Electronic Supplementary Material (ESI) for Nanoscale Advances.

Surfactant-Assisted Individualization and Dispersion of Boron Nitride Nanotubes

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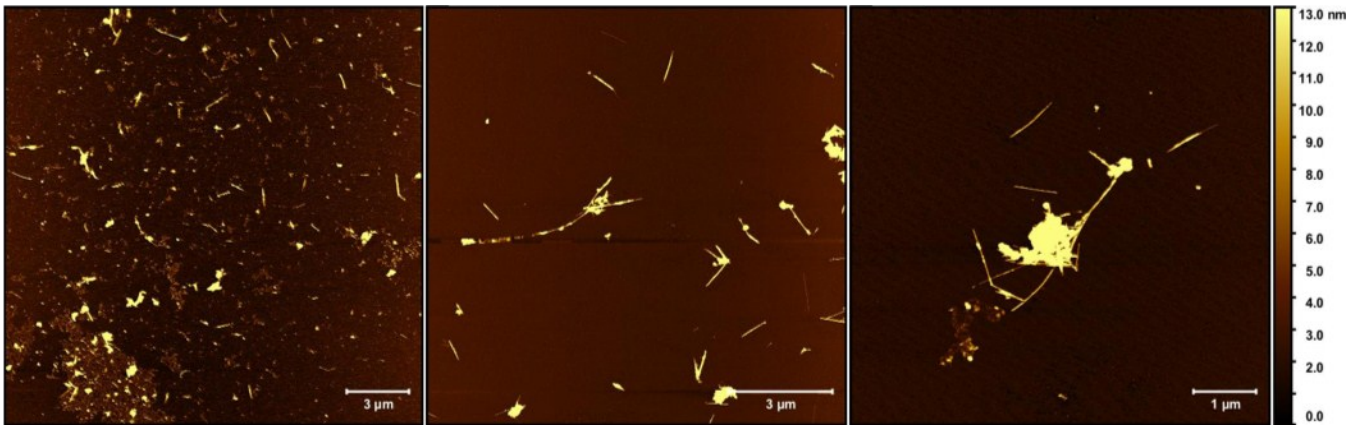
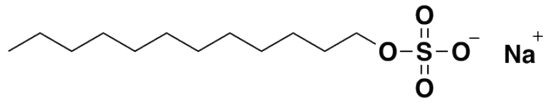
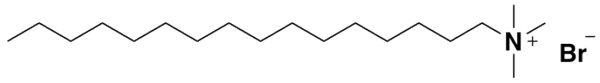


Figure S1. BNNTs dispersed in SDS after undergoing slow centrifugation (100g). h-BN impurities and large aggregates of tubes are prevalent in the sample.

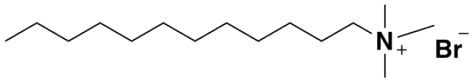
Sodium dodecylsulfate (SDS)



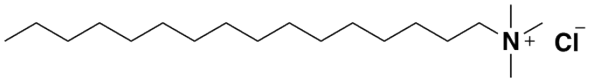
Cetyltrimethylammonium bromide (CTAB)



Dodecyltrimethylammonium bromide (DTAB)

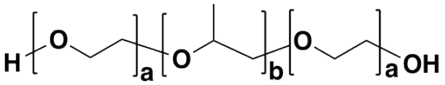


Cetyltrimethylammonium chloride (CTAC)



Pluronic®

ABA - PF108(a=132,b=50), PF87(a=67,b=39), PL81(a=3,b=43)



BAB - P17R4(b=14,a=24)

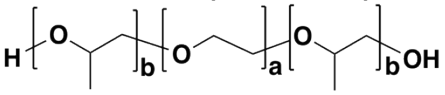


Figure S2. Chemical structures of surfactants used in our experiments

Figure S3. Images of BNNT dispersions in (from left to right) SDS, CTAB, DTAB, CTAC, Pluronic F108, Pluronic F87, Pluronic L81, Pluronic 17R4. All dispersions, except Pluronic 17R4, produce the Tyndall Effect, demonstrating that they contain dispersed particles.

