Electronic Supplementary Information (ESI)

Highly Connected Hierarchical Textured TiO_2 Spheres as Photoanodes for Dye-sensitized Solar Cells

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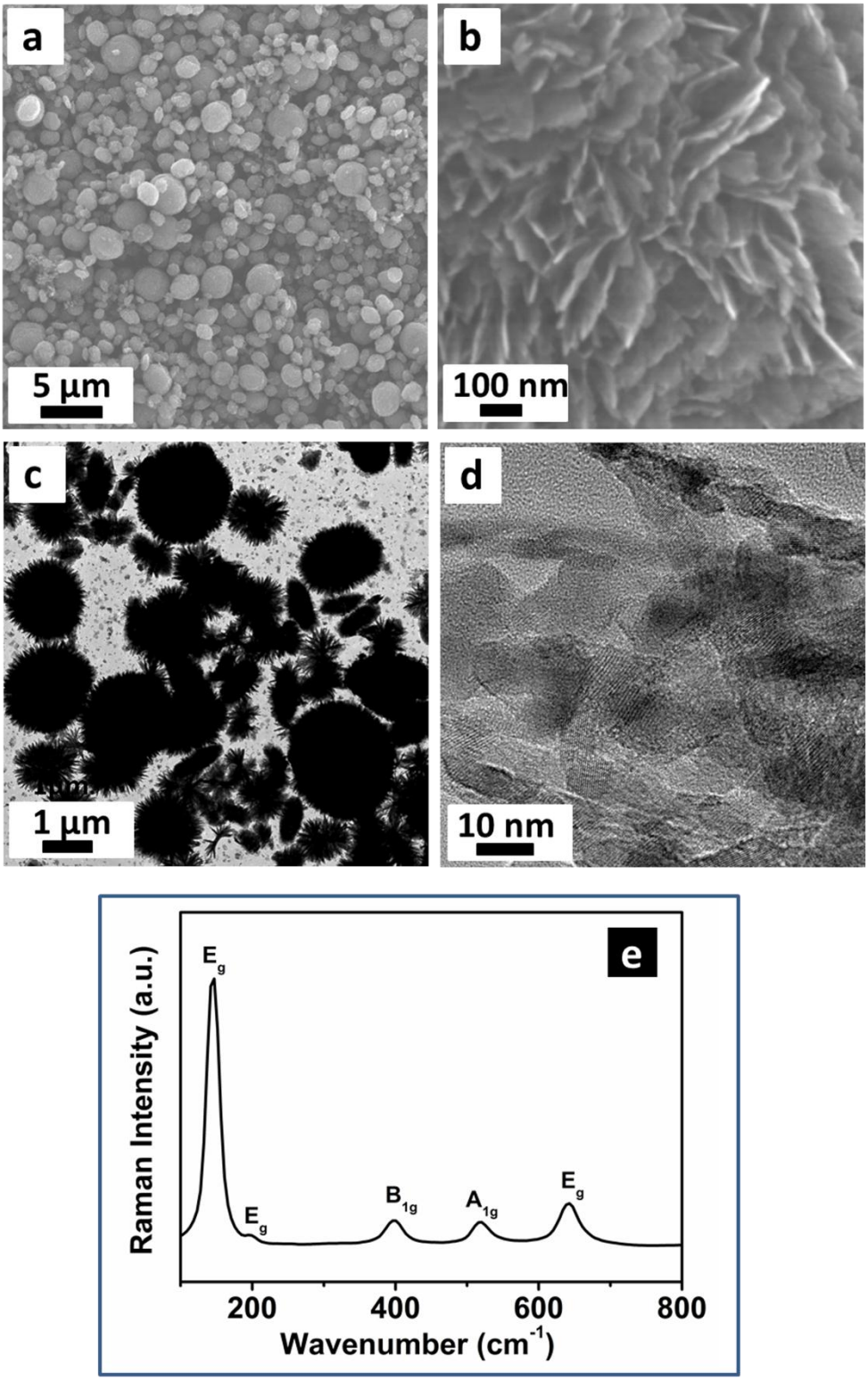

Fig. S1 (a) Low magnification SEM image of the calcined HCHT, (b) higher magnification image of the nanosheet building blocks, (c) low magnification TEM image of the urchin-like spheres, (d) enlarged TEM image of the nanosheet building blocks; (e) Raman spectrum of the calcined HCHT clearly identifies the anatase phase from the characteristic Raman modes at 142.1 cm^{-1} (E_g), 194.5 cm^{-1} (E_g), 396.1 cm^{-1} (B_{1g}), 515.8 cm^{-1} (A_{1g}), and 638.4 cm^{-1} (E_g), which can be assigned to the Raman active modes (A_{1g}+B_{1g}+3E_g) of anatase.

