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Supporting Information

Controllable synthesis of porous TiO_2 with hierachical nanostructure for efficient photocatalytic hydrogen evolution

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Table S1. Photocatalytic H_2 evolution

Material	Cocatalyst	Light source[a]	Reaction solution[b]	H_2 Activity (μmol g^{-1} h^{-1})	Reference (year)
TiO_2	Pt	UV-Vis (H) 150 W	TEOA	3667	1 (2012)
TiO_2	Au	UV-Vis (Hg) 300 W	Methanol	2785	2 (2005)
TiO_2	Rh	Hg 500 W	water vapor	449	3 (1985)
TiO_2	CuO	UV-Vis (Hg) 400 W	Methanol	18 500	4 (2009)
TiO_2	$Cu(OH)_2$	UV-Vis (Hg) 400 W	Methanol	14 940	5 (2013)
TiO_2	Ni(OH)2	365 nm (LED) 3 W	Methanol	3056	6 (2011)
TiO_2	C_{60}–CNT	UV-Vis (Xe) 300 W	TEOA	6510	7 (2013)
TiO_2	MoS_2–RGO	UV-Vis (Xe) 350 W	Ethanol	2066	8 (2012)
TiO_2	NiO	UV-Vis (Hg) 300 W	Methanol	813	9 (2005)

[a] H: halogen lamp, Xe: xenon lamp, Hg: mercury lamp.

[b] TEOA: triethanolamine.

Table S2. Compositions of the solutions for hydrothermal reaction of porous TiO_2 hierarchical microspheres synthesized under different conditions

Sample	TTIP (g)	Volume ratio of HCl:EG	CTAB (g)	H_2O (mL)	Average diameters of the constituent units (nm)
TiO_2-15	0.6	7:5	0.5	2.5	15
TiO_2-10	0.6	7:21	0.5	2.5	10
TiO_2-5	0.6	7:35	0.5	2.5	5

Table S3. Surface analysis data

Sample	Specific surface area (m^2 g^{-1})[a]	Average pore size (nm) [b]	Pore volume(cm^3 g^{-1})
TiO_2-15	72.317	5.0	0.087
TiO_2-10	111.147	4.9	0.122
TiO_2-5	216.607	3.8	0.241

[a] Specific surface area was calculated from the linear part of BET plot.

[b] Average pore diameter was estimated.

Table S4. Photocatalytic activities of the samples

Samples	H_2 activity (mmol g^{-1} h^{-1})	QE (%)
P25	18.94	14.59
TiO_2-15	12.38	9.59
TiO_2-10	14.33	11.05
TiO_2-5	23.74	18.34

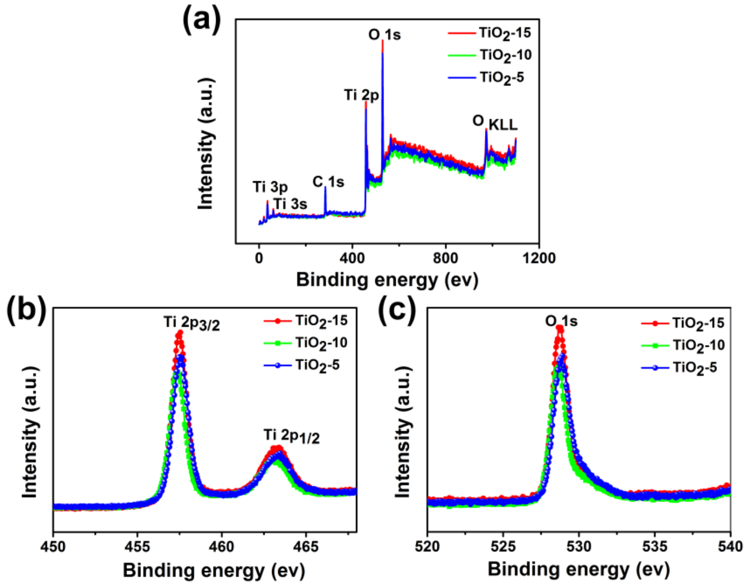

Figure S1. XPS spectra of TiO_2-15, TiO_2-10 and TiO_2-5; (a) showing the three characteristic peaks of Ti, O and C of them, (b) and (c) showing the two characteristic peaks of Ti and O.

