

**Electronic supplementary information**

**Sonochemical reaction to control the near-infrared photoluminescence properties of single-walled carbon nanotubes**

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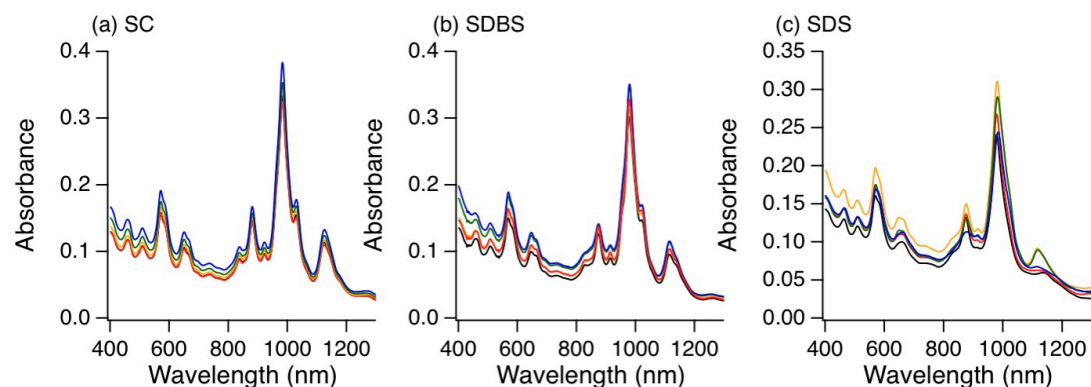
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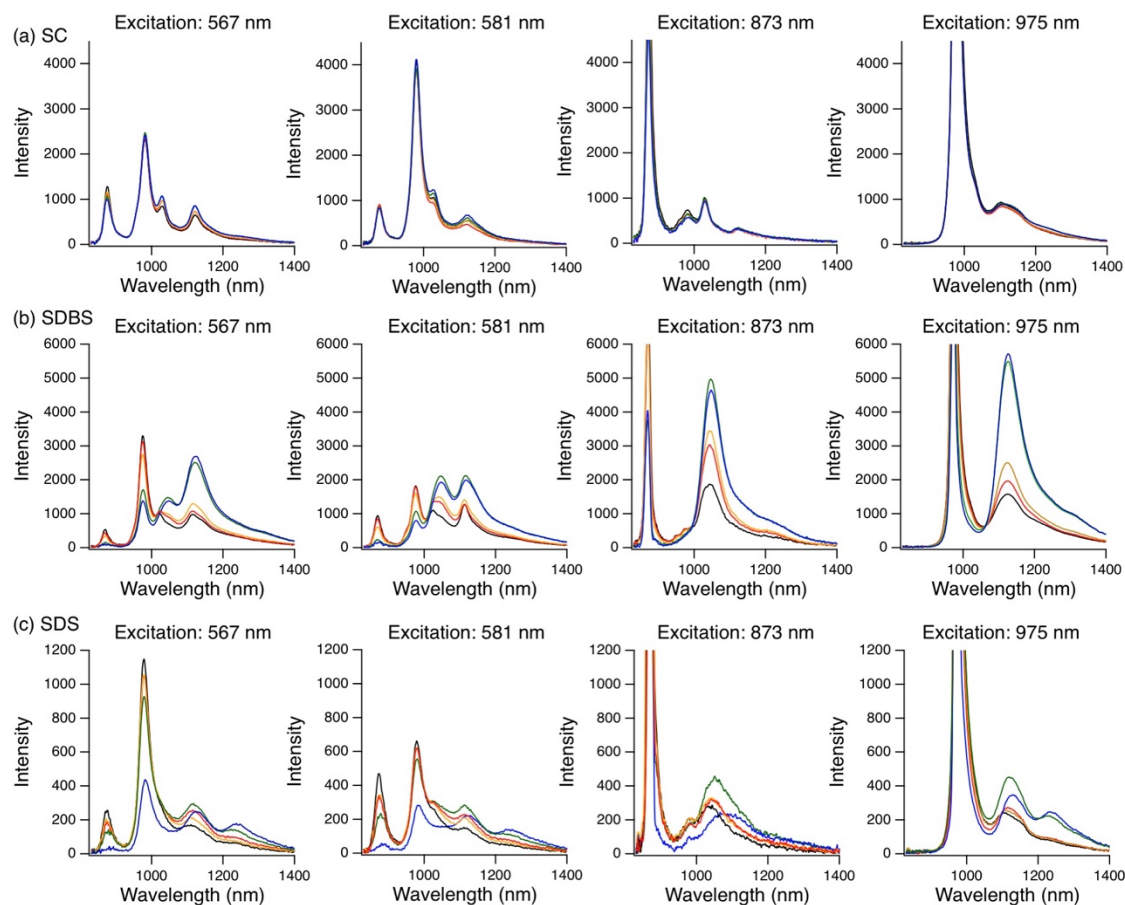
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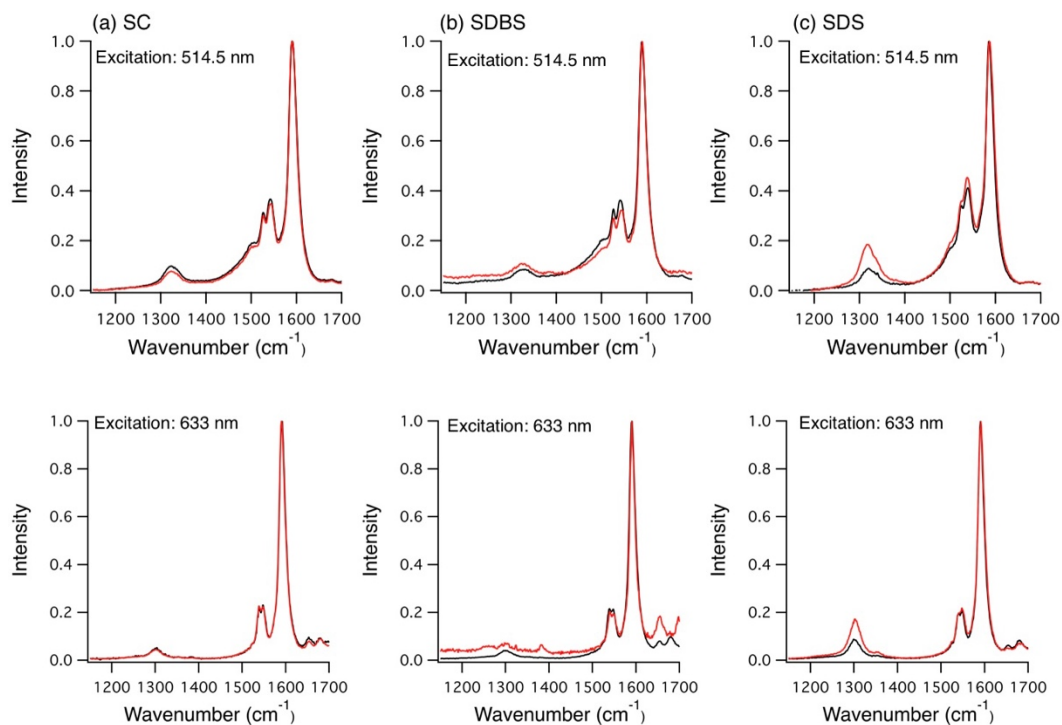