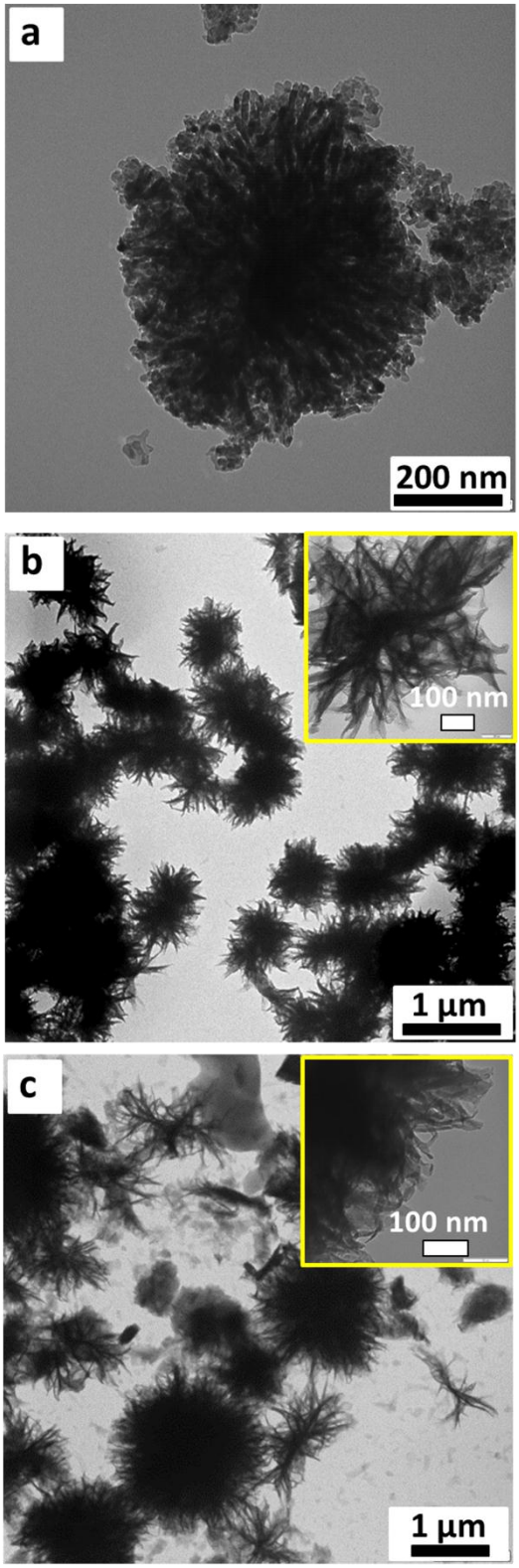

Fig. S2 TEM images, with the insets showing higher magnification, of as-prepared precipitates obtained after different reaction times (a) 1 h, (b) 5 h, (c) 12 h, via hydrothermal reaction of a solution containing 0.5 mL TB and 30 mL HAc at 150 ^{o}C.

