

Figure S1. (a) The structure of H₄TTFTB, (b) illustration of the fabrication of the H₄TTFTB-TiO₂.

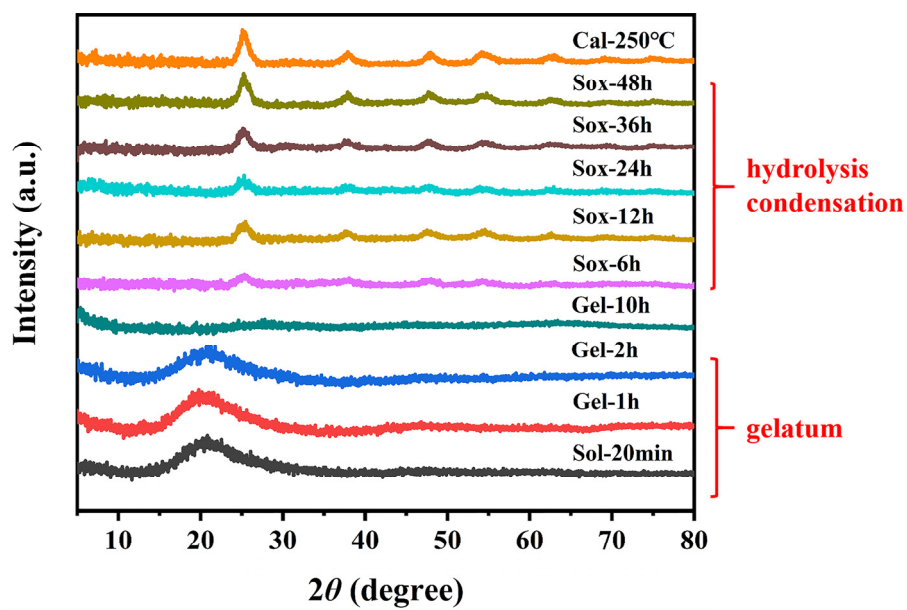


Figure S2. The XRD patterns of the intermediate products at different reaction times.

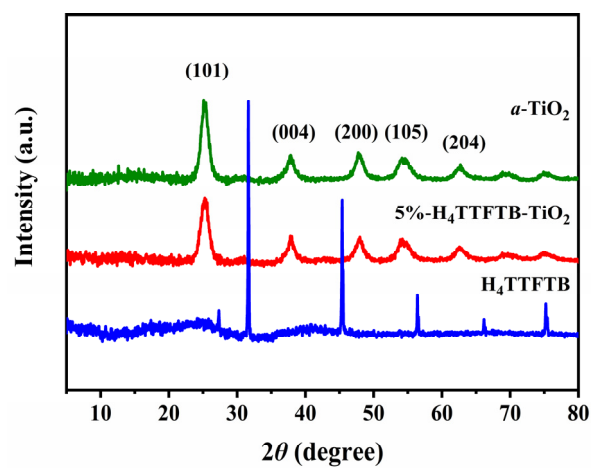


Figure S3. The XRD patterns of the a -TiO₂, H₄TTFTB and H₄TTFTB-TiO₂-5.0.

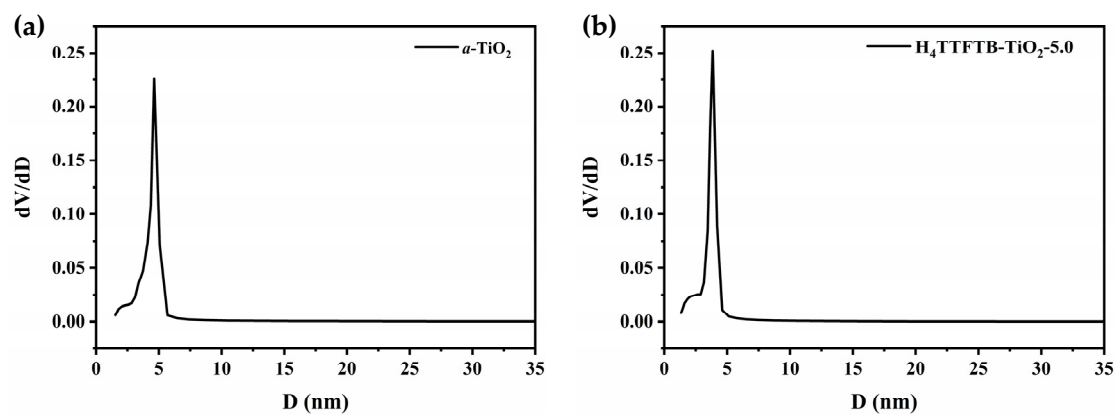


Figure S4. The pore size distributions of (a) a -TiO₂, (b) H₄TTFTB-TiO₂-5.0.

