Supporting Information

Spectroscopic investigation of electrochemically charged individual (6,5) single walled carbon nanotubes

Sebastian Schäfer,[†] Nicole M. B. Cogan,[†] and Todd D. Krauss^{*,†,‡}

Department of Chemistry, University of Rochester, Rochester, New York 14627, United States, and Institute of Optics, University of Rochester, Rochester, New York 14627, United States

E-mail: krauss@chem.rochester.edu

*To whom correspondence should be addressed

[†]Department of Chemistry

[‡]Institute of Optics

Photoluminescence Excitation (PLE) Spectroscopy

The PLE map was obtained using a 1 cm path length quartz cuvette and a home-built fluorometer system consisting of a 450 W xenon arc lamp source coupled to a SpectraPro 150 monochromator system for excitation, and a SpectraPro 300i monochromator equipped with a liquid-N₂ cooled InGaAs detector for emission detection. Excitation wavelengths ranged from 500 to 800 nm with a 5 nm excitation step. SWNT emission was measured from 850 to 1300 nm every 2 nm with an integration time of 500 ms. All spectra were corrected for the power of the excitation source as well as the efficiency of the monochromator and the detector. The PLE map was normalized to the peak of maximum intensity.

Figure S1. PLE map of CoMoCAT SWNTs suspended by single stranded DNA (GT)₃₀. (n,m) structures that could be spectrally resolved in the CoMoCAT sample are labeled for clarity. The PLE map is normalized to the peak of maximum intensity. The horizontal white dashed lines indicates the excitation wavelength (568 nm) used in the individual SWNT experiments; the vertical white dashed line indicates the detection window (1000 ± 50 nm) used in the individual experiments.

Figure S2. Absorption (solid line) and photoluminescence (PL, dotted line) spectra of CoMOCAT SWNTs suspended by DNA (GT)₃₀. The PL spectrum was obtained with an excitation wavelength of 568 nm. (n,m) structures that could be spectrally resolved in the CoMoCAT sample are labeled for clarity.

Control Experiments to Determine Relative Surface Concentrations of Individual and Bundled SWNTs

Correlated topography and single particle fluorescence microscopy measurements have been performed to characterize the relative concentrations of individual SWNTs and SWNT bundles that exist on the sample surface. The methodology follows that described by Ebenstein et. al.¹ An individual SWNT is defined as a species which exhibits one distinguishable nanotube in an atomic force microscopy (AFM) height image and one peak in the photoluminescence (PL) spectrum. In contrast, a SWNT bundle is defined as a species that exhibits one distinguishable nanotube in an AFM height image, but two or more peaks in the PL spectrum. We find that the relative concentration of SWNT bundles on the sample surface is 31% (the remaining 69% are individual SWNTs). In the current study only individual (6,5) SWNTs are detected, therefore, only bundles that contain one (6,5) SWNT need to be considered. Using the relative distribution of SWNT chiralities that exist in the sample (determined from the PLE map), we calculate that 44% of all bundled pairs could contain one (6,5) SWNT. Combining these two factors, the maximum concentration of bundles that could exist in the present sample is 14%.

References

- 1) Ebenstein, Y.; Mokari, T.; Banin, U.; *Appl. Phys. Lett.* **2002**, *80*, 4033.