Supporting Information

A One-Pot, Large-Scale Synthesis of Organic Color Center-Tailored Semiconducting Carbon Nanotubes

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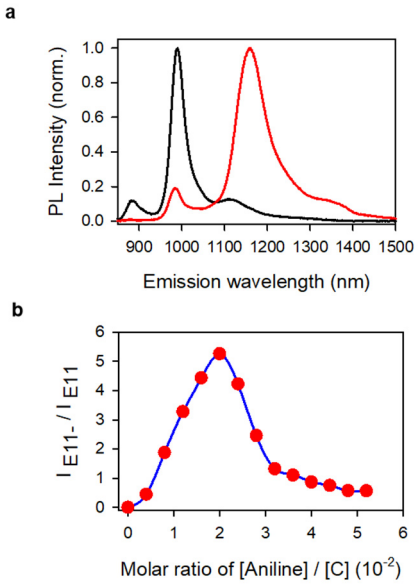

Figure S1. (a) PL spectra (at 565 nm excitation) of pristine SWCNTs (black) and $C_6H_3(NO_2)_2$-OCC-tailored-SWCNT (red) dispersed in 2 wt/v% DOC-D_2O solution. (b) The PL intensity ratio of E_{11}^{-}/E_{11} as a function of the initial relative concentration of aniline and carbon. By adjusting the initial relative amounts of the reagents, the PL intensity of the synthesized OCC-SWCNTs can be controlled.

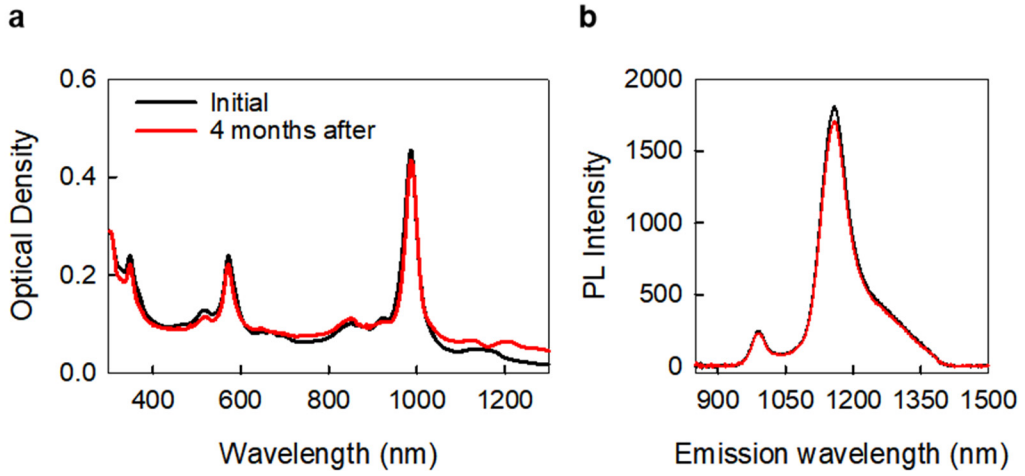

Figure S2. Stability of OCC-(6,5)-SWCNTs in 2 wt/v% DOC-D_2O solution. (a) UV-Vis-NIR absorption and (b) PL spectra (565 nm excitation) of the solution before (black line) and after 4 months (red line).

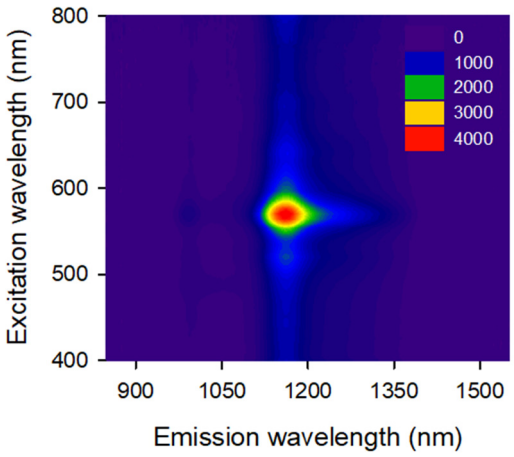

Figure S3. The excitation-emission PL map of OCC-(6,5)-SWCNTs in 2 wt/v% DOC-D_2O solution. The optical density of the solution was adjusted to ~0.1 at the (6,5) E_{11} transition for PL measurement, and the spectral integration time was 1 s. Note that this E_{11}^{-} brightness is similar to the OCCs that were created by aqueous diazonium chemistry[1] at the same PL measurement condition.

