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Supplementary Information

Photoelectric conversion based on peptide-porphyrin conjugates assembled hydrogel

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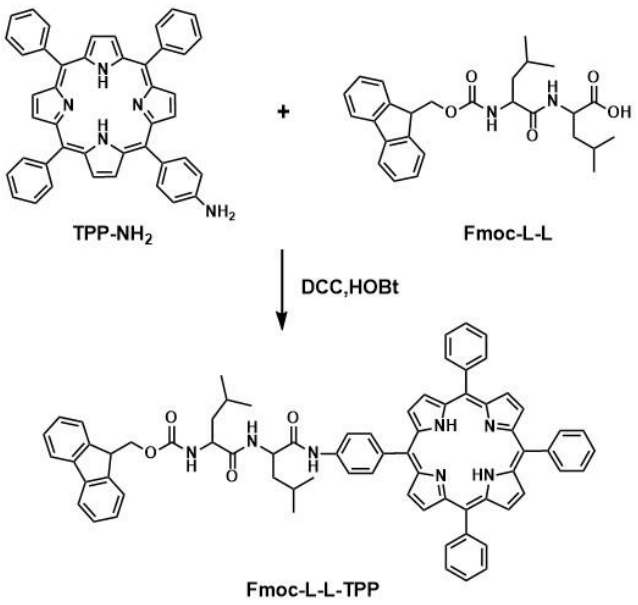
Experiments:



Scheme S1 Synthetic route for Fmoc-L-L-TPP

1. Characterization of the molecules

Fmoc-L-L-TPP:

^{1}H-NMR($CDCl_3$, 600 MHz): δ8.94 (s, 1H), 8.81 (m, 8H), 8.21 (d, *J* = 7.0 Hz, 2H), 8.16 (m, 6H), 8.03 (d, *J* = 8.0 Hz, 2H), 7.81-7.64 (m, 11H), 7.59 (t, *J* = 6.4 Hz, 2H), 7.34 (t, *J* = 7.4 Hz, 2H), 7.27 (d, *J* = 7.5 Hz, 2H), 6.78 (s, 1H), 5.36 (s, 1H), 4.84-4.73 (m, 1H), 4.56 (d, *J* = 6.6 Hz, 2H), 4.33 (m, 1H), 4.24 (t, *J* = 6.6 Hz, 1H), 2.04 (m, 2H), 1.76 (m, 4H), 1.06-0.95 (m, 12H), -2.79 (s, 2H).

MS (MALDI-TOF): m/z calculated for $C_{71}H_{64}N_7O_4$ $[M + H]^+$ 1078.33, found 1078.797.

Fmoc-L-L:

^{1}H-NMR (DMSO-d6, 600 MHz): δ 7.84 (d, J = 8.0 Hz, 2H), 7.68 (t, J = 8.0 Hz, 2H), 7.37 (t, J = 7.5 Hz, 2H), 7.28 (dd, J = 7.2, 13.5 Hz, 2H), 3.98-4.28 (m, 5H), 1.41-1.60 (m, 6H), 0.77-0.85 (m, 12H).

MS (MALDI-TOF): m/z calculated for $C_{27}H_{34}N_2O_5Na$ $[M + Na]^+$ 489.24, found 489.405.

TPP-NH_2:

^{1}H-NMR ($CDCl_3$, 400 MHz): δ 8.94 (d, J = 4.5 Hz, 2H), 8.83 (s, 6H), 8.21 (d, J = 6.4 Hz, 6H), 7.99 (d, J = 7.6 Hz, 2H), 7.75 (d, J = 6.8 Hz, 9H), 7.05 (d, J = 7.6 Hz, 2H), 4.01 (s, 2H), -2.75 (s, 2H).

MS (MALDI-TOF): m/z calculated for C44H32N5 $[M + H]^+$ 630.27, found 630.306.

2. Morphology characterization and spectral measurement of the hydrogels

For scanning electron microscopy (SEM) measurement, the sample was smeared with a pipettor onto a silica wafer, washed with water several times and dried in vacuum at room temperature. The sample were sputtered with platinum to increase conductivity before image acquisition with S-4800 (HITACHI, Japan, 10 kV voltage) instrument. AFM image was obtained with FASTSCANBIO (Bruker) equipment and the samples were prepared the same way as SEM without platinum sputting. CD spectra were monitored with a JASCO J-810 spectropolarimeter. UV-Vis spectra were recorded using Shimadzu UV-2600 spectrophotometer.