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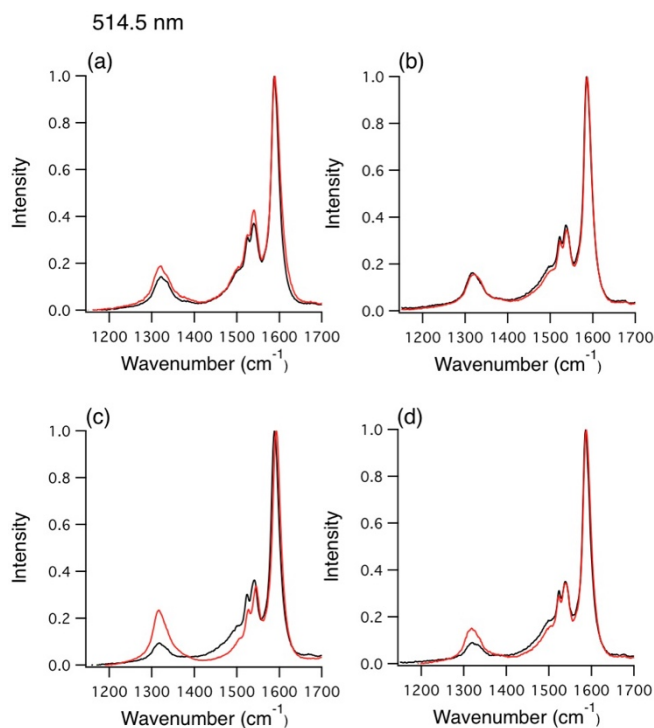
**Figure S1.** Absorption spectra of single-walled carbon nanotubes (SWNTs; 0.0125 g/L) dispersed in a D<sub>2</sub>O solution containing 1 wt% surfactant: (a) SC, (b) SDBS, (c) SDS. Sonication time: 1 h (black); 1.5 h (red); 2 h (orange); 4 h (green); 6 h (blue).



