

Supplementary Information

Size exclusion chromatography-based length sorting of single-walled carbon nanotubes stably coated with cross-linked polymer

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Table S1. Unsorted and SWCNT concentration values for each fraction estimated from absorption spectra.

Sample	SWCNTs concentration (nM)							
	Unsorted (injection)	fr1	fr2	fr3	fr4	fr5	fr6	fr7
<i>endo</i> -FpM/PEG/SWCNTs	6.76	0.116	0.233	0.231	0.185			
NIPAM/PEG/SWCNTs	27.9	0.094	0.650	0.415	0.208			
<i>endo</i> -FpM/PEG/SWCNTs (preparative scale)	*11.8	0.508	2.304	2.463	1.929	1.716	1.659	1.969

*Since the average SWCNT length of *endo*-FpM/PEG/SWCNTs (preparative scale) could not be measured, the concentration was estimated assuming it to be the same as *endo*-FpM/PEG/SWCNTs (analytical scale).

Table S2. Peak width at half maximum values obtained from peak fitting calculations for the 573 nm chromatogram.

Sample	Injected Concentration (nM)	FWHM	
		Peak 0	Peak1
<i>endo</i> -FpM/PEG/SWCNTs	6.76	4.21	6.61
NIPAM/PEG/SWCNTs	27.9	2.96	

Table S3. Diameter and normalized PL intensity values for multiple chirality of unsorted and four fractions of *endo*-FpM/PEG/SWCNTs.

Chirality	(6, 4)	(7, 3)	(6, 5)	(8, 3)	(7, 5)	(8, 4)	(7, 6)
Diameter (nm)	0.683	0.696	0.747	0.771	0.817	0.829	0.882
unsorted	0.311	0.333	1.000	0.381	0.438	0.247	0.184
fr1	0.300	0.337	1.000	0.399	0.325	0.228	0.136
fr2	0.328	0.333	1.000	0.406	0.500	0.247	0.205
fr3	0.306	0.328	1.000	0.359	0.598	0.311	0.270
fr4	0.277	0.334	1.000	0.331	0.626	0.337	0.339

Table S4. D/G ratio values of unsorted and four fractions of *endo*-FpM/PEG/SWCNTs, PNIPAM/PEG/SWCNT and *endo*-FpM/PEG/SWCNTs (preparative scale).

Sample	D/G ratio							
	unsorted	fr1	fr2	fr3	fr4	fr5	fr6	fr7
<i>endo</i> -FpM/PEG/SWCNTs	0.023	0.019	0.022	0.031	0.039			
PNIPAM/PEG/SWCNTs	0.056	0.032	0.039	0.070	0.079			
<i>endo</i> -FpM/PEG/SWCNTs (preparative scale)	0.018	0.011	0.015	0.016	0.017	0.019	0.018	0.020