Surfactant[a]	Molecular Weight[b]	BNNT Mass Conversion[c]	SWCNT Mass Conversion[1]	Control Mass Conversion
Anionic				
SDS	288.4	3.9 ± 0.3%	3.3 ± 0.5%	0.1 ± 0.4%
Cationic				
CTAB	364.5	8 ± 2%	5.1%	-0.2 ± 0.9%
DTAB	308.4	8 ± 2%	5.6%	
CTAC	320.0	6 ± 2%	n/a	
Nonionic				
Pluronic F108	14,600 (11,680)	10 ± 2%	8.7%	0 ± 1%
Pluronic F87	7,700 (5,390)	3 ± 1%	8.8%	
Pluronic L81	2,800 (280)	2.5±0.4%	0%	
Pluronic 17R4	2,700 (1,080)	0 ± 1%	n/a	

Table S1. BNNT dispersion in the seven sample surfactants

[a]SDS = sodium dodecyl sulfate;; CTAB = cetyltrimethylammonium bromide; DTAB = dodecyltrimethylammonium bromide; CTAC = cetyltrimethylammonium chloride

[b]For the Pluronic dispersions, the molecular weight of the PEO component is included in parentheses

[c]Mass conversion results were compared to those obtained by Moore and coworkers for SWCNTs[1] and a control.

