Supplementary Material (ESI) for Journal of Materials Chemistry

Supplementary Table 1.

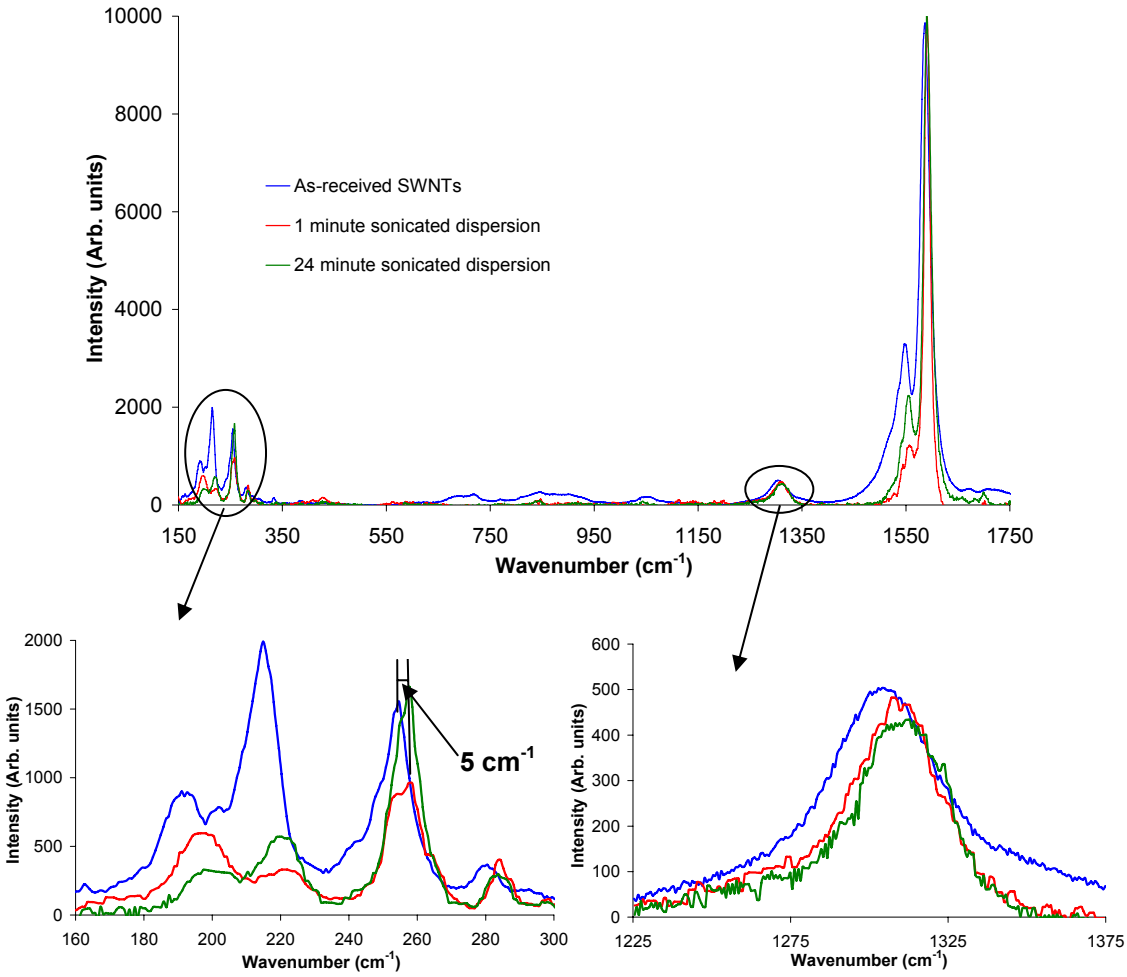
Effect of varying preparation conditions on the physical and electrical properties of SWNT buckypapers.

