Supplementary Information for

Photosensitized Hydrogen Evolution from Water Using Single-Walled Carbon Nanotube/Fullerodendron/Pt(II) Coaxial Nanohybrids

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**General**

Raman spectra of the powders and solutions were obtained with a HORIBA Jobin Yvon XploRA Raman spectrometer using laser excitation at a wavelength of 488 nm and 785 nm. FT-IR spectra were recorded using Shimazu IR Affinity-1. Microwave irradiation experiment was carried out using a Biotage Initiator™. The reaction was performed with temperature and power-controlled program in a glass vial (0.5-2.0 mL) sealed with a Teflon septum. The externally temperature was measured by an IR sensor. The reaction time was counted when the reaction mixture was reached the stated temperature. TGA was measured on a Shimadzu DTG-60 in platinum pans at a heating rate of 10 °C / min under air flow.
Synthesis of fullerodendron/Pt(II) complex

To an aqueous solution of fullerodendron (50 μM, pH 7.5, 100 mL) was added a solution of K₂PtCl₄ (0.01 M, 0.38 mL) in water and stirred for 12 h at 50 °C under N₂ atmosphere. The reaction was monitored by UV-vis spectroscopy.

Fabrication if colloidal PVA-Pt

An aqueous of NaOH (1.0 M) was added to an aqueous solution (40 mL) of PVA (0.80 g, average number of repeating units = 1750 ± 50) and H₂PtCl₆·6H₂O (154 mg, 297 μmol) until the pH value reached 8.0. The mixture was diluted with water up to a total volume of 100 mL, and the solution was stirred at 0 °C for 1 h. After the solution was stirred under reflux conditions for 4 h, the reaction mixture was cooled to room temperature. The resulting solution was bubbled with H₂ for 1.5 h. After the mixture was centrifuged at 15,000 rpm for 13 h, and a clear phase was collected to give a colloidal PVA–Pt. The average diameter of the colloidal PVA–Pt, as evaluated by DLS, was 22.3 nm.
**Fig. S1.** Time-dependent UV-vis spectra observed after mixing K$_2$PtCl$_4$ with fullerodendron.
**Fig. S2.** HRTEM image of fullerodendron/Pt(II) complex.
Fig. S3. IR spectra of fullerodendron and fullerodendron/Pt(II) complex.
Fig. S4. (A) XANES spectra for fullerodendron/Pt(II) complex and references (Pt foil and PtO$_2$) and (B) Magnitude of Fourier transform of the EXAFS spectra for fullerodendron/Pt(II) complex.
Fig. S5. Vis-NIR spectra of raw–SWCNT/fullerodendron and purified–SWCNT/fullerodendron.
Fig. S6. TGA of raw−SWCNTs and purified−SWCNTs.
Fig. S7. AFM image of purified-SWCNT/fullerodendron.
Fig. S8. Raman spectra of (A) SWCNT/fullerodendron/Pt(II) coaxial nanohybrids and (B) SWCNT/fullerodendron supramolecular nanocomposites.
Fig. S9. Schematic energy diagram for hydrogen evolution systems using SWCNT/fullerodendron nanohybrid, of which SWNT is (9,7) SWCNT.