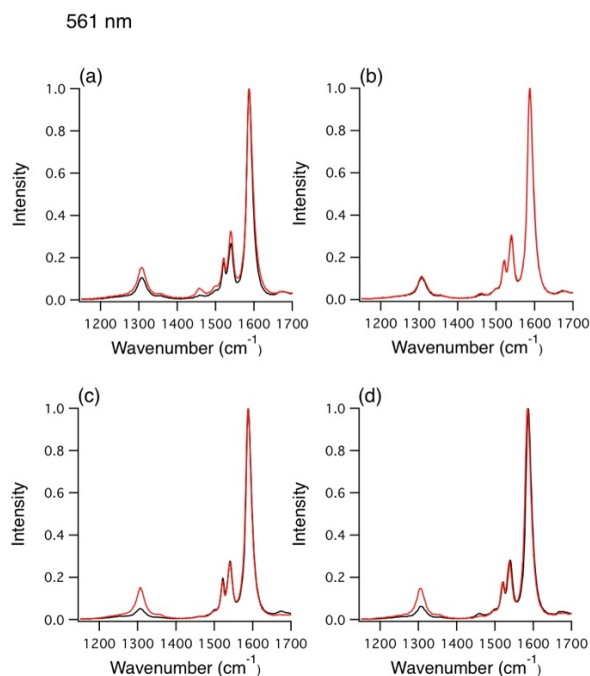
**Figure S2.** Photoluminescence (PL) spectra of SWNTs (0.0125 g/L) dispersed in a D<sub>2</sub>O solution containing 1 wt% surfactant under 567, 581, 873, and 975 nm excitation: (a) SC, (b) SDBS, (c) SDS. Sonication time: 1 h (black); 1.5 h (red); 2 h (orange); 4 h (green); 6 h (blue).



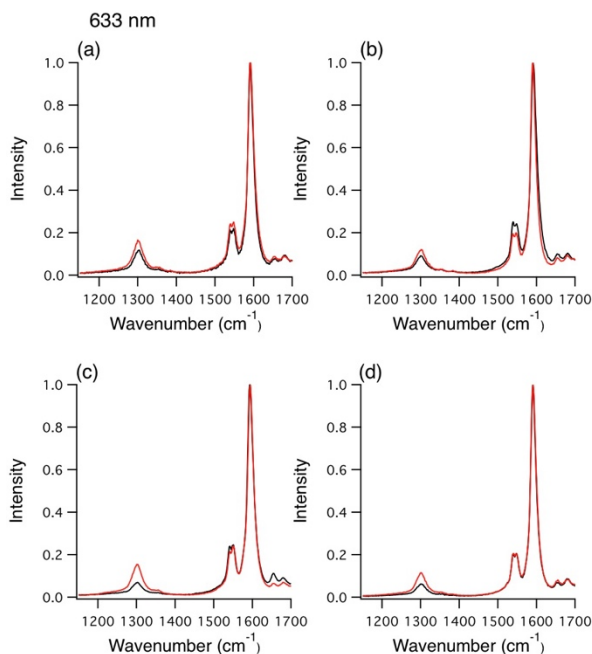
**Figure S3.** Raman spectra of SWNTs (films) after sonication in a  $D_2O$  solution containing a surfactant. Sonication time: 1 h (black); 6 h (red).