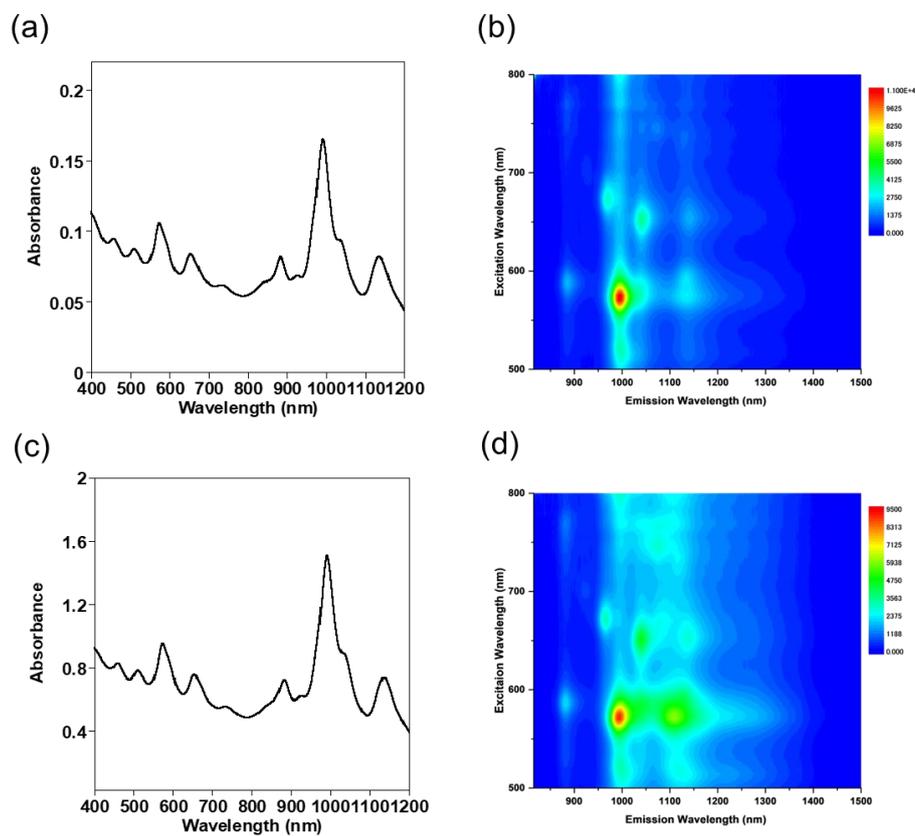


Figure S1. (a, c) Absorption spectra and (b, d) PL contour plot of *endo*-FpM/PEG/SWCNT and PNIPAM/PEG/SWCNT after removing SDS.

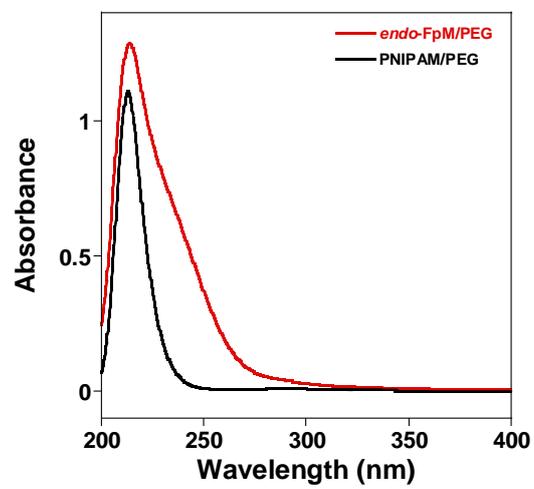


Figure S2. Absorption spectra of free gel solution of *endo*-FpM/PEG (red) and PNIPAM/PEG (black).

