A Tunable Photosensor

Yan-Li Zhao,[†] Liangbing Hu,[‡] George Grüner,*[,‡] and J. Fraser Stoddart*[,†,§]

[†]*Department of Chemistry and Biochemistry and* [‡]*Department of Physics and Astronomy, University of California, Los Angeles, 405 Hilgard Avenue, Los Angeles, California 90095*

[§] *Department of Chemistry, Northwestern University, 2145 Sheridan Road, Evanston, Illinois 60208*

Supporting Information

Correspondence Addresses

Professor **George Grüner**
Department of Physics and Astronomy
University of California, Los Angeles
Los Angeles, CA 90095-1547 (USA)
Tel: (+1)-310-825-8782
Fax: (+1)-310-825-5734
Email: ggruner@ucla.edu

Professor **J Fraser Stoddart**
Department of Chemistry
Northwestern University
2145 Sheridan Road
Evanston, Illinois 60208-3113
Tel: (+1)-847-491-3793
Fax: (+1)-847-491-1009
Email: stoddart@northwestern.edu

Description for Figures

In ^{1}H NOESY spectrum (Figure S1) of β-cyclodextrin (0.5 mM) with the ADA-Ru complex (0.5 mM) in D_2O at 25 °C, NOE crosspeaks (A–C) between the protons of the adamantyl group and the H3 and H5 protons on the inside of the β-cyclodextrin ring and no NOE crosspeak between the protons of the phenanthroline group and the H3 and H5 protons are observed, indicating that the adamantyl group of the ADA-Ru complex is included in the hydrophobic cavity of the β-cyclodextrin ring.

Figure S2 presents a fluorescence spectrum of the pyrenecyclodextrin (2.82×10^{-6} mol L^{-1}) in aqueous solution at 25 °C with an excitation wavelength (λ_{ex}) of 274 nm.

Figure S3 shows the fluorescence spectral changes of the pyrenecyclodextrin (4.30×10^{-4} mol L^{-1}) upon addition of the SWNTs ($0 - 1.44 \times 10^{-3}$ g L^{-1}) in DMF solution at 25 °C with an excitation wavelength (λ_{ex}) of 274 nm.

Figure S4 shows a correlation between the absorption spectrum of the pyrenecyclodextrin and the changes in resistance of the pyrenecyclodextrin-SWNT/FET device.

Figure S5 presents a fluorescence spectrum of the ADA-Ru complex (3.76×10^{-6} mol L^{-1}) in aqueous solution at 25 °C with an excitation wavelength (λ_{ex}) of 490 nm.

Figure S6 gives the fluorescence spectral changes of the ADA-Ru complex (3.76×10^{-6} mol L^{-1}) in aqueous solution upon addition of the SWNTs ($0 - 0.67 \times 10^{-3}$ g L^{-1}) in DMF solution at 25 °C with an excitation wavelength (λ_{ex}) of 490 nm.

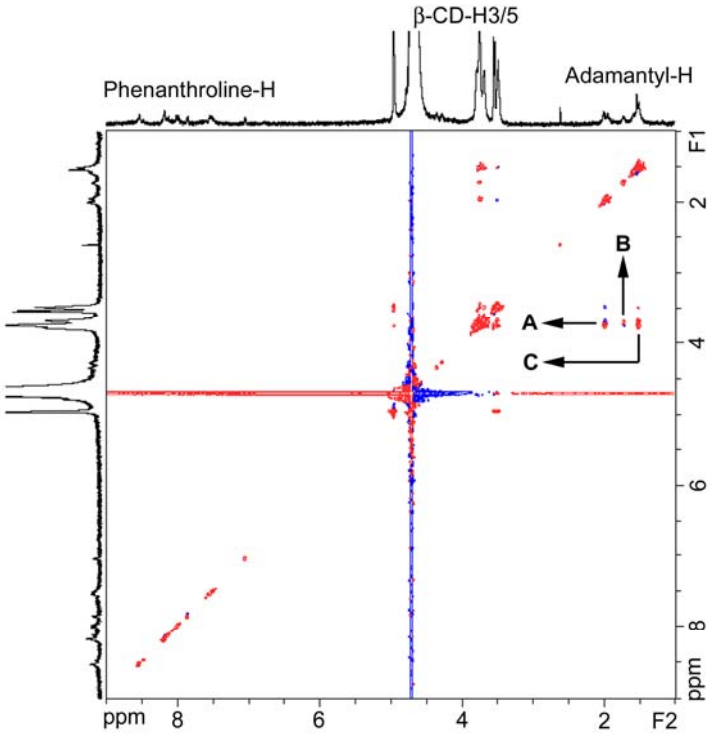


Figure S1. ^{1}H NOESY spectrum (600 MHz) of *β*-cyclodextrin (0.5 mM) with the ADA-Ru complex (0.5 mM) in D_2O at 25 °C with a mixing time of 150 ms.