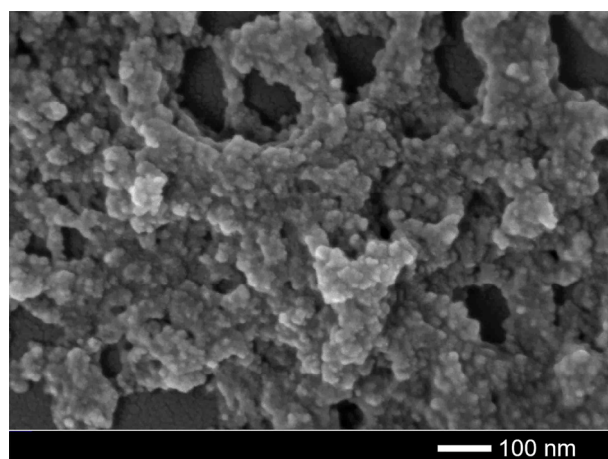


Figure S5. The SEM of H₄TTFTB-TiO₂-5.0.

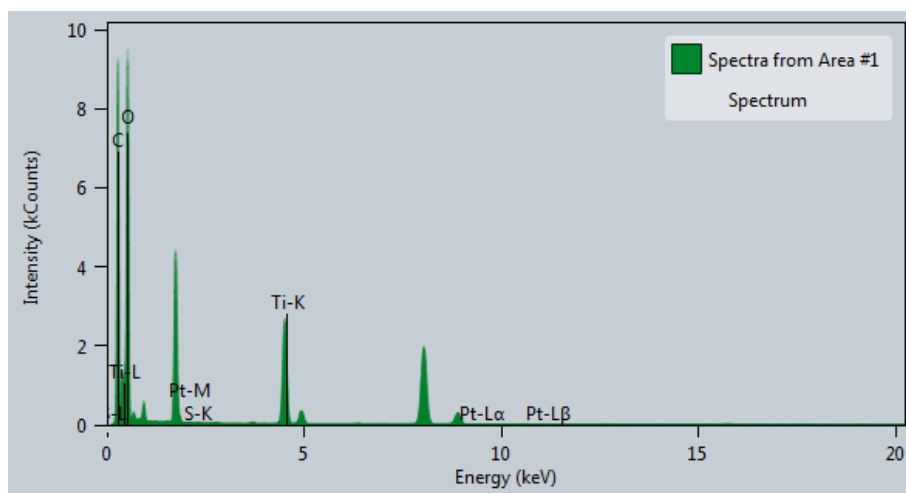


Figure S6. EDX of the Pt@H₄TTFTB-TiO₂-5.0.