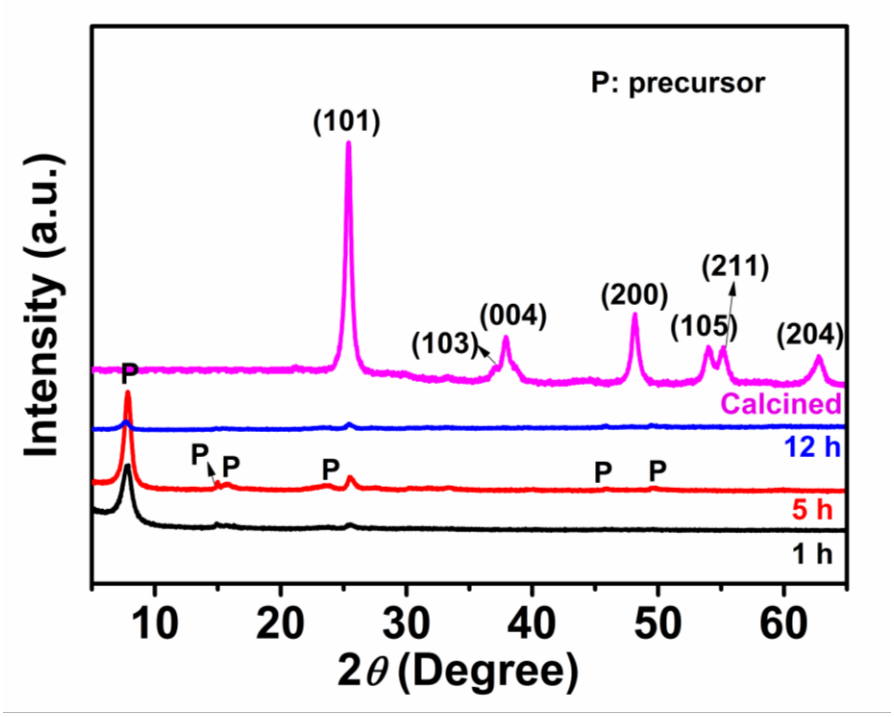

Fig. S3 XRD patterns of as-prepared precipitates obtained after different reaction times via hydrothermal reaction of a solution containing 0.5 mL TB and 30 mL HAc at 150 ^{o}C, as well as a sample obtained after 12 h of reaction and 3 h of calcination at 500 ^{o}C.

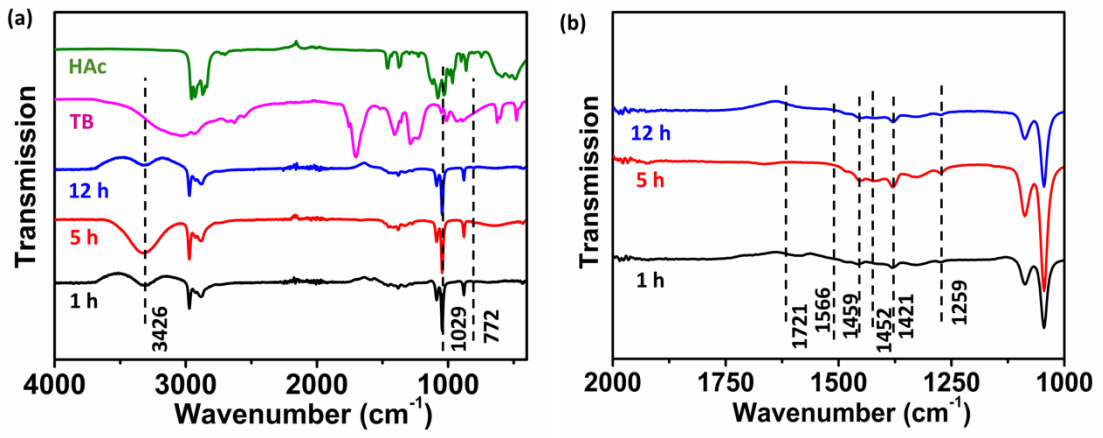

Fig. S4 (a) FTIR spectra of HAc, TB, and the precipitates obtained after different reaction times via a hydrothermal reaction of a solution containing 0.5 mL TB and 30 mL HAc at 150 ^{o}C; (b) magnification of (a) in the range of 1000-2000 cm^{-1}.