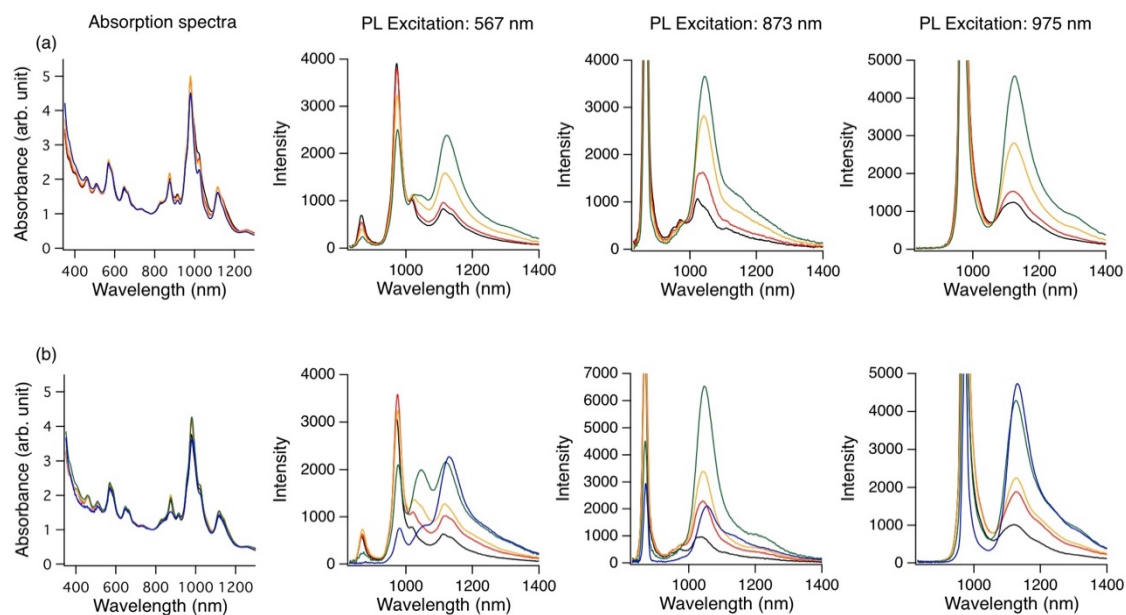
**Figure S4.** Raman spectra of SWNTs (0.01 g/L) dispersed in a  $D_2O$  solution containing 1 wt% SDBS under 514.5 nm excitation. (a) Ambient condition, (b) ambient condition with BuOH, (c) Ar atmosphere, (d) Ar atmosphere with BuOH. Black: Sonicated for 4 h, red: Sonicated for 10 h.



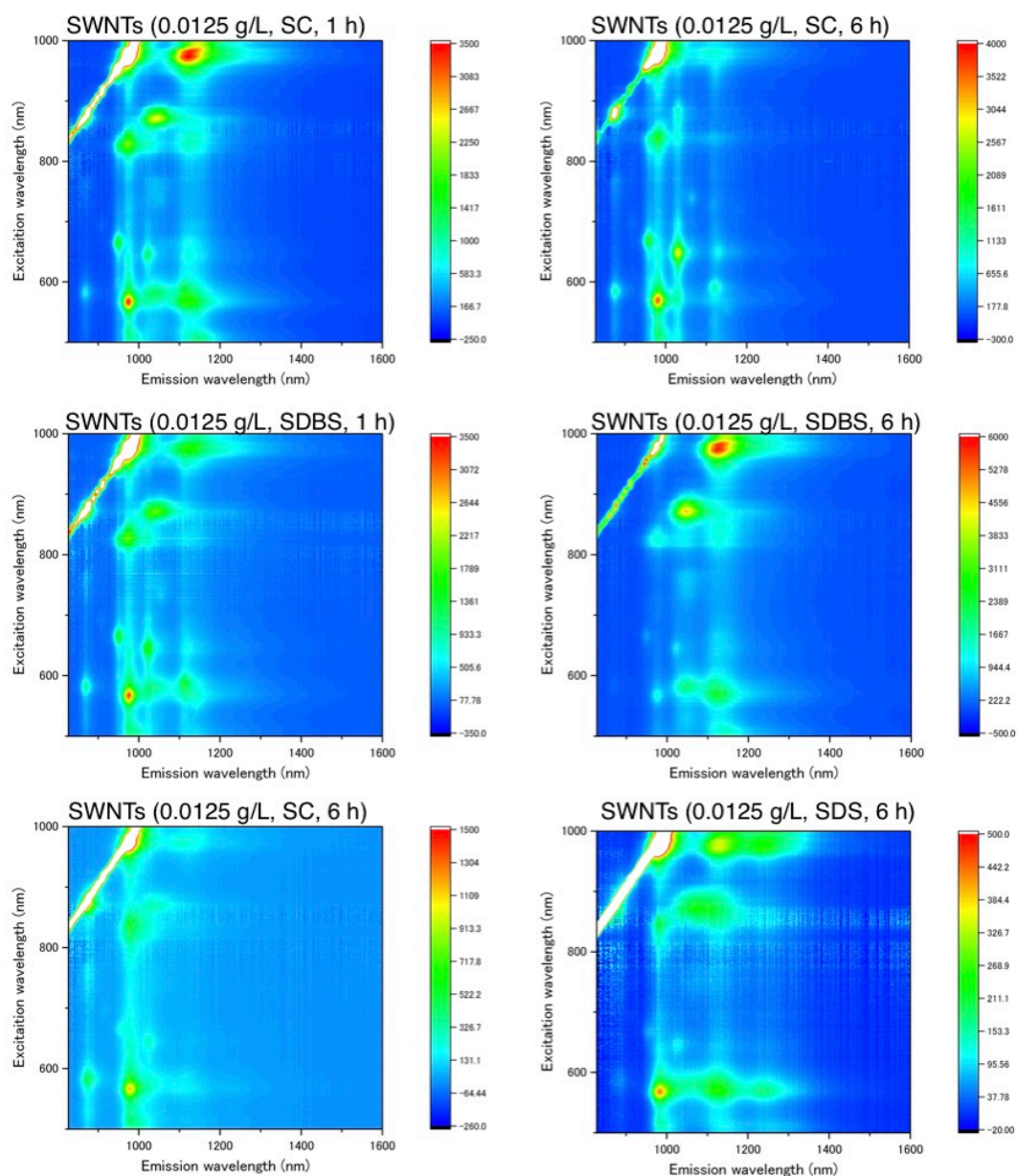
**Figure S5.** Raman spectra of SWNTs (0.01 g/L) dispersed in a D<sub>2</sub>O solution containing 1 wt% SDBS under 561 nm excitation. (a) Ambient condition, (b) ambient condition with BuOH, (c) Ar atmosphere, (d) Ar atmosphere with BuOH. Black: sonicated for 4 h, red: sonicated for 10 h.