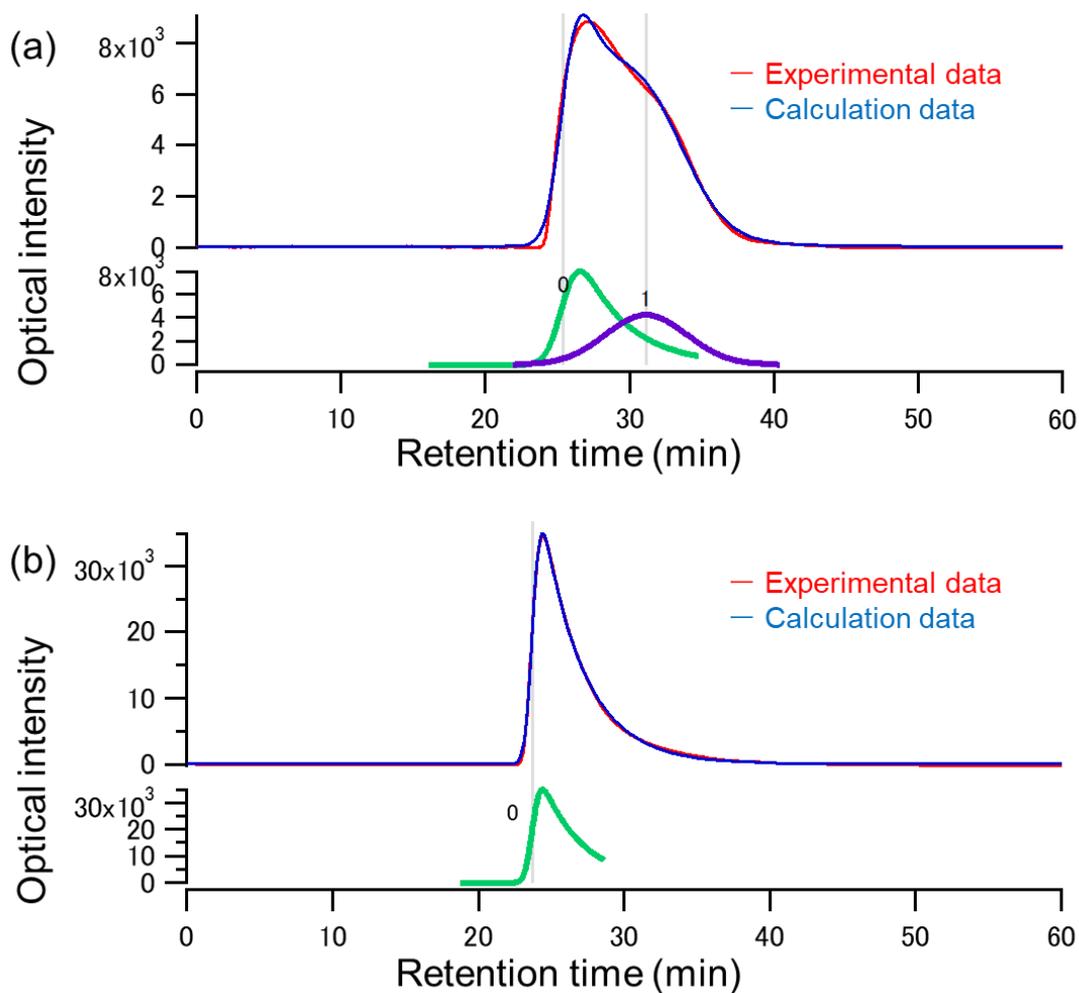


Figure S3. Experimental data (red) and calculated data (blue) from peak fitting of 573 nm chromatograms of (a) endo-FpM/PEG/SWCNTs and (b) NIPAM/PEG/SWCNTs. Fitting peak numbers 0 (green) and 1 (purple) are Exponential Modified Gaussian and Gaussian, respectively. Calculations were performed in Igor Pro (6.36J).