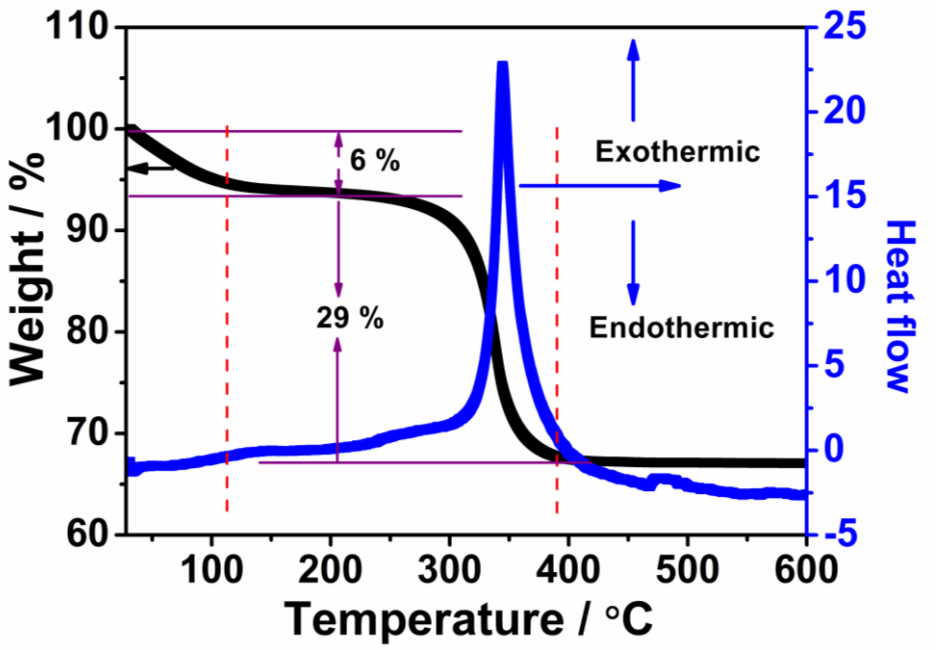

Fig. S5 Thermogravimetric analysis and differential scanning calorimetry curves of the dried precipitate prepared via hydrothermal reaction of a solution containing 0.5 mL TB and 30 mL HAc at 150 ^{o}C for 12 h.

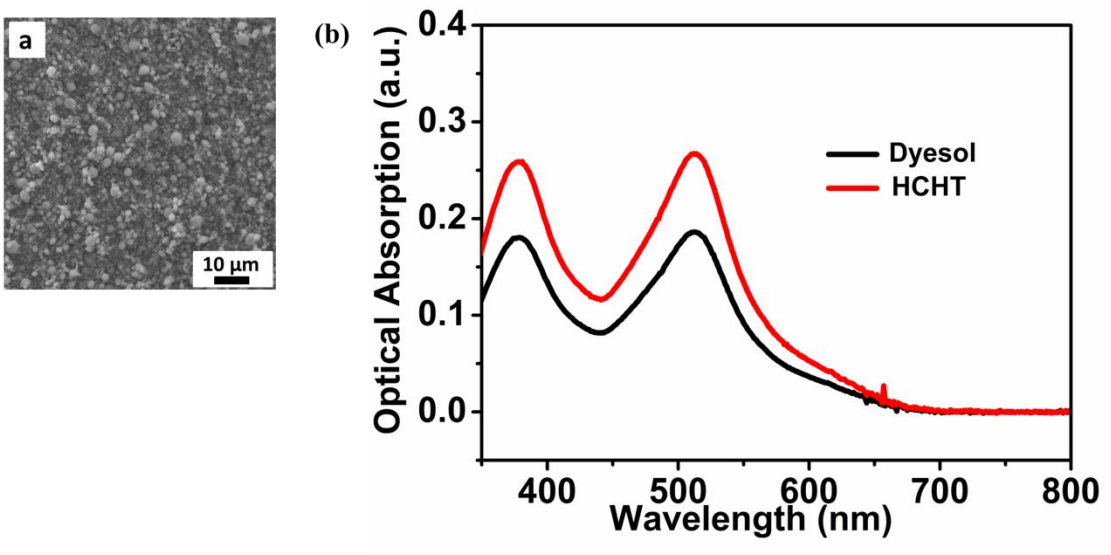

Fig. S6 (a) Top-view SEM image of HCHT film on FTO glass. (b) Optical absorption of dye desorbed from the Dyesol and HCHT films by dissolving it in 0.1 M NaOH.