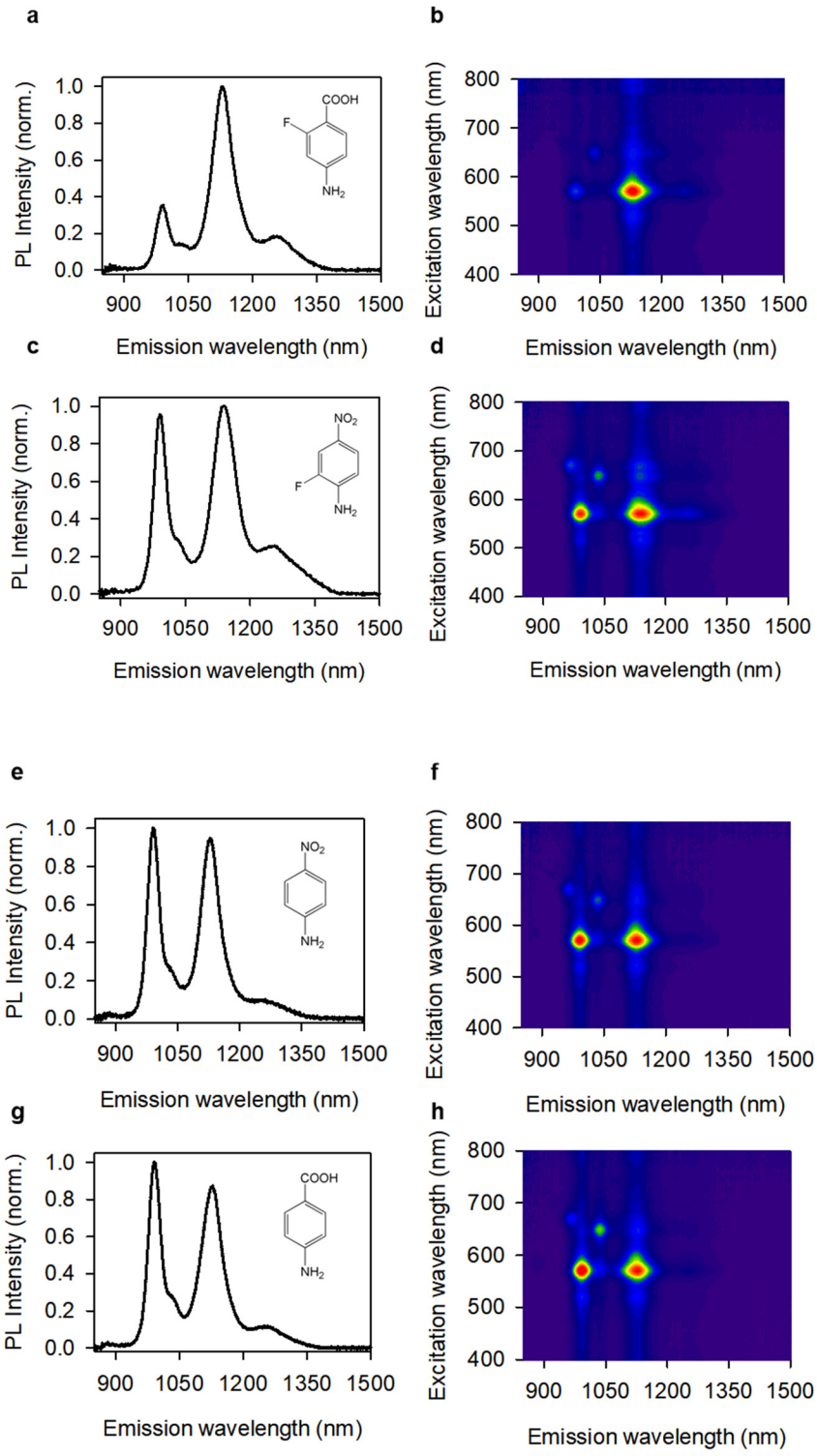

Figure S4. The PL spectra (at 565 nm excitation) and excitation-emission maps of OCC-SWCNTs synthesized from different anilines, including (a, b) 4-amino-3-fluorobenzoic

acid, (c, d) 2-fluoro-4-nitroaniline, (e, f) 4-nitroaniline and (g, h) 4-aminobenzoic acid. The OCC-SWCNTs were stabilized as individual nanotubes in 2 wt/v% DOC-D_2O solution.