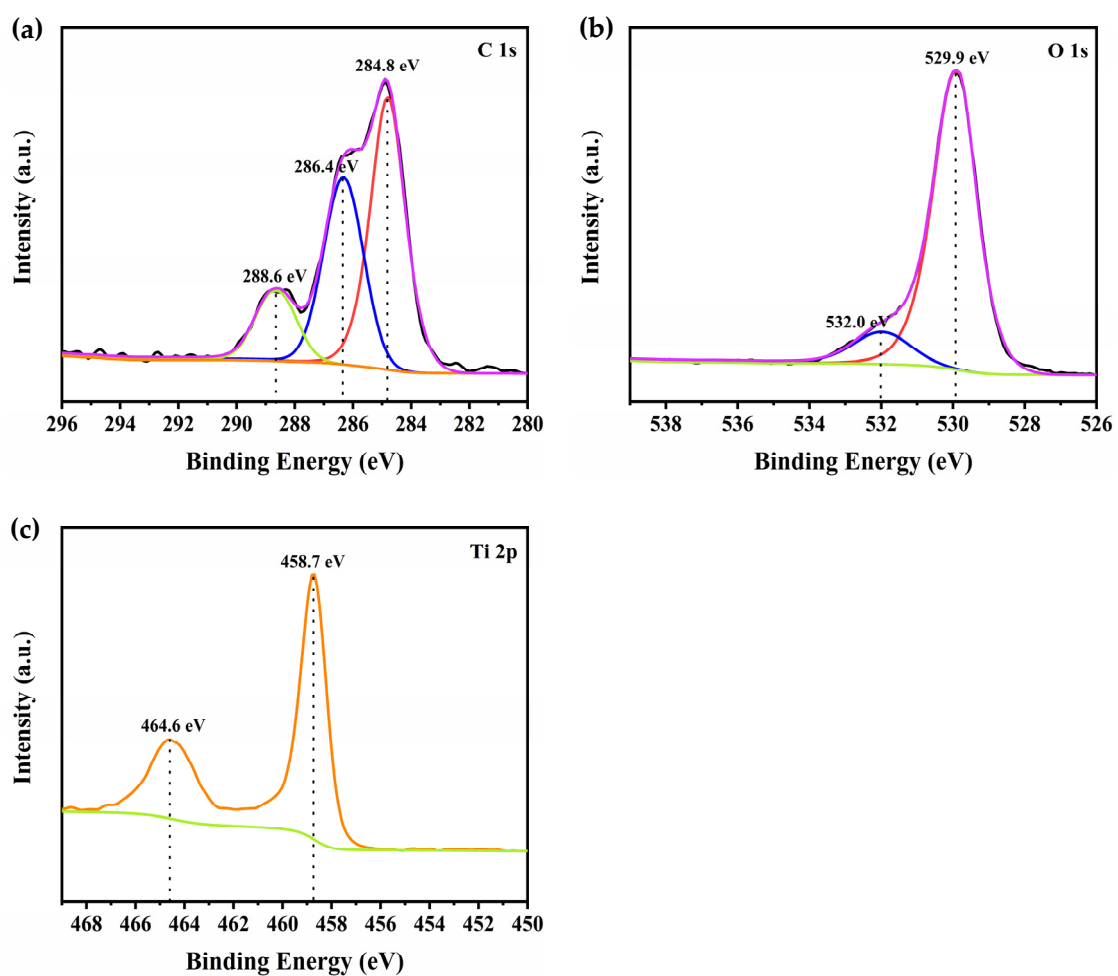


Figure S7. X-ray photoelectron spectra of *a*-TiO₂: (a) C 1s; (b) O 1s and (c) Ti 2p.

Atomic ratio of Ti : O = 35% : 65% \approx 1 : 2.