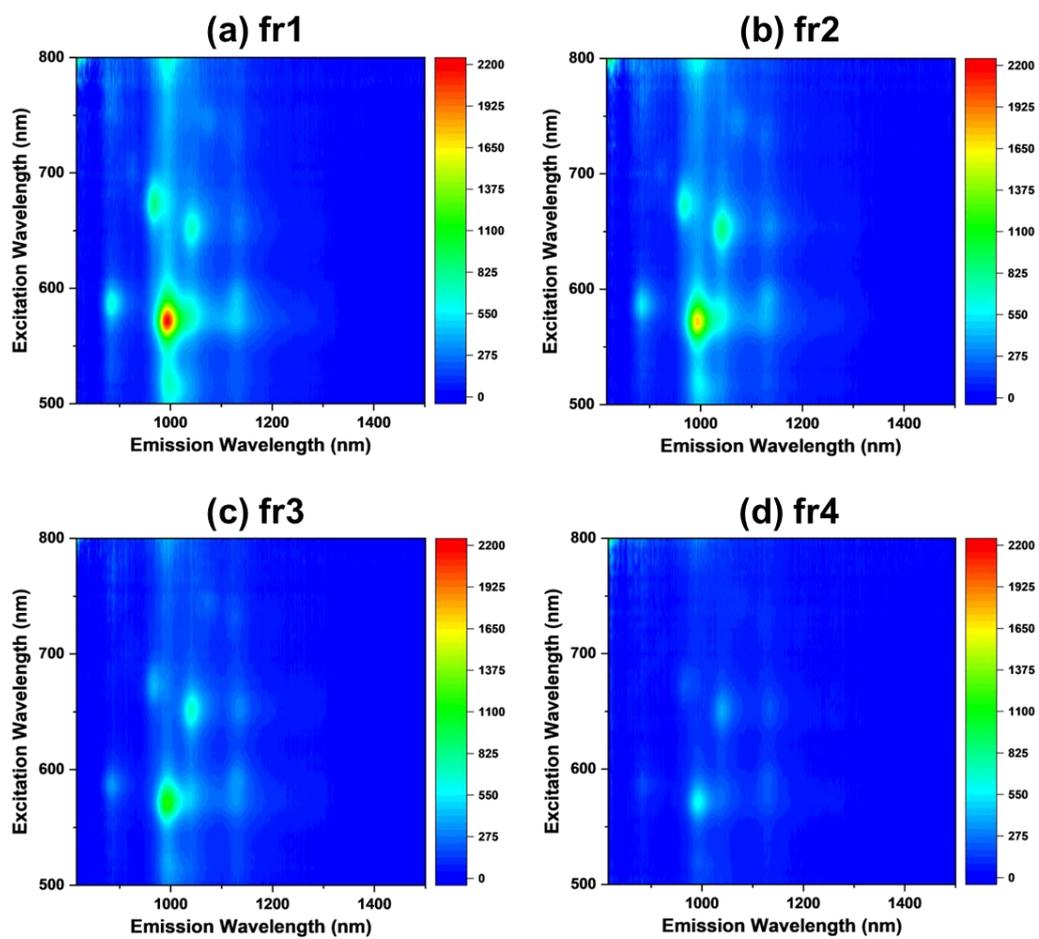


Figure S4. PL contour plots of fractionated dispersions of *endo*-FpM/PEG/SWCNTs. (After 10 times concentration, after 6 months)

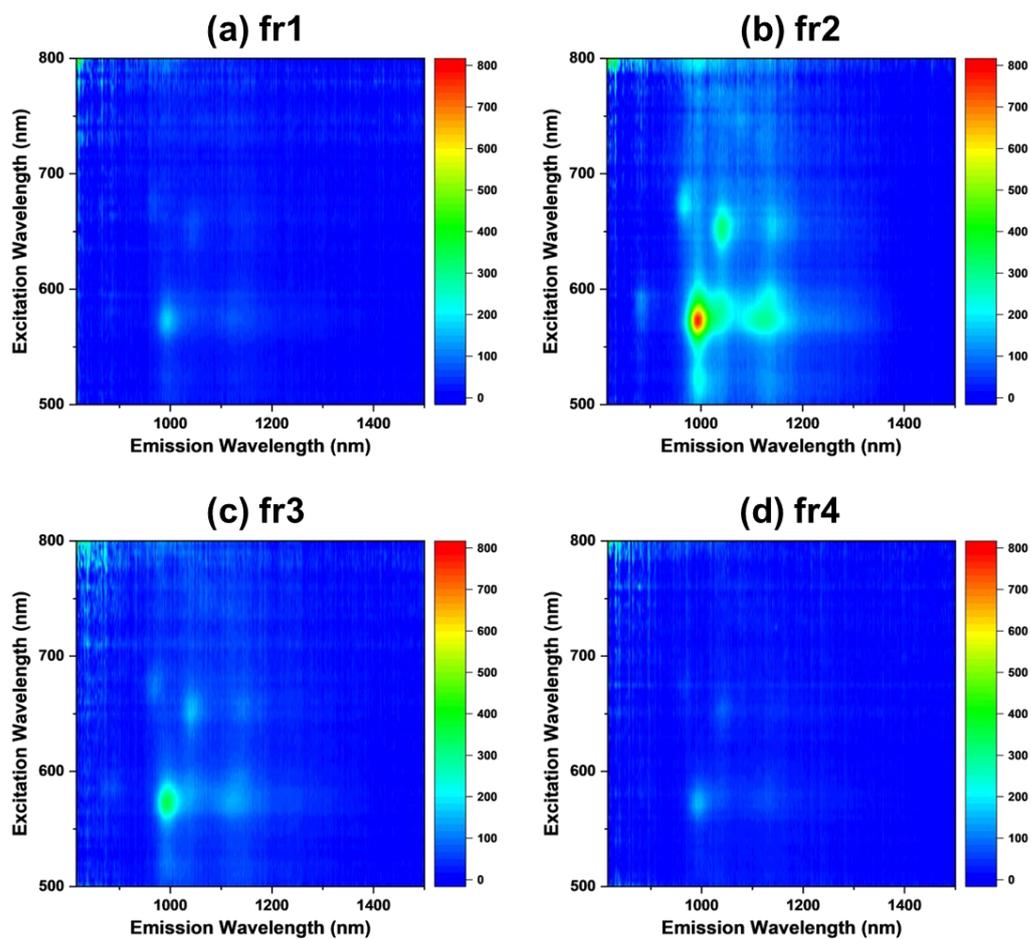


Figure S5. PL contour plots of fractionated dispersions of PNIPAM/PEG/SWCNTs. (After 4 months)