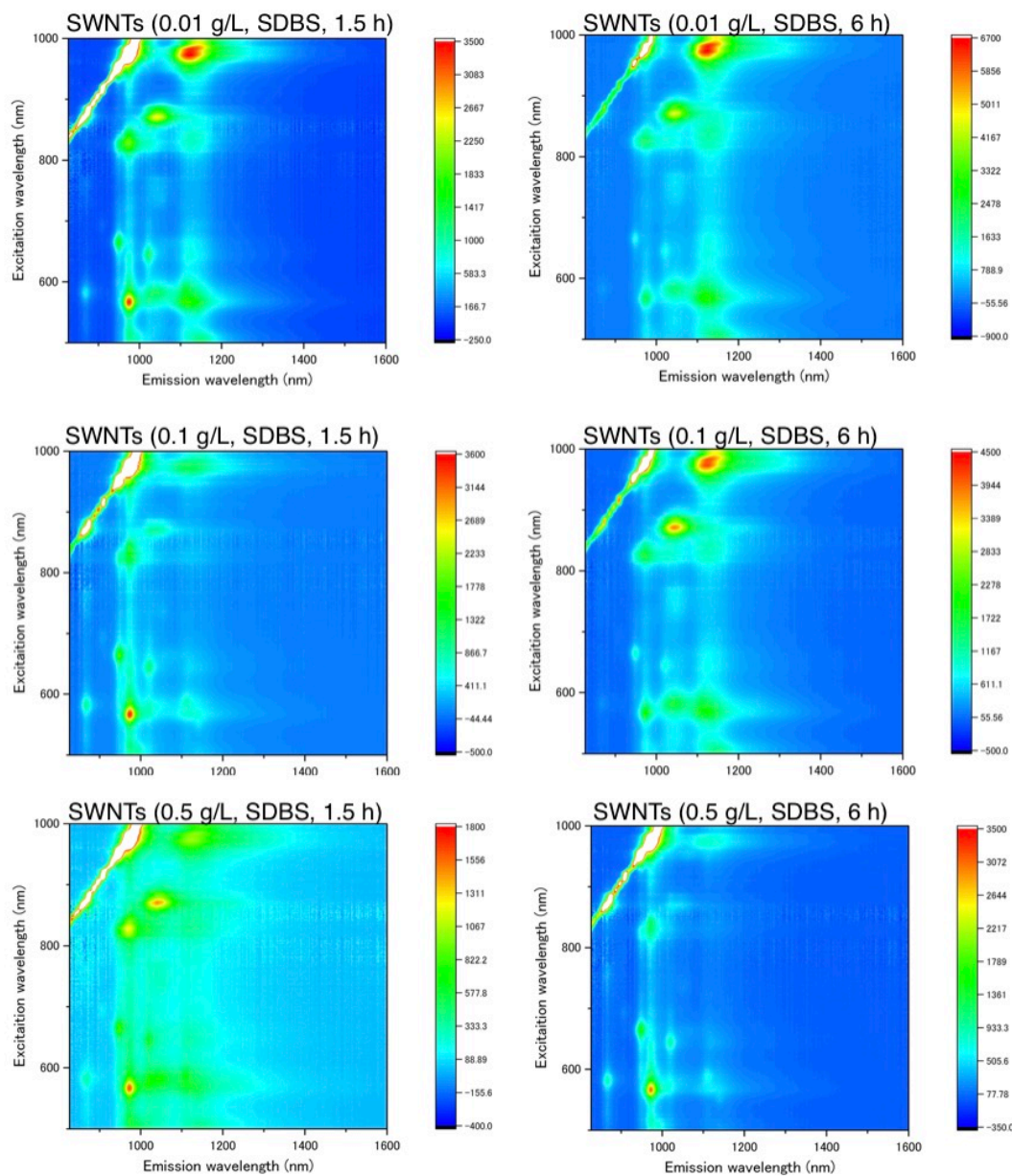
**Figure S6.** Raman spectra SWNTs (0.01 g/L) dispersed in a D<sub>2</sub>O solution containing 1 wt% SDBS under 633 nm excitation. (a) Ambient condition, (b) ambient condition with BuOH, (c) Ar atmosphere, (d) Ar atmosphere with BuOH. Black: sonicated for 4 h, red: sonicated for 10 h.