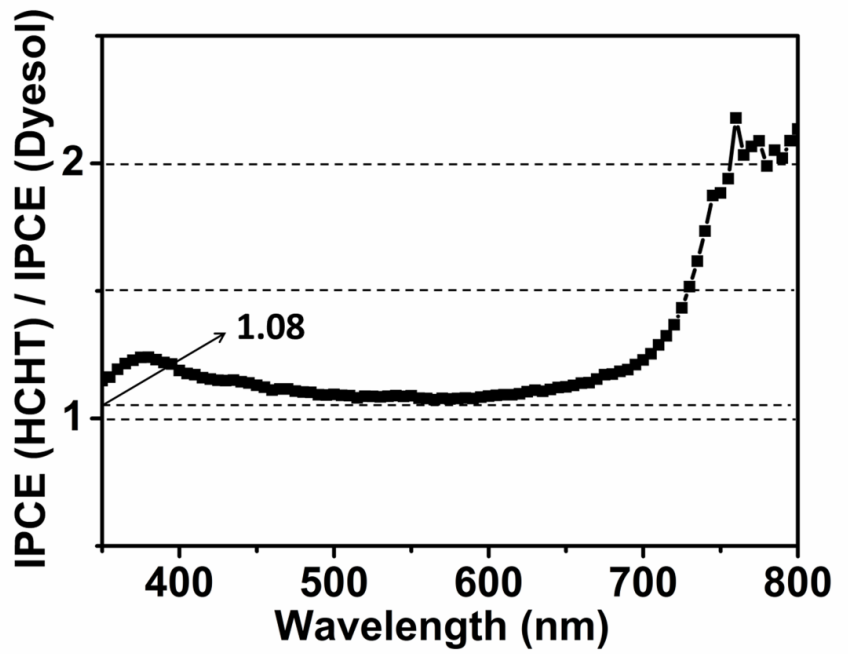

Fig. S7 Ratio of IPCE value of HCHT to that of Dyesol, depending on the wavelength of the incident light.

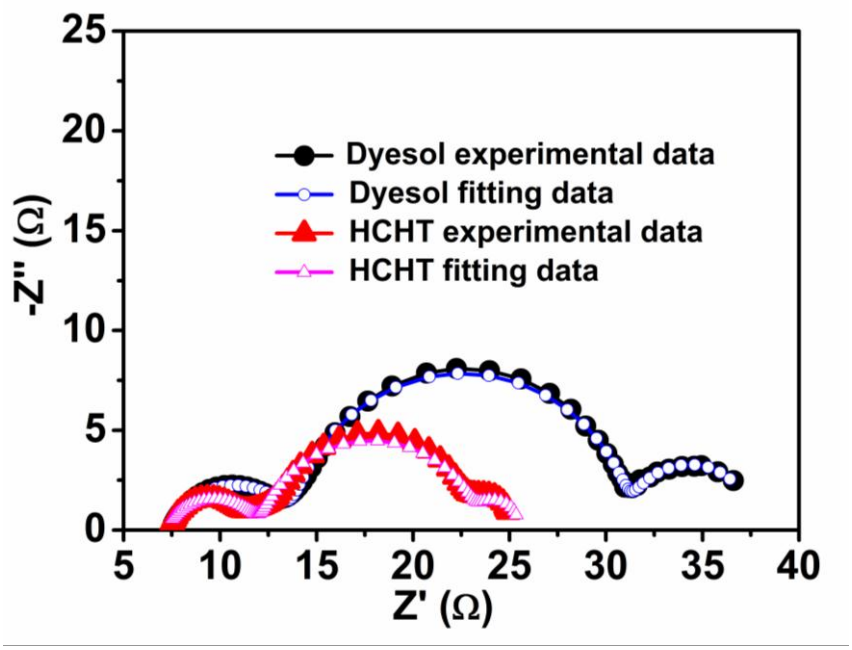

Fig. S8 Impedance spectra of DSCs containing Dyesol and IHTT photoanodes measured at V_{oc} under illumination at 100 mW cm^{-2}: Nyquist plots, with the experimental data and the fitting data.

Table S1 Series resistances of Dyesol- and HCHT-based DSCs.

Samples	R_s (Ω)	R_{ct1} (Ω)	R_{ct2} (Ω)	R_{diff} (Ω)
Dyesol	7.4	6.4	17.6	6.3
HCHT	7.2	4.9	11.5	1.9