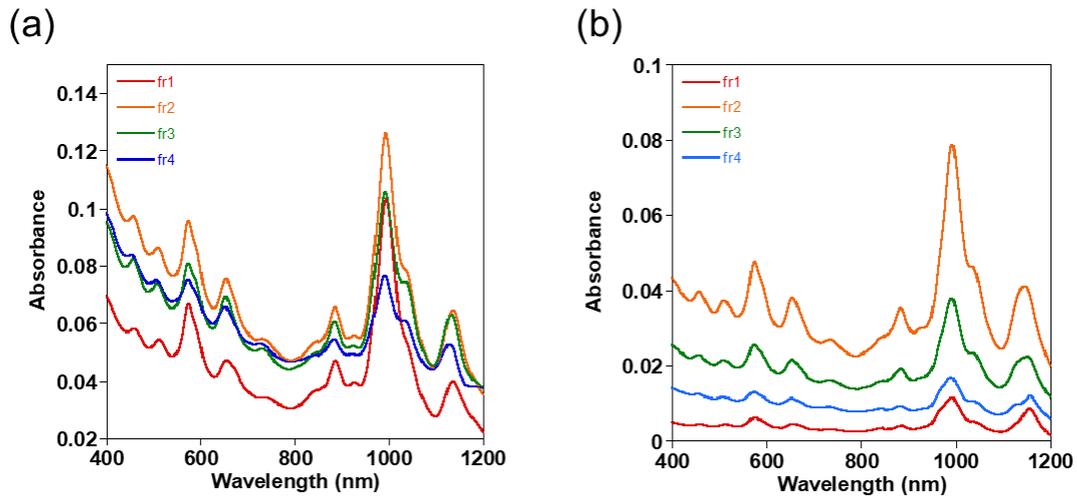


Figure S6. Absorption spectra of fractionated dispersions of (a) endo-FpM/PEG/SWCNTs (after 10 times concentration, after 6 months) and (b) PNIPAM/PEG/SWCNTs (after 4 months).

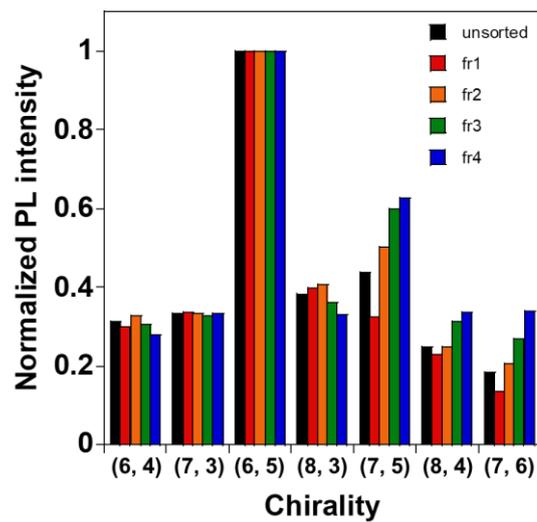


Figure S7. Normalized PL intensities of multiple chirality of unsorted and four fractions of endo-FpM/PEG/SWCNTs.