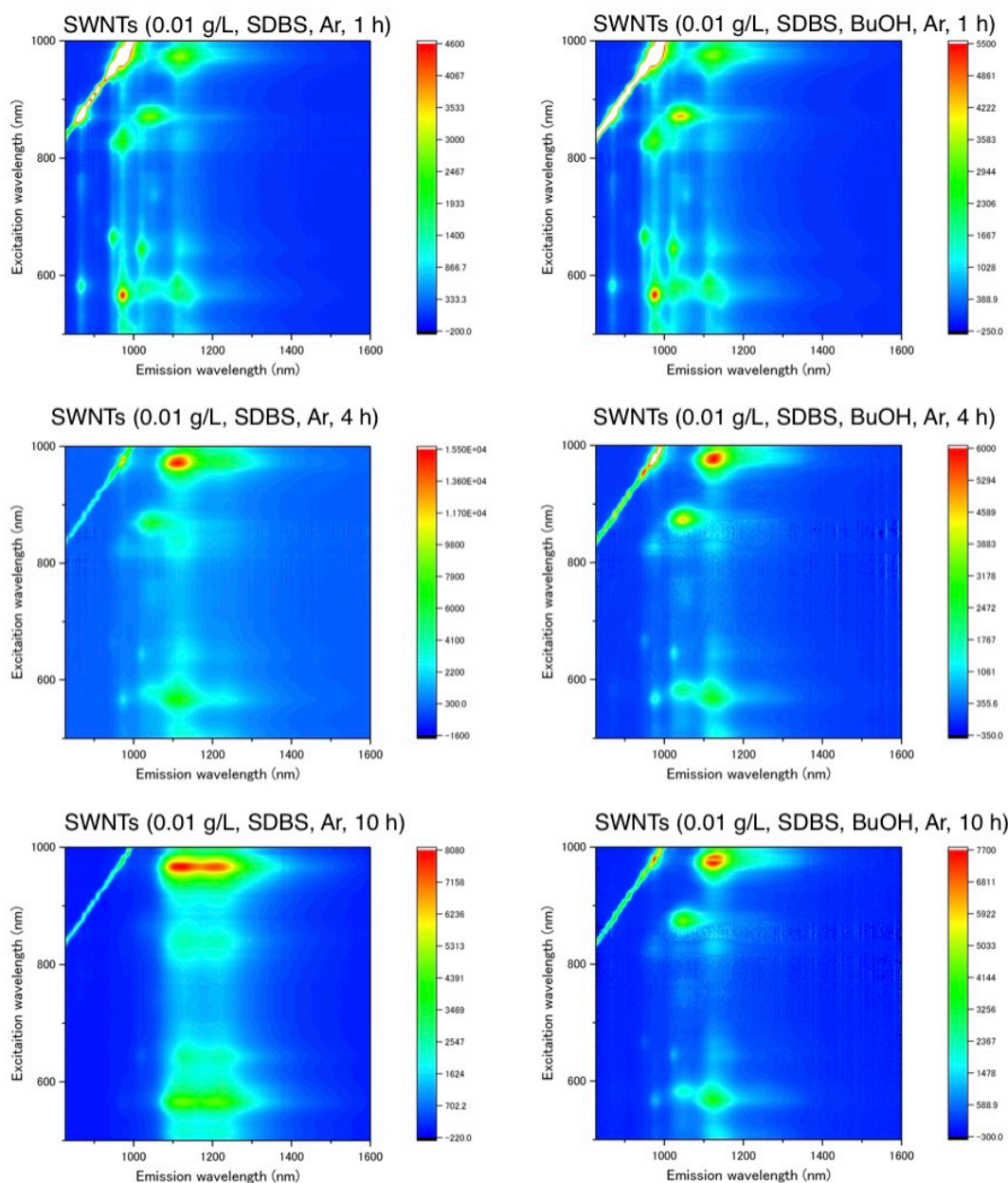
**Figure S7.** Absorption and PL spectra of SWNTs (0.01 g/L) dispersed in a D<sub>2</sub>O solution containing 1 wt% SDBS. (a) O<sub>2</sub> atmosphere and (b) ambient condition. Sonication time: 0.5 h (black); 2 h (red); 4 h (orange); 10 h (green); 46 h (blue).