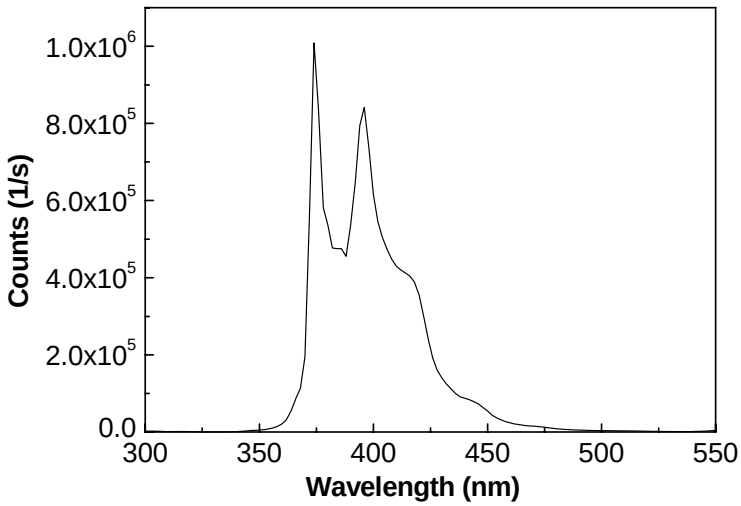


Figure S2. Fluorescence spectrum of pyrenecyclodextrin (2.82×10^{-6} mol L^{-1}) in aqueous solution at 25 °C, λ_{ex} = 274 nm.

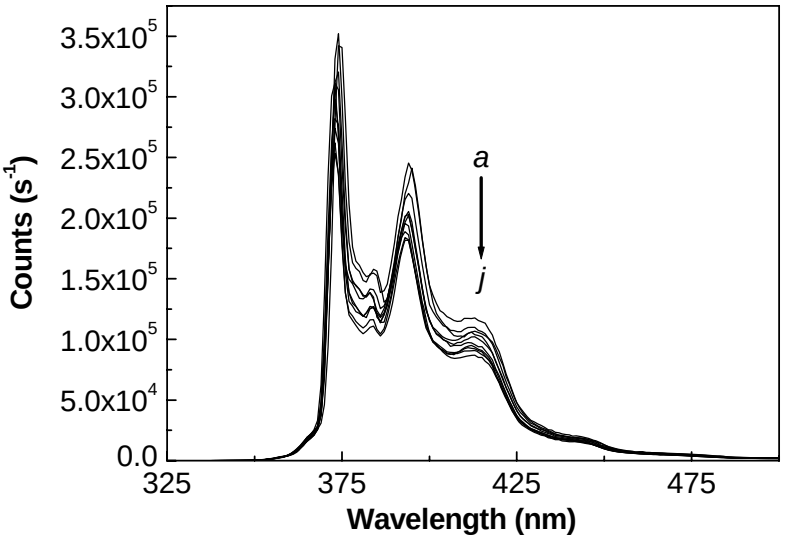


Figure S3. Fluorescence spectral changes of the pyrenecyclodextrin (4.30×10^{-4} mol L^{-1}) upon addition of the SWNTs (0, 0.16, 0.32, 0.48, 0.64, 0.80, 0.96, 1.12, 1.28, and 1.44×10^{-3} g L^{-1} from *a* to *j*) in DMF solution at 25 °C, λ_{ex} = 274 nm.