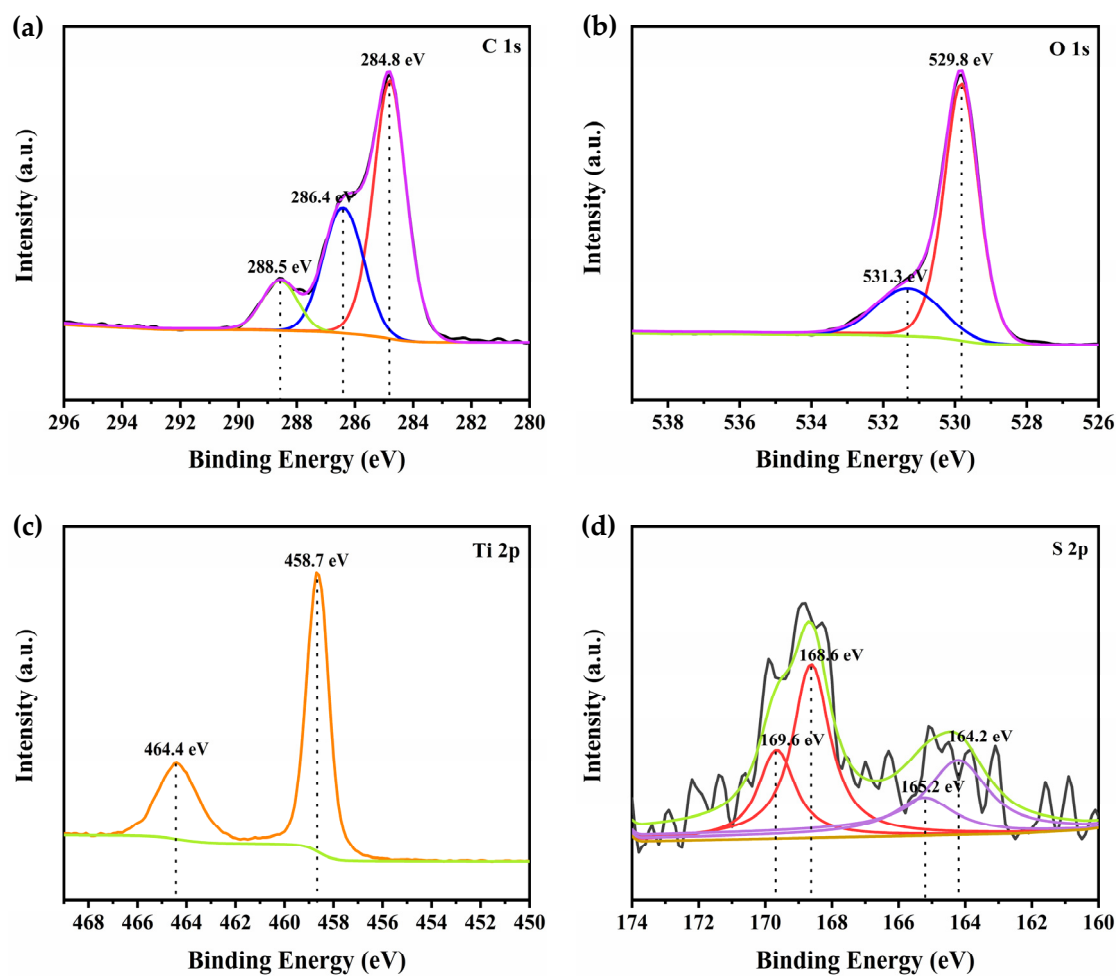


Figure S8. X-ray photoelectron spectra for of H₄TTFTB-TiO₂-5.0:(a) C 1s; (b) O 1s; (c) Ti 2p and (d) S 2p. Atomic ratio of Ti : O : C : S = 27% : 51% : 21% : 1.18%.