3. Rheological Characterization of the hydrogels

Mechanical properties of the hydrogels were determined and analyzed with an Anton Paar MCR302 rheometer at room temperature using a TA Instruments TRIOS software.

4. Photocurrent measurement of the hydrogels

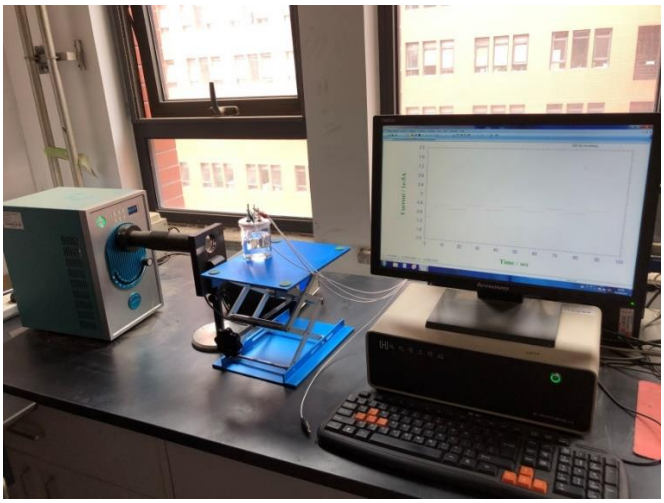


Figure S1 Schematic illustration of the photoelectrical measurement device

The hydrogels with different Fmoc-L-L-TPP concentrations were first coated on ITO substrates with an area of 20 mm × 10 mm for electrochemical characterization. An electrochemical

workstation (CHI 660D), a 150 W Xe lamp (white light, $P_{423\ nm}$=160 mW cm^{-2}) and a condenser were equipped for the characterization. The prepared samples on ITO served as the working electrode, while a platinum wire was used as the counter electrode and Ag/AgCl electrode as the reference electrode. During photocurrent measurements, all the electrodes were immersed into an electrolyte buffer solution (pH = 7.5, 0.02 M PBS). All experimental data was processed by baseline correction.

Additional data:

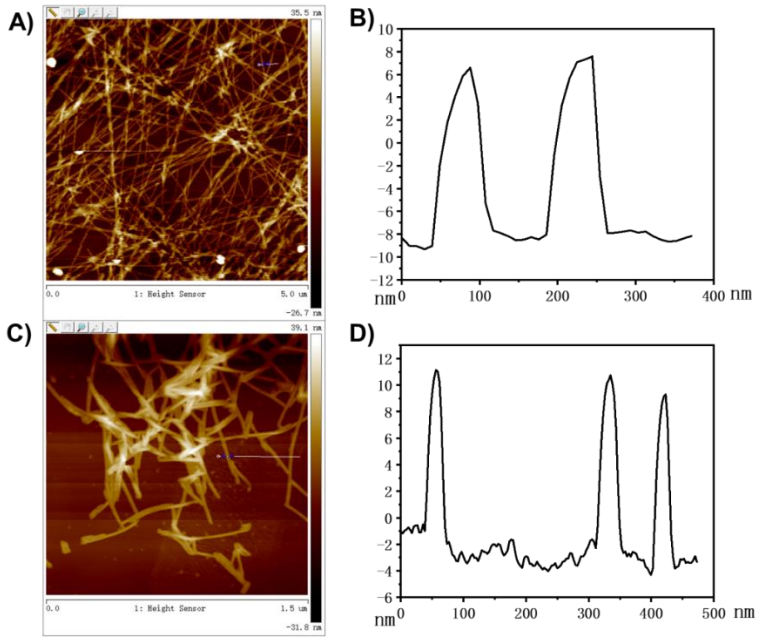


Figure S2 AFM height images and cross-sectional profiles of hydrogels (A), (B) without and (C), (D) with 2% Fmoc-L-L-TPP doping

Table S1 Photocurrent of hydrogels with different Fmoc-L-L-TPP concentrations

Mass concentration (%)	Photocurrent density (μA·cm^{-2})
0.5	0.245
1	0.815
1.5	0.985
2	1.175
4	0.795