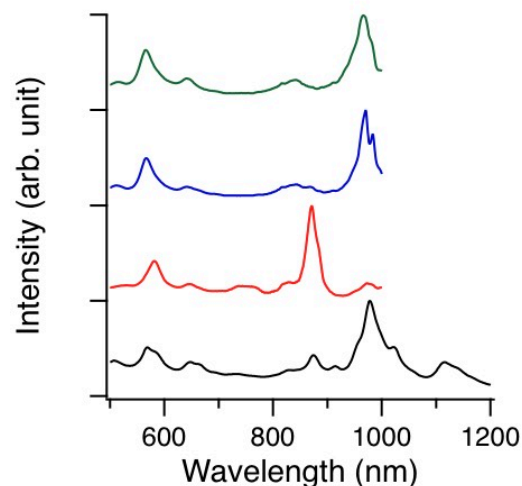
**Figure S8.** Contour plots of the fluorescence intensity versus the excitation and emission wavelength of SWNTs (0.0125 g/L) dispersed in a D<sub>2</sub>O solution containing 1 wt% surfactant under ambient condition.



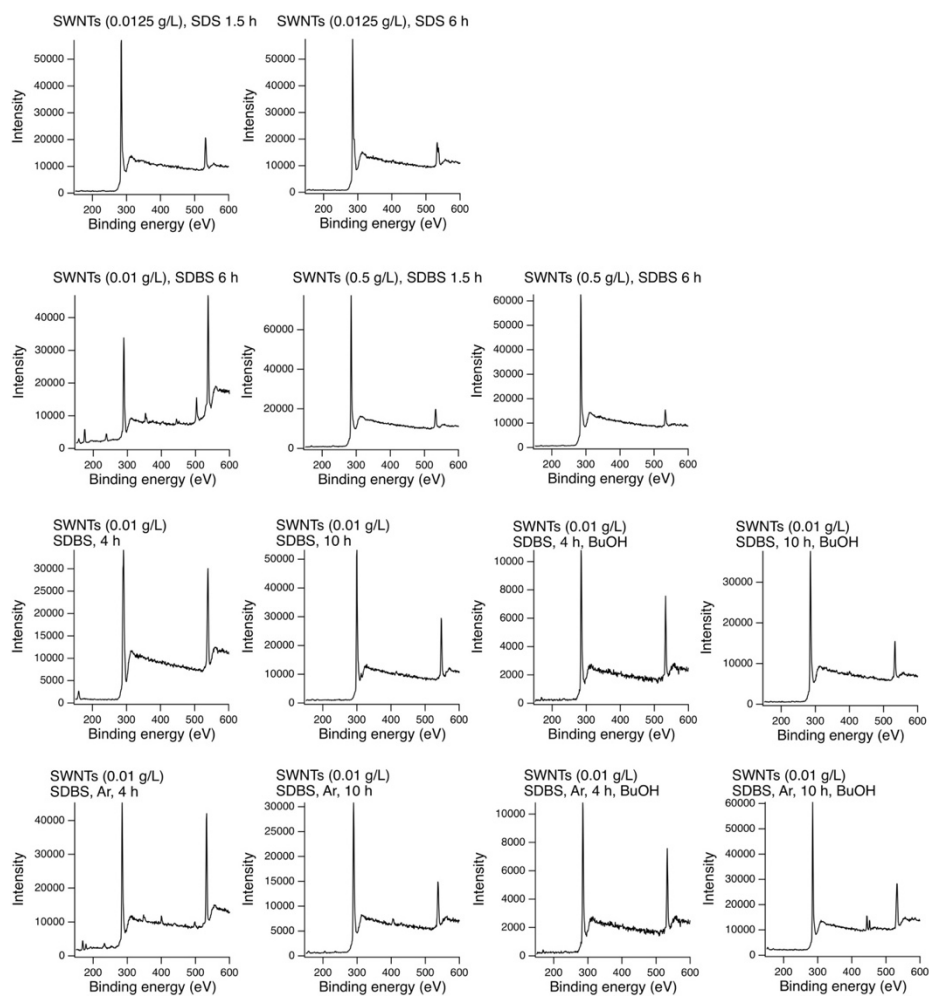
**Figure S9.** Contour plots of the fluorescence intensity versus the excitation and emission wavelength of SWNTs (0.01, 0.1, and 0.5 g/L) dispersed in a D<sub>2</sub>O solution containing 1 wt% surfactant under ambient condition.