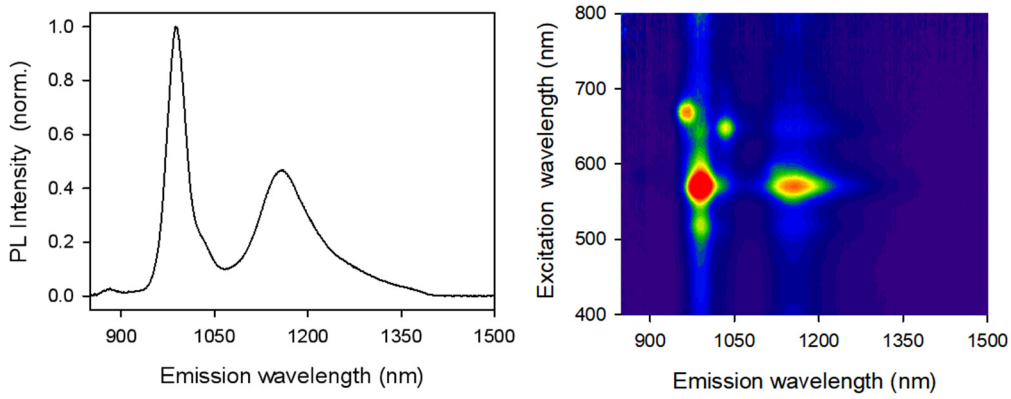

Figure S5. The PL spectrum (at 565 nm excitation) and excitation-emission map of $C_6H_3(NO_2)_2$-OCC-tailored-SWCNTs that were directly stabilized as individual particles by a superacid-surfactant exchange process.

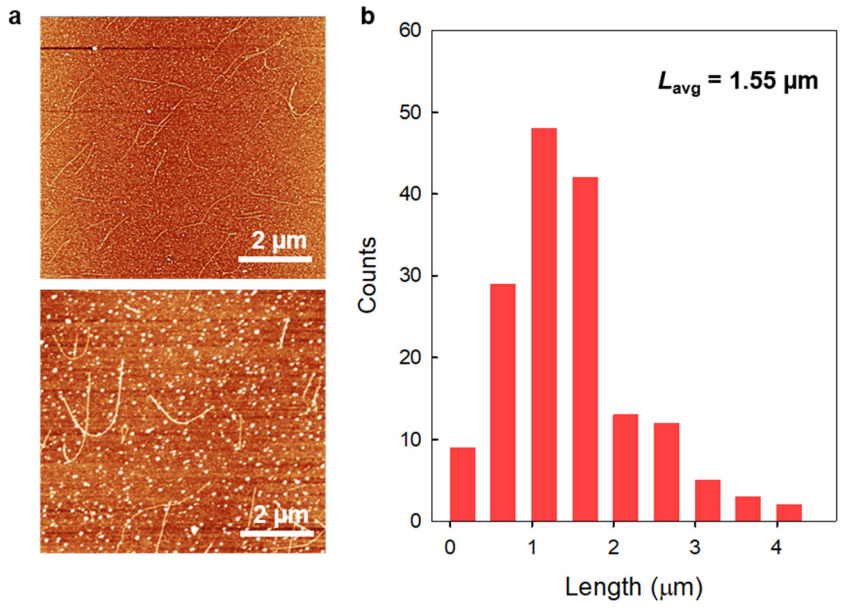

Figure S6. AFM imaging and length distribution of the $C_6H_3(NO_2)_2$-OCC-tailored-SWCNTs. In total 163 OCC-SWCNTs were analyzed for the average length characterization. The standard deviation was 816 nm.

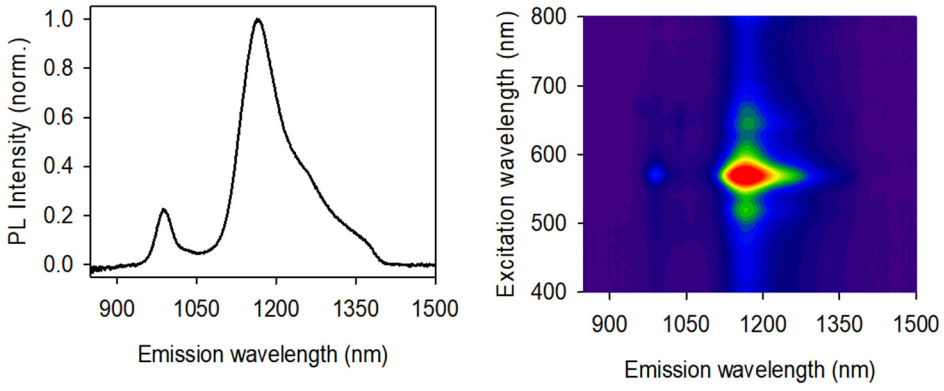

Figure S7. The PL spectrum (at 565 nm excitation) and excitation-emission map of the $C_6H_3(NO_2)_2$-OCC-tailored-SWCNT sample produced from the separate S2E step.