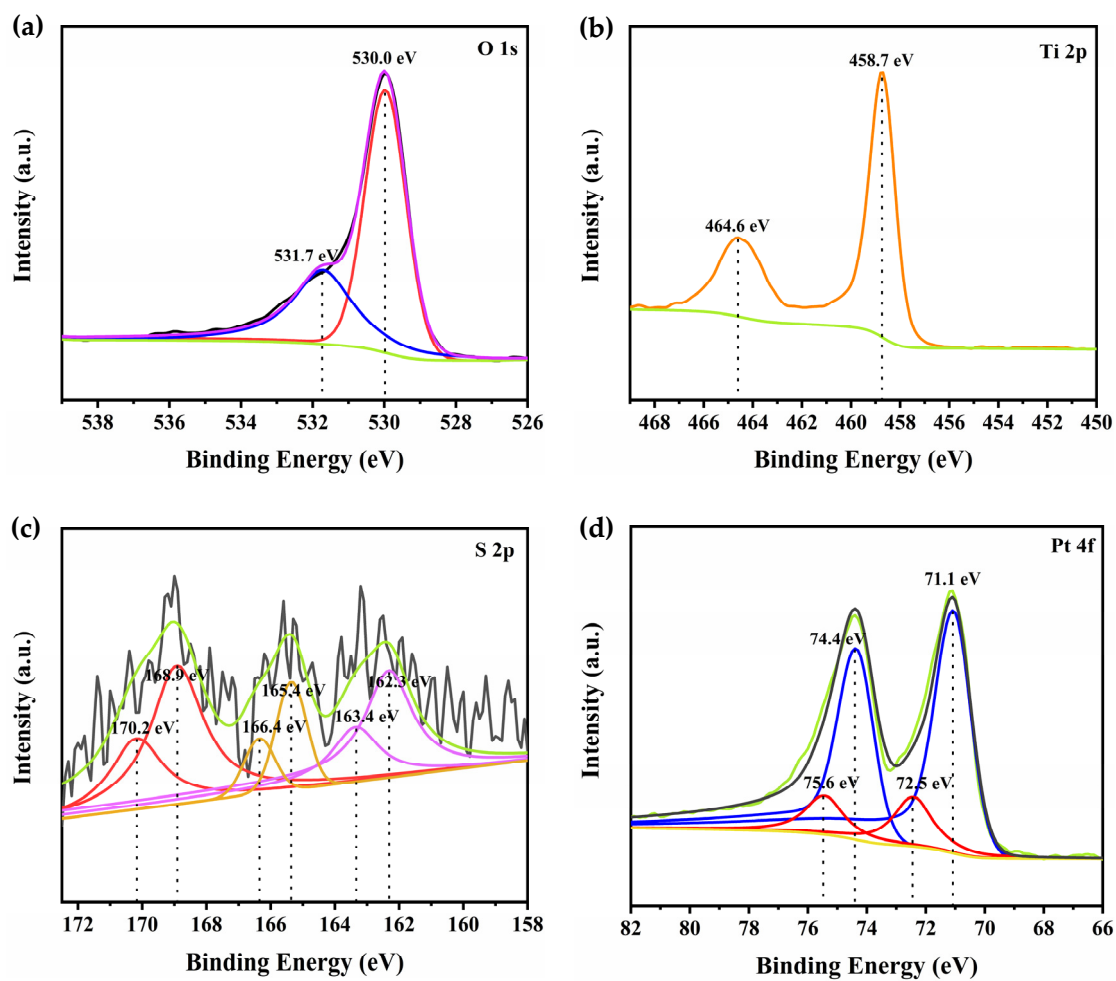


Figure S9. X-ray photoelectron spectra of Pt@H₄TTFTB-TiO₂-5.0: (a) O 1s; (b) Ti 2p; (c) S 2p and (d) Pt 4f.

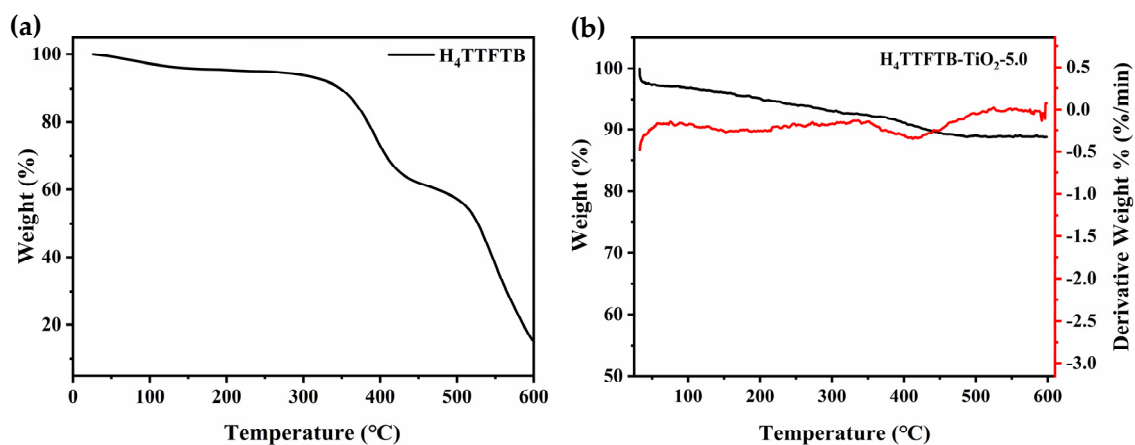


Figure S10. Thermogravimetry analysis of (a) H₄TTFTB compound, (b) H₄TTFTB-TiO₂-5.0.