**Figure S10.** Contour plots of the fluorescence intensity versus the excitation and emission wavelength of SWNTs (0.01 g/L) dispersed in a D<sub>2</sub>O solution containing 1 wt% surfactant under Ar atmosphere with and without 1-butanol.



**Figure S11.** Absorption spectrum (Black: sonication time of 2 h) and excitation spectra (Red: 1044 nm, sonication time of 2 h; Blue: 1118 nm, sonication time of 4 h; Green: 1221 nm, sonication time of 10 h) of SWNTs dispersed in a  $D_2O$  solution containing 1 wt% SDBS under Ar atmosphere.



**Figure S12.** X-ray photoelectron spectra of SWNTs.

**Table S1.** Sonication condition, procedure, atomic ratio of C vs. O estimated by XPS, D/G,  $E_{11}$  absorption peak intensity of (6,5)SWNTs normalized at local minimum near 780 nm, and  $E_{11}$  PL peak intensity of (6,5)SWNTs excited at 567 nm.

	Surfactant	SWNTs (g/L)	Atmosphere	Sonication time (h)	Additive	Atomic ratio C1s	Atomic ratio O1s	D/G <sub>514.5</sub>	D/G <sub>561</sub>	D/G <sub>633</sub>	$E_{11}$ absorption peak	$E_{11}$ PL peak intensity	Procedure
1	SDS	0.0125	air	1		0.91	0.09	0.09	0.08	0.09	3.59	1151	A
2	SDS	0.0125	air	6		0.91	0.09	0.18	0.14	0.17	3.18	437	A
3	SDBS	0.1	air	6		0.69	0.31	-	-	-	5.43	2252	A
4	SDBS	5	air	1.5		0.94	0.06	0.06	0.04	0.05	5.26	3098	A
5	SDBS	5	air	6		0.95	0.05	0.06	0.03	0.05	4.01	1618	A
6	SDBS	0.1	air	4		0.81	0.19	0.14	0.11	0.12	4.27	3246	B
7	SDBS	0.1	air	10		0.85	0.15	0.19	0.15	0.17	4.27	2101	B
8	SDBS	0.1	air	20		0.92	0.08	0.16	0.10	0.11	4.25	1767	B
9	SDBS	0.1	air	46		0.92	0.08	0.16	0.10	0.11	3.64	758	B
10	SDBS	0.1	air	4	BuOH	0.81	0.19	0.18	0.10	0.10	4.04	4213	B
11	SDBS	0.1	air	10	BuOH	0.89	0.11	0.15	0.11	0.12	4.02	2522	B
12	SDBS	0.1	Ar	4		0.76	0.24	0.09	0.05	0.07	4.54	2145	B
13	SDBS	0.1	Ar	10		0.87	0.13	0.23	0.15	0.16	2.74	275	B
14	SDBS	0.1	Ar	4	BuOH	0.8	0.20	0.09	0.06	0.06	5.34	5042	B
15	SDBS	0.1	Ar	10	BuOH	0.86	0.14	0.15	0.15	0.12	4.89	1899	B