Dispersant	Membrane filter	Final dispersion volume (ml)	Sonication time (min)	Thickness (μm)	Density (kg m^{-3})	Contact angle (°)	Conductivity (S cm^{-1})
Triton X-100	5.0 μm PTFE	1000	24	31.5 ± 3.5	1160 ± 20	73 ± 5	127 ± 11
Triton X-10	0.45 μm PVDF	1000	24	28.0 ± 2.5	1330 ± 60	74 ± 6	124 ± 3
Triton X-100	0.45 μm nylon	1000	24	28.5 ± 1.0	1300 ± 40	75 ± 5	142 ± 8
Triton X-100	0.20 μm CN	1000	24	32.5 ± 3.0	1380 ± 80	70 ± 7	106 ±5
Triton X-100	5.0 μm PTFE	500	24	35.0 ± 2.5	1090 ± 30	78 ± 7	94 ± 4
Triton X-100	5.0 μm PTFE	250	24	36.0 ± 1.0	1090 ± 30	68 ± 8	84 ± 4
Triton X-100	5.0 μm PTFE	80	24	41.5 ± 2.0	1360 ± 80	73 ± 6	80 ± 6
Triton X-100	0.20 μm CN	80	24	53.0 ± 4.0	1100 ± 50	69 ± 3	79 ± 6
Triton X-100	5.0 μm PTFE	1000	12	29.0 ± 1.5	1150 ± 50	0	100 ± 9
Triton X-100	5.0 μm PTFE	1000	36	10.5 ± 1.0	1120 ± 20	70 ± 7	101 ± 5
Triton X-100	5.0 μm PTFE	1000	48	9.5 ± 2.0	1360 ± 50	51 ± 8	64 ± 3
Triton X-100	0.45 μm nylon	80	24	31.0 ± 2.0	1130 ± 60	73 ± 4	85 ± 5
Lysozyme	0.45 μm nylon	1000	24	35.5 ± 3.0	1075 ± 50	80 ± 7	138 ± 6
Lysozyme	0.45 μm nylon	500	24	90.0 ± 4.5	1060 ± 30	92 ± 6	132 ± 5
Lysozyme	0.45 μm nylon	250	24	54.0 ± 5.5	1240 ± 60	88 ± 7	127 ± 6
Lysozyme	0.45 μm nylon	80	24	55.0 ± 2.5	1300 ± 60	74 ± 4	52 ± 3
Lysozyme	5.0 μm PTFE	80	24	88.0 ± 6.0	1085 ± 50	63 ± 3	25 ± 4
Lysozyme	0.20 μm CN	80	24	76.0 ± 3.5	1095 ± 50	75 ± 5	44 ± 5
Lysozyme	0.45 μm nylon	1000	12	84.0 ± 3.0	930 ± 40	79 ± 4	32 ± 5
Lysozyme	0.45 μm nylon	1000	36	67.0 ± 4.0	1130 ± 20	73 ± 5	12 ± 3
Lysozyme	0.45 μm nylon	1000	48	75.5 ± 4.5	1030 ± 30	58 ± 2	10 ± 3
BSA	0.20 μm CN	1000	24	72.0 ± 2.5	1370 ± 60	99 ± 6	26 ± 3
BSA	0.20 μm CN	500	24	69.0 ± 3.0	940 ± 30	104 ± 10	19 ± 3
BSA	0.20 μm CN	250	24	84.0 ± 3.0	1110 ± 70	93 ± 5	15 ± 3
BSA	0.20 μm CN	80	24	74.0 ± 2.5	990 ± 20	65 ± 10	12 ± 3
BSA	0.20 μm CN	1000	12	83.5 ± 4.5	1090 ± 50	99 ± 11	16 ± 4
BSA	0.20 μm CN	1000	36	66.5 ± 5.0	1240 ± 80	79 ± 3	9 ± 2
BSA	0.20 μm CN	1000	48	73.5 ± 4.5	1150 ± 40	59 ± 2	4 ± 1
BSA	0.45 μm nylon	80	24	74.0 ± 2.5	1050 ± 30	67 ± 6	12 ± 3
Chitosan	0.45 μm nylon	80	24	67.0 ± 2.0	1120 ± 50	76 ± 4	47 ± 3
Chitosan	0.20 μm CN	80	24	70.0 ± 2.5	1220 ± 60	85.0 ± 5	40 ± 4
Gellan gum	0.45 μm nylon	80	24	114.0 ± 6.0	1120 ± 60	71 ± 5	4 ± 1
Gellan gum	0.20 μm CN	80	24	117.5 ± 3.0	1220 ± 40	61 ± 3	3 ± 1

Supplementary Table 2.

Effect of varying preparation conditions on the mechanical properties of SWNT buckypapers.