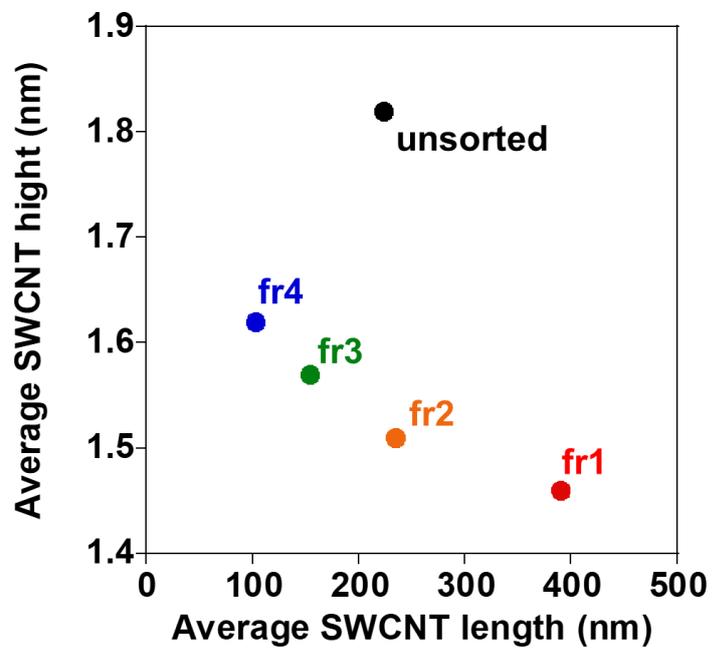


Figure S8. Relationship of average SWCNT height to average SWCNT length.

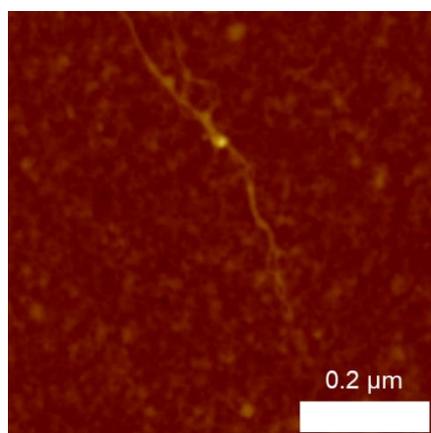


Figure S9. AFM image of undeprotect *endo*-FpM/PEG/SWCNTs and BSA mixed solution.

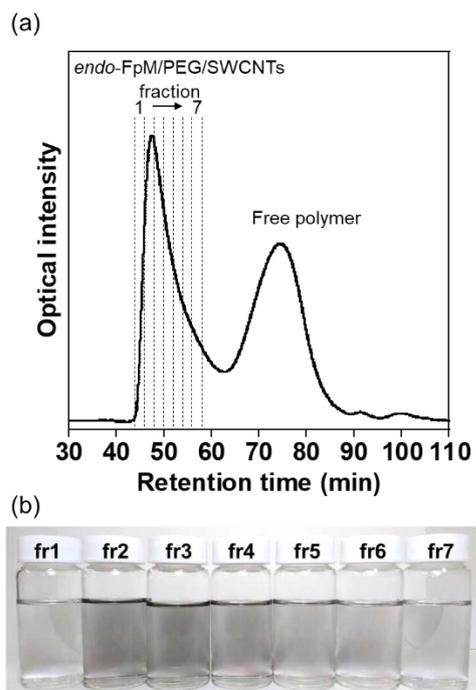


Figure S10. (a) SEC chromatogram and (b) photograph of *endo*-FpM/PEG/SWCNTs on the preparative scale.