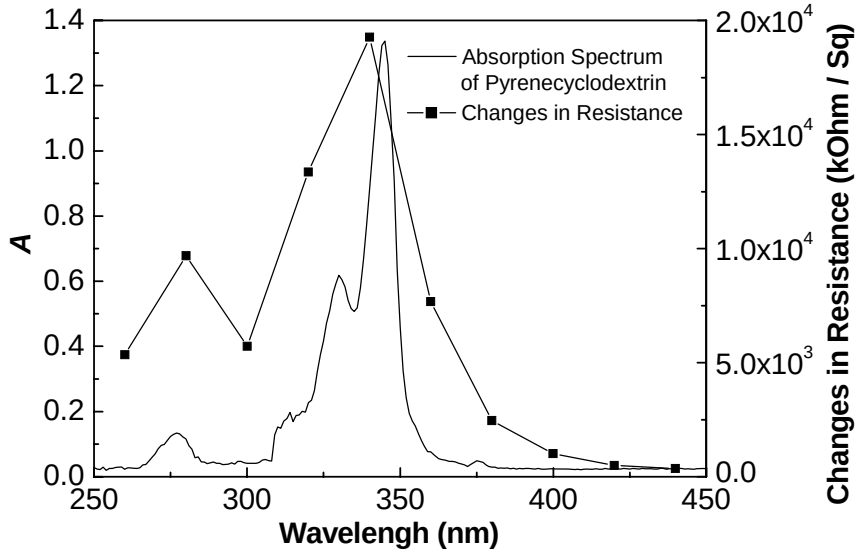


Figure S4. Changes in resistance of the pyrenecyclodextrin-SWNT/FET in response to light of varying wavelengths yet of constant intensity (I = 40 W m^{-2}). The FET device was irradiated with a source of wavelength between 260 and 420 nm varied in intervals of 20 nm. The light was left on for 10 s and off for 50 s. The absorption spectrum of the pyrenecyclodextrin (5.64×10^{-5} mol L^{-1}) was recorded in DMF solution at 25 °C. The plot shows a correlation between the absorption spectrum of the pyrenecyclodextrin and the changes in resistance of the pyrenecyclodextrin-SWNT/FET device.

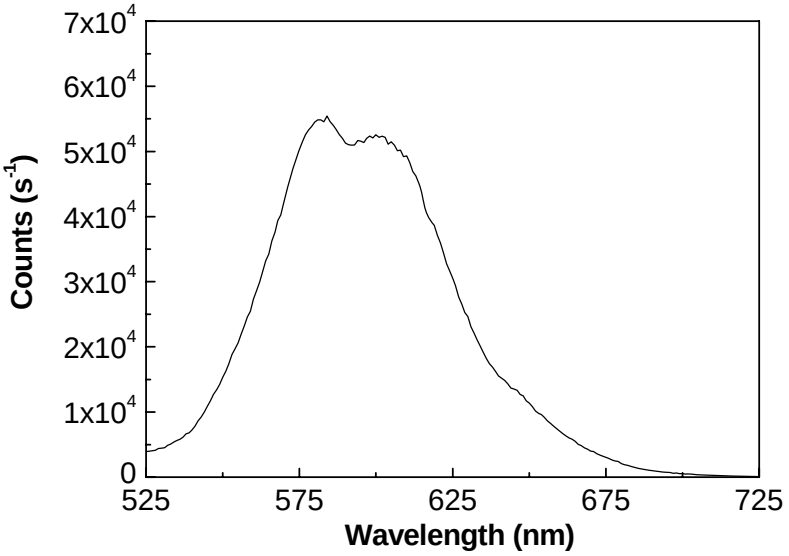


Figure S5. Fluorescence spectrum of ADA-Ru (3.76×10^{-6} mol L^{-1}) in aqueous solution at 25 °C, λ_{ex} = 490 nm.

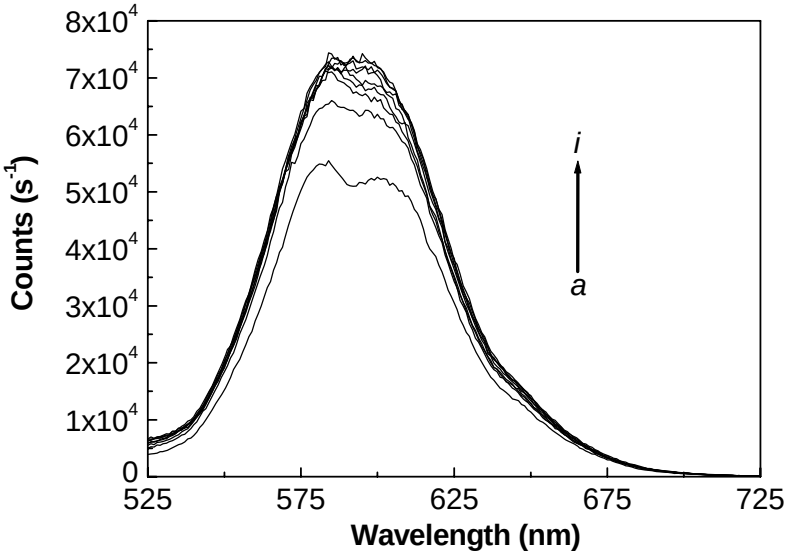


Figure S6. Fluorescence spectral changes of the ADA-Ru (3.76×10^{-6} mol L^{-1}) in aqueous solution upon addition of the SWNTs (0, 0.08, 0.17, 0.25, 0.33, 0.42, 0.50, 0.58, and 0.67×10^{-3} g L^{-1} from *a* to *i*) in DMF solution at 25 °C, λ_{ex} = 490 nm.