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Supplementary Information

Selective Distributions of Functionalized Single-Walled Carbon Nanotubes in a Polymeric Reverse Hexagonal Phase

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Estimation of the polar and apolar domain sizes of L121/water and p-SWNT/L121/water at the lamellar and reverse hexagonal phases

The detailed structural dimensions of L121/water (61/39) at the lamellar and hexagonal phases were estimated from the measured lattice parameters, composition of the sample and mass densities of components. The volume fractions of polar (PEO + water, $\phi_{polar} = 0.43$) and apolar (PPO, $\phi_{apolar}=1- \phi_{polar} = 0.57$) domains in the L121/$D_2O$ (61/39 by weight, D_2O was used in the SAXS measurements as well) sample were estimated from the mass densities of D_2O (1.10 g/ml) and L121 (1.01 g/mL), and the volume ratio (9:1) of PPO and PEO in a L121 molecule (which was determined from the known monomer volumes of PPO (95.4 $Å^3$) and PEO (72.4 $Å^3$) [S.H. Chen et al, Colloids Surf. A, 2001, **183-185**, 95] and the number of units in L121). In the lamellar phase, the thickness of polar (5.9 nm = $\phi_{polar} \times d_{1am}$) and apolar (7.6 nm = $\phi_{apolar} \times d_{1am}$) domains were calculated using the measured repeat distance (d_{1am} = 13.5 nm). In the reverse hexagonal phase, the diameter of the cylindrical polar core (7.4 nm=$a_{rev\text{-}hex}[\phi_{polar}\sqrt{3}/2\pi]^{0.5}$) was calculated using the measured center-to-center distance between the nearest inverted cylindrical micelles ($a_{rev\text{-}hex}$ = 21.4 nm). The polar and apolar domain sizes in the *p*-SWNT/L121/D_2O (3.9/61/39) were estimated in the same way with all *p*-SWNTs included in the polar domain. The mass density of *p*-SWNTs is 1.06 g/ml.

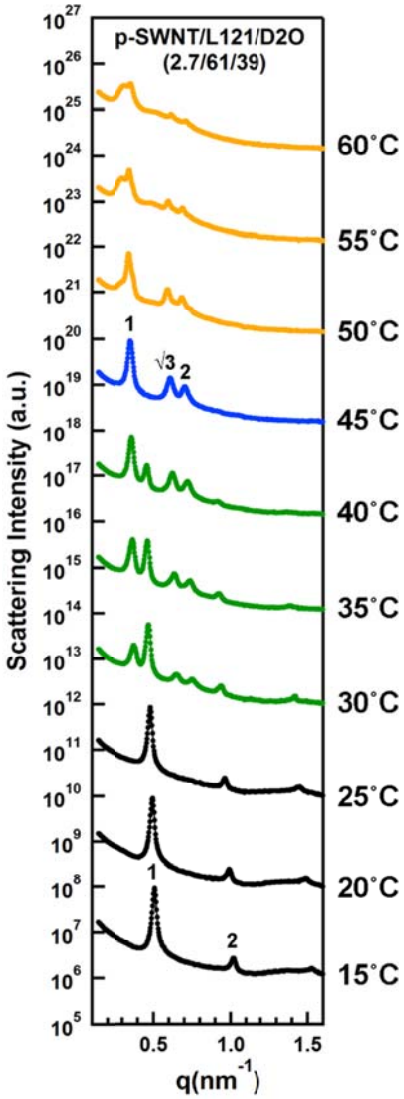

Fig S1. SAXS intensities of *p*-SWNT/L121/water (2.7/61/39) upon increasing temperature. The scattering intensities are vertically shifted for visual clarity.

Table S1. SAXS peak positions of L121/water (61/39) at different temperatures. The unit of peak position is nm^{-1}. The peak position ratios are given in parentheses.

Temperature (main phase)	1st peak	2nd peak	3rd peak	4th peak	5th peak	6th peak
15°C (Lamellar)	0.467 (1)	0.934 (2)	1.404 (3)			
20°C (Lamellar + Reverse hex)	0.331 (1)	0.464 (1)	0.573 (√3)	0.661 (2)	0.928 (2)	1.395 (3)
25°C (Lamellar + Reverse hex)	0.342 (1)	0.464 (1)	0.593 (√3)	0.684 (2)	0.928 (2)	1.394 (3)
30°C (Lamellar + Reverse hex)	0.347 (1)	0.461 (1)	0.601 (√3)	0.694 (2)	0.920 (2) (√7)	1.038 (3)
35°C (Reverse hex)	0.338 (1)	0.586 (√3)	0.678 (2)	0.892 (√7)	1.018 (3)	
40°C (Reverse hex + Isotropic)	0.278 -	0.326 (1)	0.565 (√3)	0.653 (2)	0.860 (√7)	0.980 (3)

* (-) comes from the transition peak which is under appearing or disappearing.