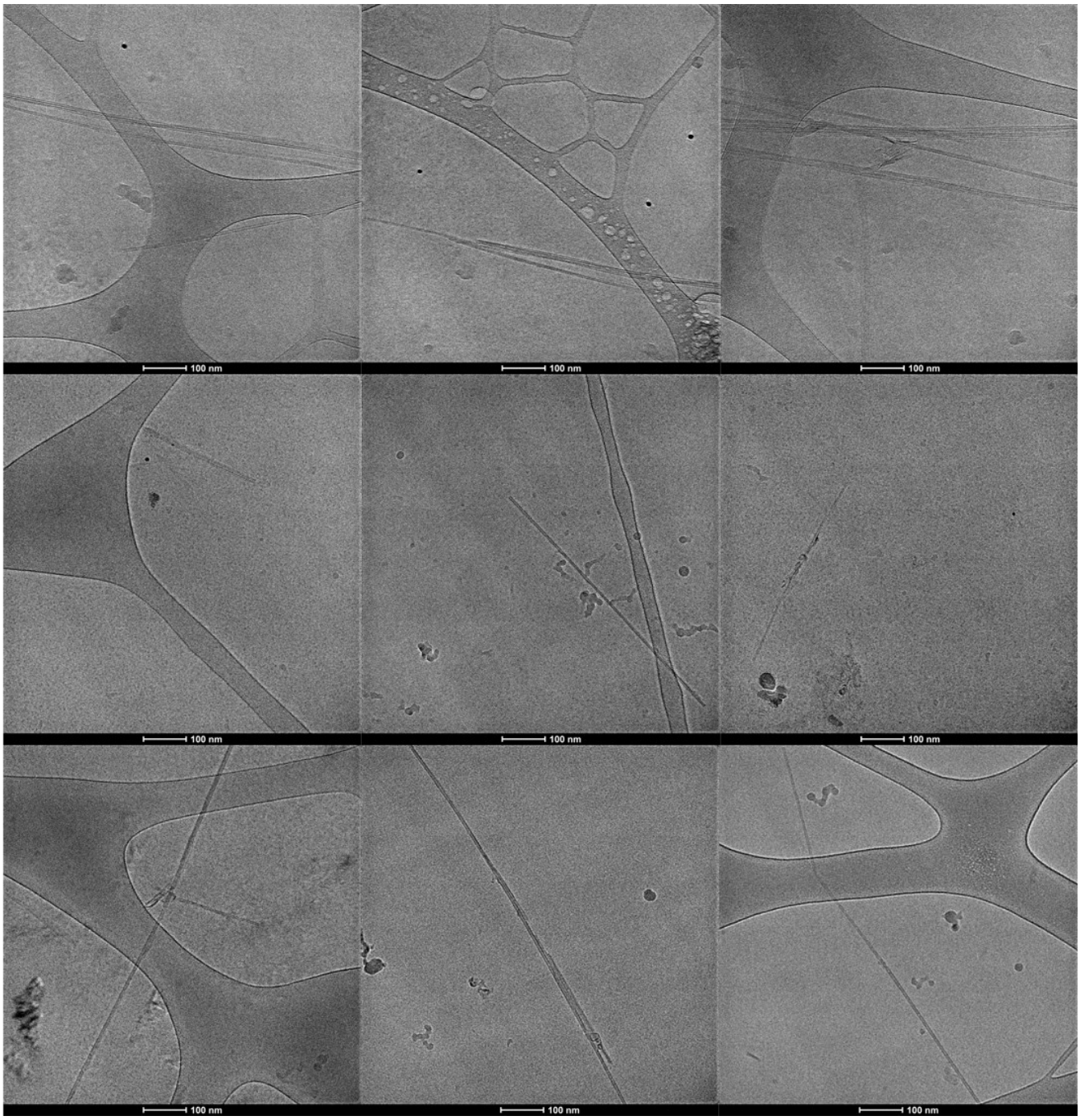


Figure S4. Cryo-TEM images of additional BNNTs from the dispersions in SDS (top), CTAB (middle), and Pluronic F 108 (bottom). These images further demonstrate the individualization of BNNTs in the dispersions.