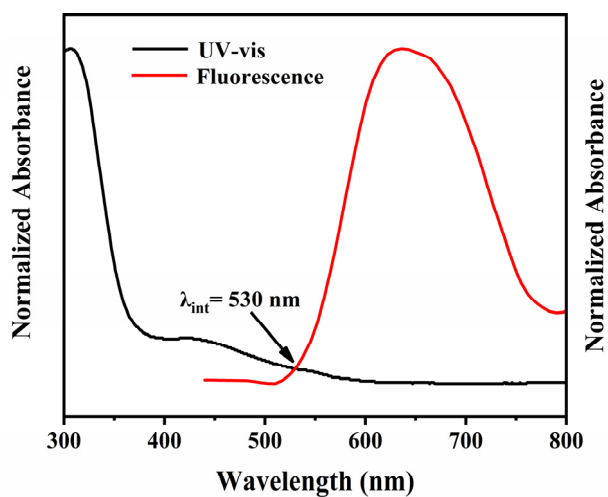


Figure S11. UV-vis absorption spectra and photoluminescence spectra of H₄TTFTB in DMF ($E_{0-0} = 1240/\lambda_{\text{int}}$).

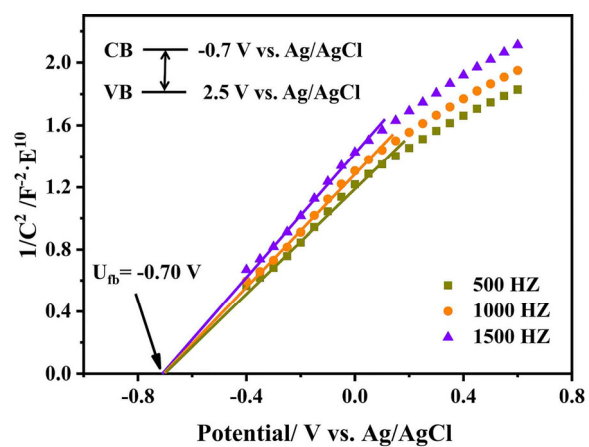


Figure S12. Mott-Schottky plot of α -TiO₂ in 0.5 M Na₂SO₄ aqueous solution.

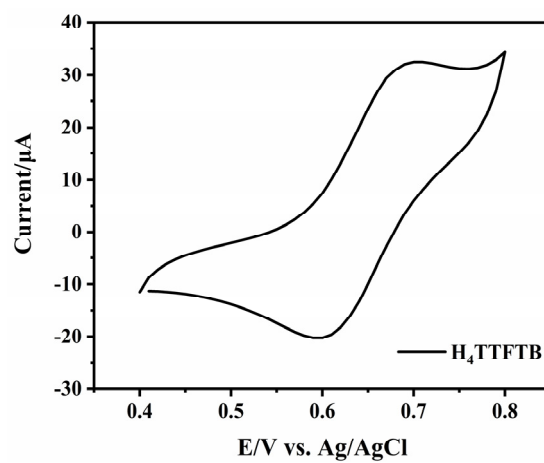


Figure S13. Cyclic voltammogram of H₄TTFTB in 0.1 M TBAPF₆ of DMF solutions measured with a scan rate of 50 mV s⁻¹.

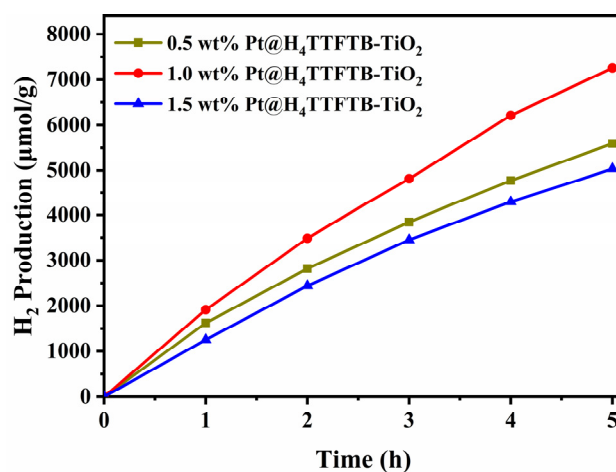


Figure S14. Comparison of photocatalytic H₂ evolution of 5 hours of H₄TTFTB-TiO₂-5.0 hybrid material under different loads of Pt.