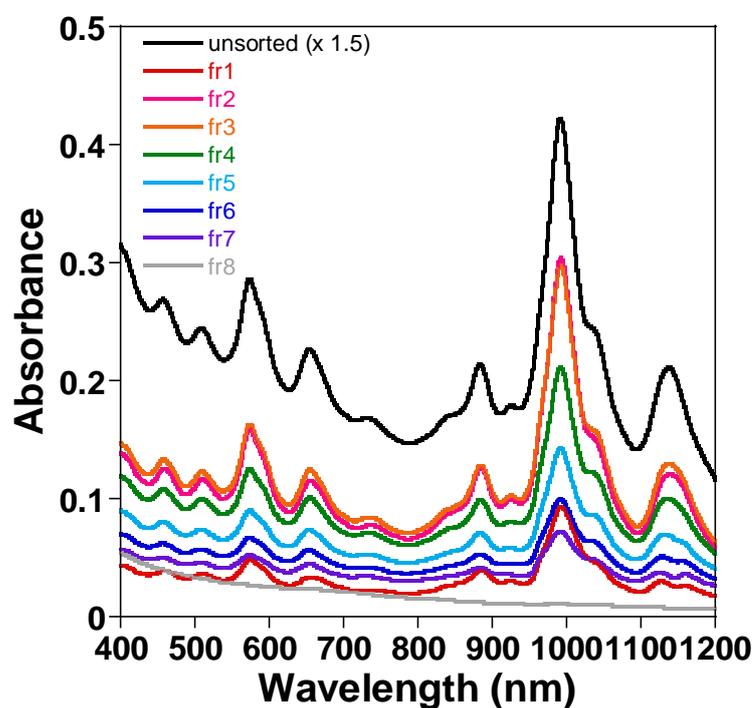


Figure S11. Absorption spectra of unsorted (black), fr1 (red), fr2 (pink), fr3 (orange), fr4 (green), fr5 (sky blue), fr6 (blue), fr7 (purple) and fr8 (gray) of *endo*-FpM/PEG/SWCNTs. To facilitate comparison between unsorted (measured at 2 mm optical path length) and fr (measured at 10 mm optical path length), unsorted shows the spectrum multiplied by 1.5.