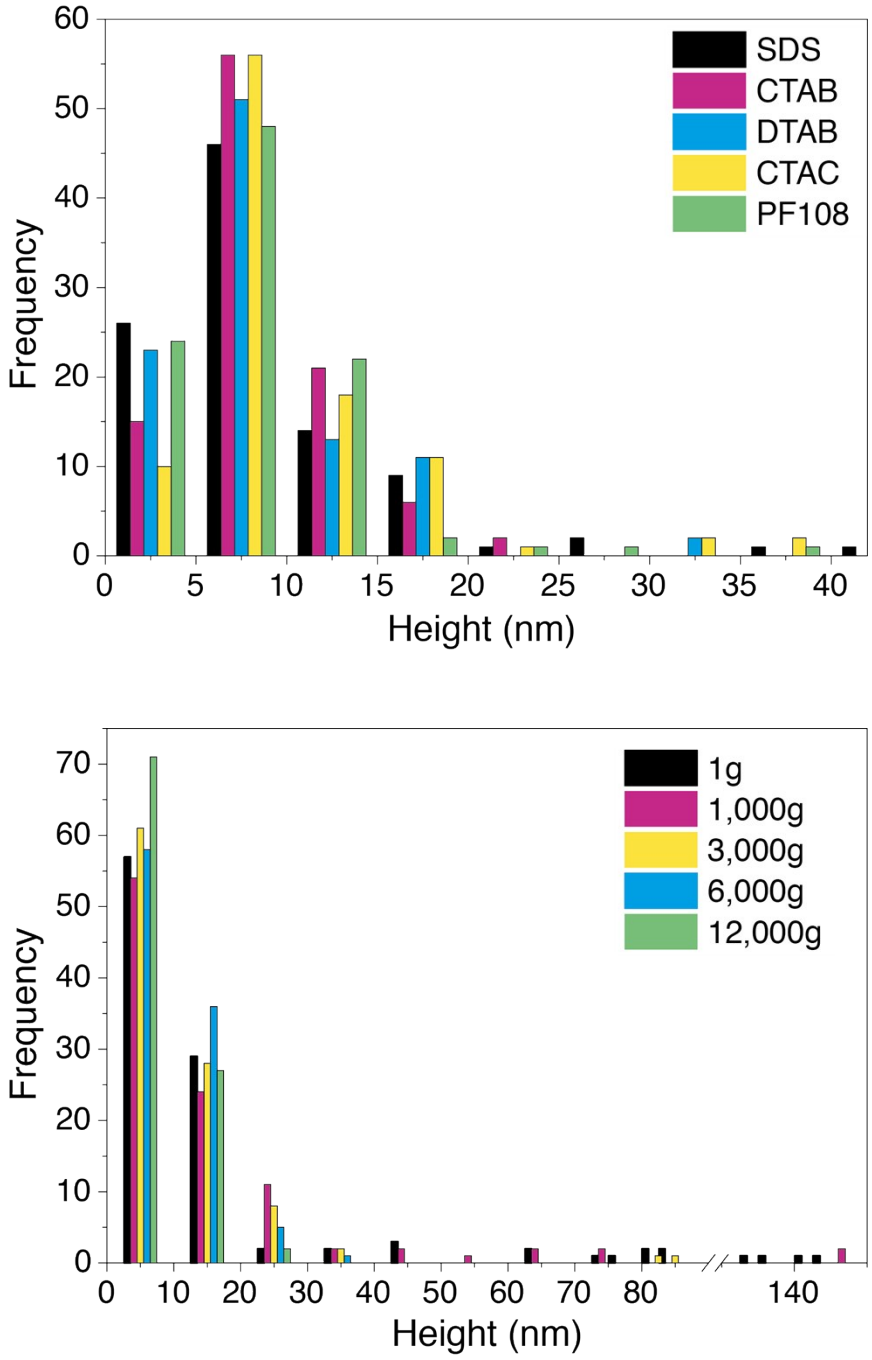


Figure S5. Histograms comparing the bundle height of 100 randomly chosen BNNT materials in different surfactants (top) and after undergoing different centrifugation rates (bottom) in CTAB. The histogram comparing the different surfactants reveals that at least 95% of those measured had a height less than 20 nm and the average bundle size was below 10 nm. The histogram of samples that underwent different centrifugation rates demonstrates how increasing centrifugation rate impacts the composition of the supernatant, with large aggregates getting removed with centrifugation rates greater than 3,000g.

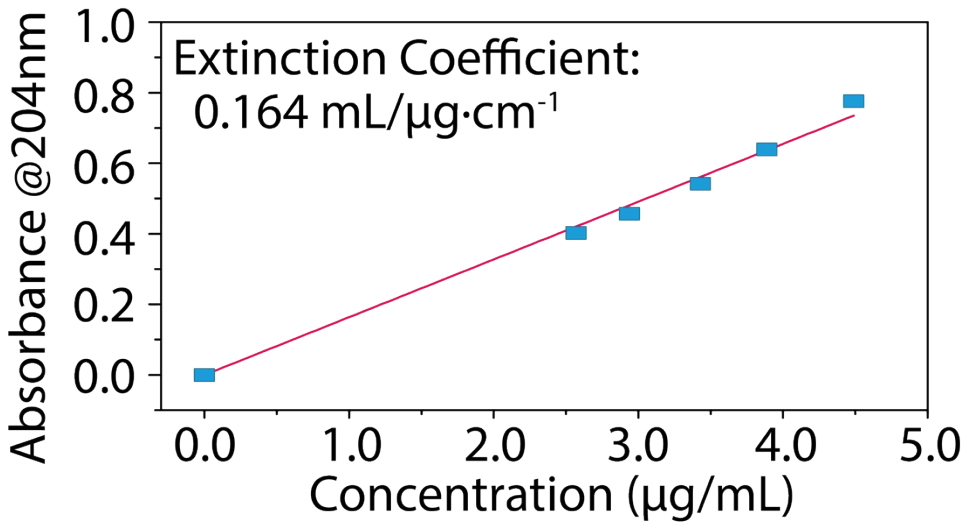


Figure S6. Absorbance at 204 nm of BNNT-SDS dispersions as a function of BNNT concentration. The slope of the line, 0.164 mL/µg•cm^{-1}, is the extinction coefficient for the dispersion.

REFERENCES

1 V. C. Moore, M. S. Strano, E. H. Haroz, R. H. Hauge, R. E. Smalley, J. Schmidt and Y. Talmon, *Nano Lett.*, 2003, **3**, 1379–1382.