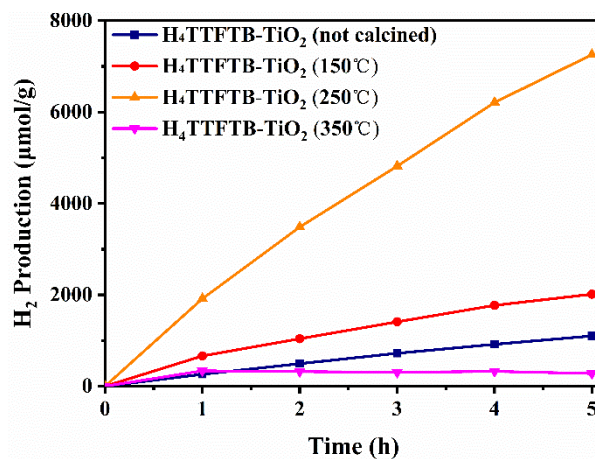


Figure S15. Comparison of photocatalytic H₂ evolution of H₄TTFTB-TiO₂-5.0 hybrid material under different calcined temperature loaded with 1.0 wt% Pt.

Table. S1. The amount of Pt NPs of Pt@H₄TTFTB-TiO₂.

Sample	Pt NPs Loading amount(wt%)
0.5 wt% Pt@H ₄ TTFTB-TiO ₂	0.393
1.0 wt% Pt@H ₄ TTFTB-TiO ₂	0.878
1.5 wt% Pt@H ₄ TTFTB-TiO ₂	1.288

Table. S2. BET surface area, pore volume and pore size of *a*-TiO₂, H₄TTFTB-TiO₂-5.0 derived from 77 K N₂ sorption isother.

Sample	Surface area (m ² /g)	Pore size (nm)	Pore volume (cm ³ /g)
<i>a</i> -TiO ₂	184.10	4.411	0.257
H ₄ TTFTB-TiO ₂ -5.0	212.65	3.630	0.239

Table. S3. Atomic Fraction of Pt@H₄TTFTB-TiO₂.

Z	Element	Family	Atomic Fraction (%)	Atomic Error (%)	Mass Fraction (%)	Mass Error (%)	Fit Error (%)
6	C	K	58.16	7.63	43.36	3.48	2.79
8	O	K	34.35	8.16	34.12	7.29	0.55
16	S	K	0.01	0.00	0.02	0.01	14.70
22	Ti	K	7.46	1.38	22.16	3.38	0.04
78	Pt	L	0.03	0.00	0.34	0.05	2.28

Table S4. Comparison of H₂ evolution activity of TTF and TiO₂ photocatalytic systems.

Catalyst	Co-catalyst	Sacrificial agent	Solvent	Light source (nm)	H ₂ Production rate (μ mol h ⁻¹ g ⁻¹)	Ref
H ₄ TTFTB-TiO ₂	Pt	TEOA	H ₂ O	>400	1452	This work
Zn-TPY-TTF	Pt	TEA	H ₂ O	>400	14727	[45]
G3T3	Pt	TEOA	H ₂ O	>400	24560	[19]
DPPCN/TiO ₂	Pt	TEOA	H ₂ O	>400	12080	[18]
DPPCA/TiO ₂	Pt	TEOA	H ₂ O	>400	8400	[18]
MOC-16/TTF	Pd	TEOA	DMSO-H ₂ O	>420	7344.9	[46]
Rh B-Co/TiO ₂	Co	-	water	>400	227.3	[47]
P42-TiO ₂	Pt	TEOA	H ₂ O	>420	745.0	[48]
PI-OMe-TiO ₂	Pt	TEOA	H ₂ O	>420	1190	[26]
3C/TiO ₂	Pt	TEOA	H ₂ O	>420	247	[49]
ZnPc/TiO ₂	Pt	TEOA	H ₂ O	>420	3448	[22]
CoPc/TiO ₂	Pt	TEOA	H ₂ O	>420	3328	[22]
B-Car/TiO ₂	Pt	ascorbic acid	Water	>420	249	[50]
PAN-Pt@TiO ₂	Pt	thioglycolic acid	H ₂ O	>420	61.8	[51]
Chl-3-TiO ₂	Pt	ascorbic acid	water	>400+ >600	263.3	[52]
Eosin Y ⁺ Ni(OH) ₂ /TiO ₂	Ni(OH) ₂	TEOA	H ₂ O	>420	1576	[53]
MZ-341/TiO ₂	Cu ₂ WS ₄	TEOA	water	>420	1406	[54]
1-P25	Pt	TEOA	water	>400	2364	[55]
FL@MOC-PC	Pd ²⁺	TEOA	water	>420	2402	[56]