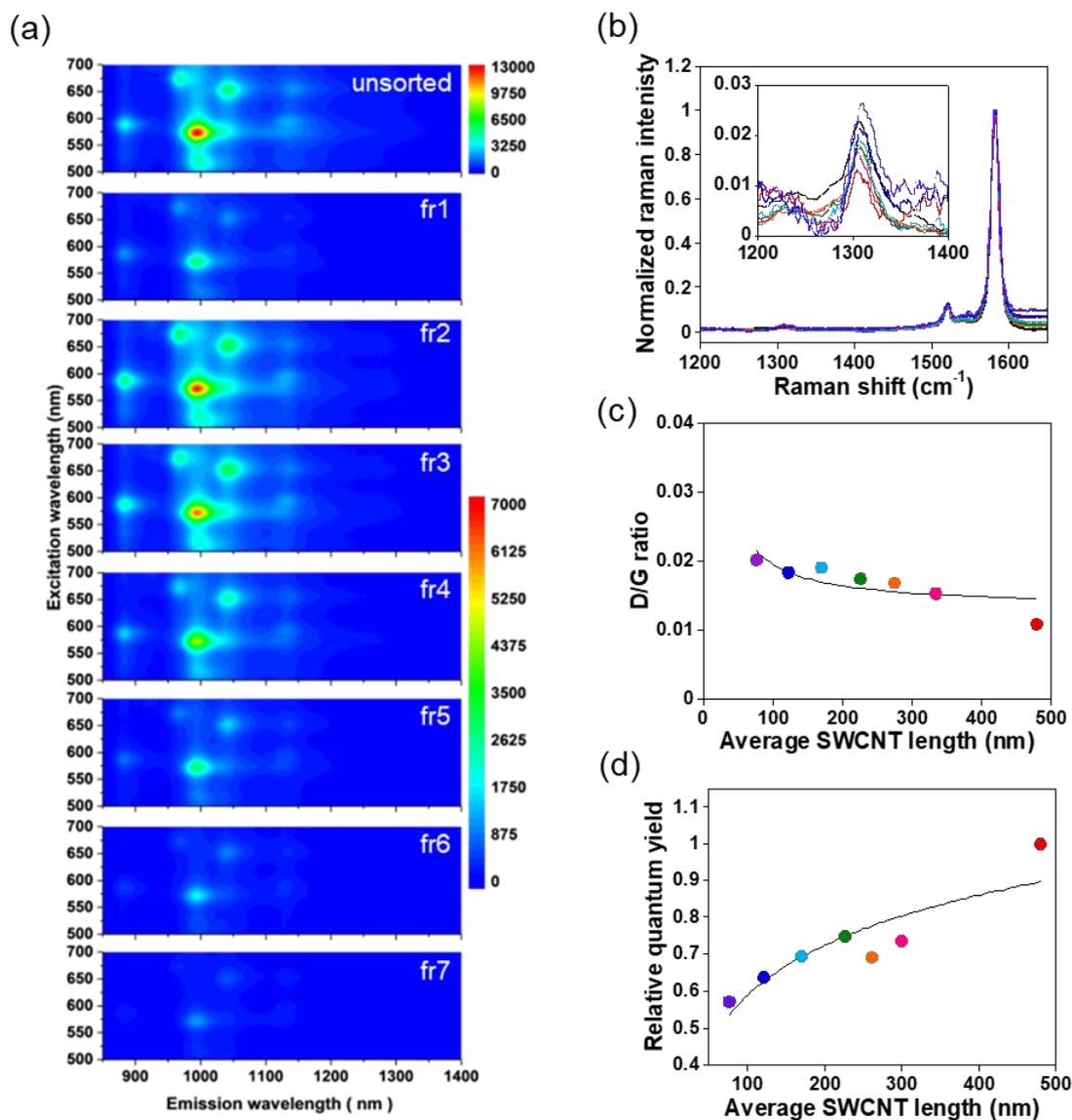


Figure S12. (a) PL counter plots of unsorted, fr1, fr2, fr3, fr4, fr5, fr6 and fr7 of *endo*-FpM/PEG/SWCNTs dispersions. (b) Raman spectra of unsorted (black), fr1 (red), fr2 (pink), fr3 (orange), fr4 (green), fr5 (sky blue), fr6 (blue) and fr7 (purple) of *endo*-FpM/PEG/SWCNTs. The insert graph is detailed near the D-band. (c) D/G ratio of fr1 (red), fr2 (pink), fr3 (orange), fr4 (green), fr5 (sky blue), fr6 (blue) and fr7 (purple). (d) Relative quantum yields of (6, 5)-SWCNT fr1 (red), fr2 (pink), fr3 (orange), fr4 (green), fr5 (sky blue), fr6 (blue) and fr7 (purple) of *endo*-FpM/PEG/SWCNTs. Curves are eye guides.

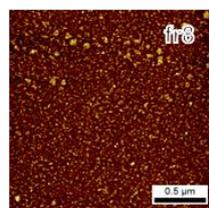
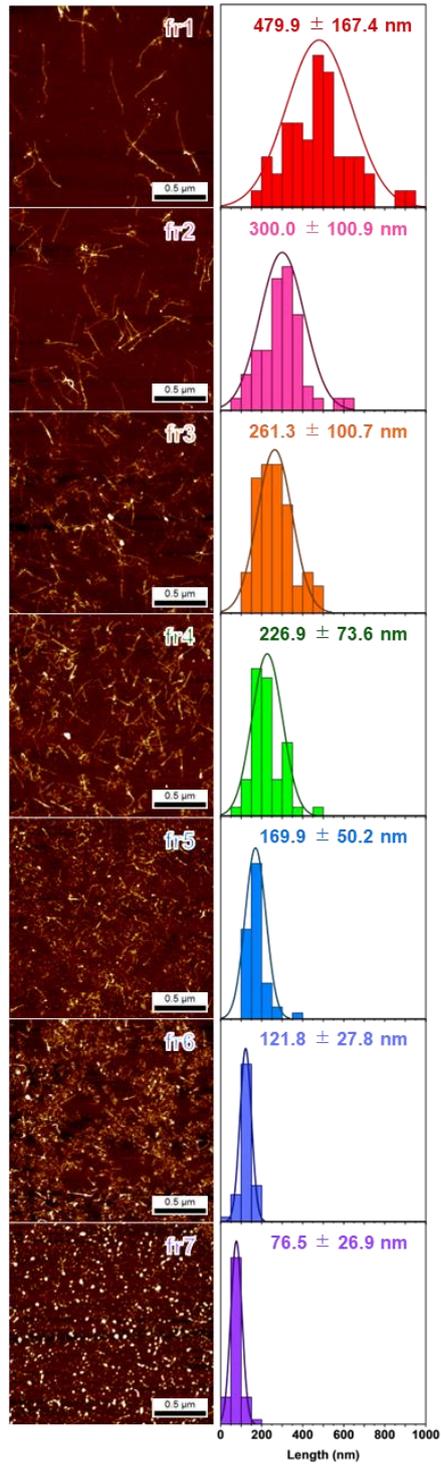


Figure S13. AFM images and length distribution of unsorted, fr1, fr2, fr3, fr4, fr5, fr6, fr7 and fr8 of *endo*-FpM/PEG/SWCNTs. Displayed values are mean length \pm standard deviation for N=50.