Table S2. SAXS peak positions of *p*-SWNT/L121/water (2/61/39) at different temperatures. The unit of peak position is nm^{-1}. The peak position ratios are given in parentheses.

Temperature (main phase)	1st peak	2nd peak	3rd peak	4th peak	5th peak	6th peak
15°C (Lamellar)	0.502 (1)	1.003 (2)	1.510 (3)			
20°C (Lamellar)	0.488 (1)	0.975 (2)	1.462 (3)			
25°C (Lamellar + Reverse hex)	0.346 (-)	0.474 (1)	0.948 (2)	1.429 (3)		
30°C (Lamellar + Reverse hex)	0.364 (1)	0.466 (1)	0.632 (√3)	0.738 (2)	0.930 (2)	1.402 (3)
35°C (Lamellar + Reverse hex)	0.360 (1)	0.463 (1)	0.624 (√3)	0.725 (2)	0.919 (2)	1.393 (3)
40°C (Lamellar + Reverse hex)	0.357 (1)	0.457 (1)	0.624 (√3)	0.725 (2)	0.919 (2)	1.393 (3)
45°C (Reverse hex)	0.347 (1)	0.601 (√3)	0.695 (2)	0.913 (√7)	1.035 (3)	
50°C (Reverse hex + Isotropic)	0.291 (-)	0.340 (1)	0.489 (-)	0.588 (√3)	0.677 (2)	
55°C (Reverse hex + Isotropic)	0.297 (-)	0.345 (1)	0.503 (-)	0.598 (√3)	0.699 (2)	

* (-) comes from the transition peak which is under appearing or disappearing.

Table S3. SAXS peak positions of *p*-SWNT/L121/water (2.7/61/39) at different temperatures. The unit of peak position is nm^{-1}. The peak position ratios are given in parentheses.

Temperature (main phase)	1st peak	2nd peak	3rd peak	4th peak	5th peak	6th peak
15°C (Lamellar)	0.508 (1)	1.015 (2)	1.443 (-)	1.527 (3)		
20°C (Lamellar)	0.495 (1)	0.989 (2)	1.418 (-)	1.489 (3)		
25°C (Lamellar)	0.480 (1)	0.960 (2)	1.407 (-)	1.447 (3)		
30°C (Lamellar + Reverse hex)	0.374 (1)	0.468 (1)	0.649 (√3)	0.755 (2)	0.934 (2)	1.419 (3)
35°C (Lamellar + Reverse hex)	0.365 (1)	0.461 (1)	0.634 (√3)	0.737 (2)	0.914 (2)	1.389 (3)
40°C (Lamellar + Reverse hex)	0.359 (1)	0.458 (1)	0.624 (√3)	0.723 (2)	0.911 (2)	
45°C (Reverse hex)	0.352 (1)	0.610 (√3)	0.706 (2)	0.914 (√7)	1.041 (3)	
50°C (Reverse hex + Isotropic)	0.285 (-)	0.342 (1)	0.592 (√3)	0.686 (2)		
55°C (Reverse hex + Isotropic)	0.294 (-)	0.344 (1)	0.598 (√3)	0.688 (2)		
60°C (Reverse hex + Isotropic)	0.310 (-)	0.356 (1)	0.618 (√3)	0.711 (2)		

* (-) comes from the transition peak which is under appearing or disappearing.

Table S4. SAXS peak positions of *p*-SWNT/L121/water (3.9/61/39) at different temperatures. The unit of peak position is nm^{-1}. The peak position ratios are given in parentheses.

Temperature (main phase)	1st peak	2nd peak	3rd peak	4th peak	5th peak	6th peak
15°C (Lamellar)	0.517 (1)	1.032 (2)	1.443 (-)	1.527 (3)		
20°C (Lamellar)	0.504 (1)	1.007 (2)	1.429 (-)	1.521 (3)		
25°C (Lamellar)	0.489 (1)	0.976 (2)	1.412 (-)	1.478 (3)		
30°C (Lamellar + Reverse hex)	0.368 (1)	0.477 (1)	0.951 (2)	1.391 (-)	1.438 (3)	
35°C (Lamellar + Reverse hex)	0.371 (1)	0.466 (1)	0.643 (√3)	0.748 (2)	0.927 (2)	1.376 (3)
40°C (Lamellar + Reverse hex)	0.362 (1)	0.454 (1)	0.628 (√3)	0.728 (2)	0.895 (2)	1.373 (3)
45°C (Lamellar + Reverse hex)	0.354 (1)	0.449 (1)	0.615 (√3)	0.712 (2)		
50°C (Reverse hex)	0.347 (1)	0.599 (√3)	0.693 (2)			
55°C (Reverse hex + Isotropic)	0.283 (-)	0.339 (1)	0.586 (√3)	0.678 (2)		
60°C (Reverse hex + Isotropic)	0.303 (-)	0.347 (1)	0.602 (√3)	0.694 (2)		

* (-) comes from the transition peak which is under appearing or disappearing.