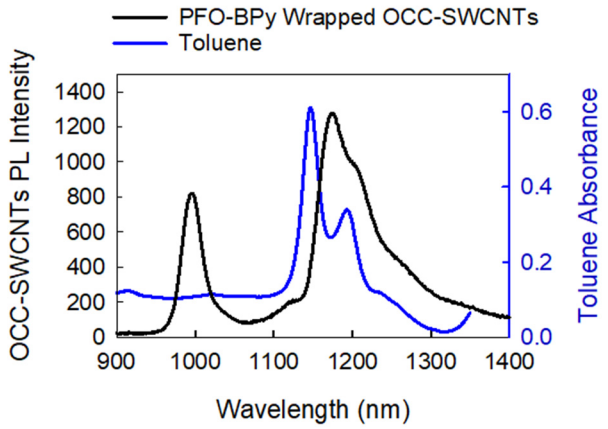

Figure S8. The PL spectrum (565 nm excitation) of PFO-BPy wrapped OCC-SWCNTs in toluene (black) and the absorption spectrum of toluene (blue). The wavelengths overlapping between the toluene absorption and E_{11}^{-} emission must have contributed to a smaller E_{11}^{-}/E_{11} ratio than that of OCC-SWCNTs dispersed in aqueous solution.

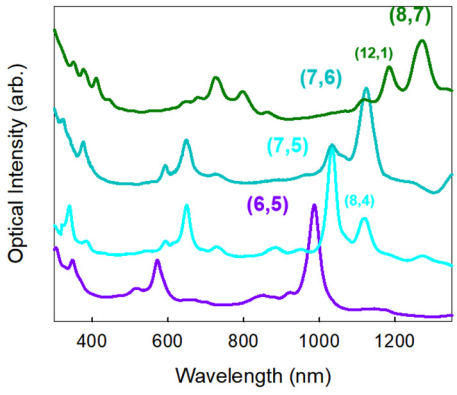

Figure S9. UV-vis-NIR absorption spectra of ATPE-sorted $C_6H_3(NO_2)_2$-OCC-tailored-SWCNT.

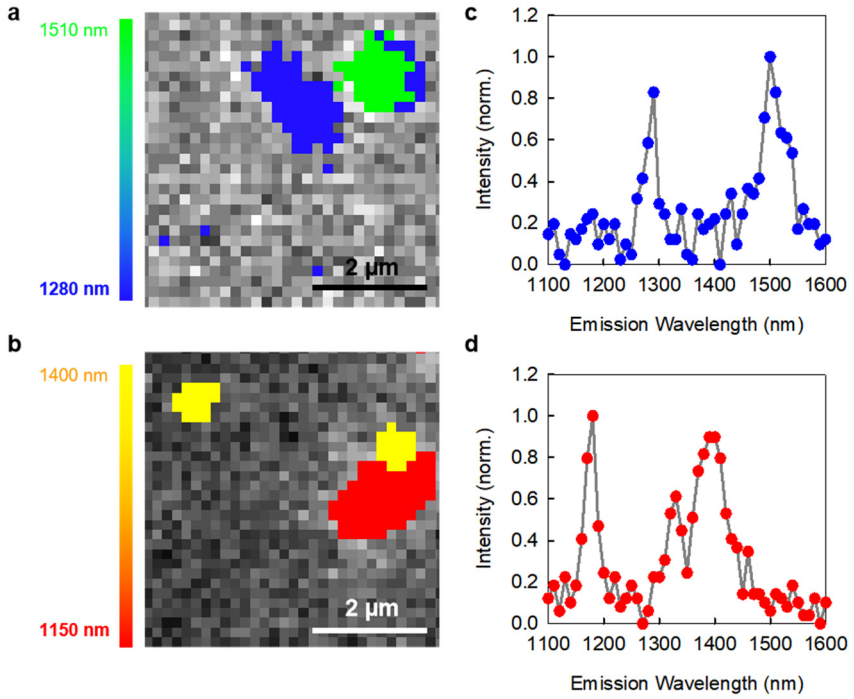

Figure S10. Hyperspectral PL images and corresponding PL emission spectra of $C_6H_3(NO_2)_2$-OCC-tailored-(8,7)-SWCNT (a, c) and $C_6H_3(NO_2)_2$-OCC-tailored-(12,1)-SWCNT (b, d).

Supporting References

1. Piao, Y.; Meany, B.; Powell, L. R.; Valley, N.; Kwon, H.; Schatz, G. C.; Wang, Y. Brightening of Carbon Nanotube Photoluminescence through the Incorporation of sp^3 Defects. *Nat. Chem.* **2013**, *5*, 840-845.