $\pm$ 1	-15 $\pm$ 2	-16 $\pm$ 2
E ₄₄ S ₂₀ -12×CAC Film Hydration	-2	13	-15 $\pm$ 3	-16 $\pm$ 2	-20 $\pm$ 1

Figure S1. Absorption spectra of SWNTs in aqueous solution of $E_{46}S_{13}E_{46}$ 0.56 mg/mL (polymer dispersion obtained from film hydration) at different sonication times.

Figure S2. Cytotoxicity of SWNT- $E_{44}S_{20}$ dispersion on HeLa cells at various SWNT concentrations.

Figure S3. Cytotoxicity of SWNT dispersions prepared with E₁₁₀S₁₈ (dark green bars) and E₁₁₀S₅₄ (light green bars) on 3T3 cells at various SWNT concentrations. Copolymer concentrations in the samples are respectively 4.87 and 15.5 µg/mL (at 0.625 µg/mL SWNTs); 9.74 and 31.1 µg/mL (at 1.25 µg/mL SWNTs), 48.7 and 155 µg/mL (at 6.25 µg/mL SWNTs); 97.4 and 311 µg/mL (at 12.5 µg/mL SWNTs) and 487 and 1554 µg/mL (at 62.5 µg/mL SWNTs).

Figure S4. Cytotoxicity of SWNT dispersions prepared with E₄₆S₁₃E₄₆ (red bars), E₄₆S₂₈E₄₆ (orange bars), E₄₅S₅₆E₄₅ (yellow bars) on 3T3 cells at various SWNT concentrations. Copolymer concentrations in the samples are respectively 47.8, 7.20, 1.08 µg/mL (at 0.625 µg/mL SWNTs); 95.5, 14.4, 2.15 µg/mL (at 1.25 µg/mL SWNTs), 478, 71.9, 10.8 µg/mL (at 6.25 µg/mL SWNTs); 955, 144, 21.5 µg/mL (at 12.5 µg/mL SWNTs) and 4780, 719, 108 µg/mL (at 62.5 µg/mL SWNTs).