Dispersant	Membrane filter	Final dispersion volume (ml)	Sonication time (min)	Young's modulus (GPa)	Tensile strength (MPa)	Ductility (% El)	Toughness ($J\ g^{-1}$)
Triton X-100	5.0 μm PTFE	1000	24	1.6 ± 0.6	15.7 ± 6.4	2.1 ± 0.5	0.11 ± 0.1
Triton X-100	0.45 μm PVDF	1000	24	2.7 ± 0.7	29.5 ± 4.6	1.1 ± 0.2	0.12 ± 0.02
Triton X-100	0.45 μm nylon	1000	24	2.5 ± 0.2	18.0 ± 0.4	1.8 ± 0.1	0.12 ± 0.01
Triton X-100	0.20 μm CN	1000	24	3.1 ± 0.2	35.0 ± 7.7	2.2 ± 0.5	0.36 ± 0.09
Triton X-100	5.0 μm PTFE	500	24	1.6 ± 0.1	21.3 ± 3.7	1.8 ± 0.2	0.19 ± 0.01
Triton X-100	5.0 μm PTFE	250	24	1.3 ± 0.5	20.6 ± 9.5	2.3 ± 0.9	0.20 ± 0.01
Triton X-100	5.0 μm PTFE	80	24	1.4 ± 0.2	17.5 ± 5.0	2.1 ± 0.7	0.13 ± 0.01
Triton X-100	5.0 μm PTFE	1000	12	0.9 ± 0.4	11.6 ± 2.3	2.4 ± 0.1	0.14 ± 0.01
Triton X-100	5.0 μm PTFE	1000	36	1.0 ± 0.2	11.7 ± 3.5	2.8 ± 0.3	0.32 ± 0.06
Triton X-100	5.0 μm PTFE	1000	48	0.8 ± 0.1	6.7 ± 1.2	0.9 ± 0.4	0.05 ± 0.03
Triton X-100	0.45 μm nylon	80	24	1.5 ± 0.6	20.8 ± 4.3	1.2 ± 0.2	0.12 ± 0.03
Lysozyme	0.45 μm nylon	1000	24	1.1 ± 0.8	16.0 ± 5.9	1.3 ± 0.1	0.05 ± 0.03
Lysozyme	0.45 μm nylon	500	24	0.9 ± 0.3	18.9 ± 3.0	3.4 ± 0.6	0.46 ± 0.04
Lysozyme	0.45 μm nylon	250	24	1.8 ± 0.7	9.7 ± 0.2	1.0 ± 0.1	0.05 ± 0.01
Lysozyme	0.45 μm nylon	80	24	1.3 ± 0.3	25.0 ± 8.4	1.2 ± 0.6	0.17 ± 0.04
Lysozyme	5.0 μm PTFE	80	24	0.9 ± 0.1	12.7 ± 7.6	2.5 ± 0.1	0.05 ± 0.02
Lysozyme	0.20 μm CN	80	24	1.7 ± 0.1	20.9 ± 5.5	1.9 ± 0.1	0.27 ± 0.01
Lysozyme	0.45 μm nylon	1000	12	1.1 ± 0.2	13.4 ± 0.5	1.2 ± 0.1	0.06 ± 0.01
Lysozyme	0.45 μm nylon	1000	36	2.4 ± 0.5	9.0 ± 2.9	2.8 ± 0.8	0.19 ± 0.03
Lysozyme	0.45 μm nylon	1000	48	1.0 ± 0.2	11.2 ± 0.8	1.2 ± 0.1	0.07 ± 0.01
BSA	0.20 μm CN	1000	24	1.9 ± 0.4	23.3 ± 5.6	1.3 ± 0.2	0.13 ± 0.07
BSA	0.20 μm CN	500	24	1.7 ± 0.2	12.5 ± 0.5	0.8 ± 0.1	0.06 ± 0.01
BSA	0.20 μm CN	250	24	0.9 ± 0.1	10.5 ± 2.1	1.8 ± 0.5	0.09 ± 0.02
BSA	0.20 μm CN	80	24	0.8 ± 0.3	24.8 ± 2.9	4.8 ± 0.3	0.84 ± 0.16
BSA	0.20 μm CN	1000	12	1.8 ± 0.1	11.6 ± 3.7	1.0 ± 0.2	0.09 ± 0.02
BSA	0.20 μm CN	1000	36	0.7 ± 0.1	11.2 ± 3.8	1.8 ± 0.7	0.05 ± 0.01
BSA	0.20 μm CN	1000	48	1.2 ± 0.2	11.3 ± 2.6	0.9 ± 0.1	0.06 ± 0.02
BSA	0.45 μm nylon	80	24	1.8 ± 0.5	26.9 ± 4.2	3.6 ± 0.5	0.65 ± 0.05
Chitosan	0.45 μm nylon	80	24	2.0 ± 0.5	32.7 ± 3.5	11.4 ± 1.3	1.68 ± 0.08
Chitosan	0.20 μm CN	80	24	0.4 ± 0.1	25.2 ± 1.1	8.4 ± 1.3	1.68 ± 0.20
Gellan gum	0.45 μm nylon	80	24	1.6 ± 0.6	39.2 ± 2.4	12.6 ± 0.6	1.62 ± 0.14
Gellan gum	0.20 μm CN	80	24	0.4 ± 0.2	30.2 ± 6.3	8.4 ± 0.7	1.17 ± 0.19



Supplementary Figure 1. Raman spectra of as-received SWNTs, and dispersions prepared by sonicating SWNTs and Triton X-100 (1%) for either 1 minute or 24 minutes, normalised with respect to the intensity of the D-band. **(B)** Expanded view of the radial breathing mode region. **(C)** Expanded view of the D Band region.