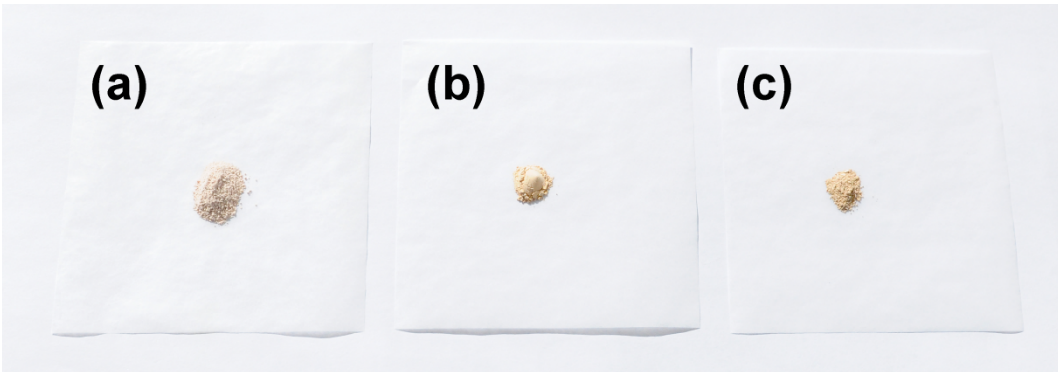

Figure S2. The photograph of all the products: (a) TiO_2-15, (b) TiO_2-10; (c) TiO_2-5.

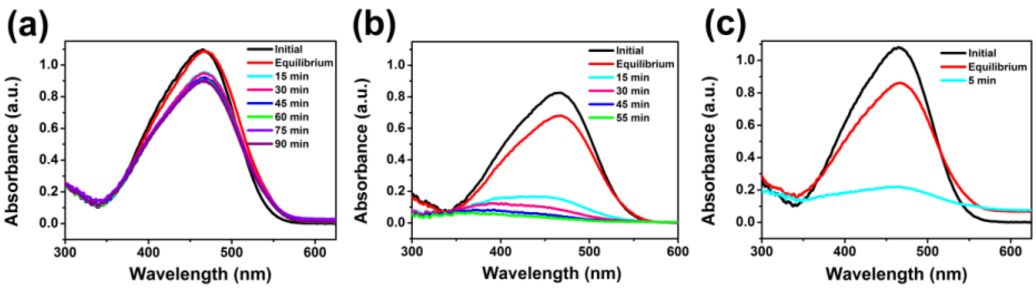

Figure S3. Photocatalytic degradation of MO under UV-visible light for 0.08 g, (a) TiO_2-15, (b) TiO_2-10, (c) TiO_2-5 as photocatalyst. After 90 min 18.5% of the MO has been degraded for TiO_2-15, after 15 min 80% of the

MO has been degraded for TiO_2-10, but only after 5 min 80% of the MO has been degraded for TiO_2-5.

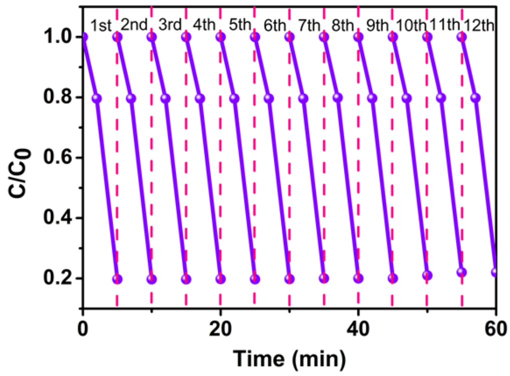

Figure S4. Cycling runs in photocatalytic degradation of MO in the presence of TiO_2-5 under UV-visible light.

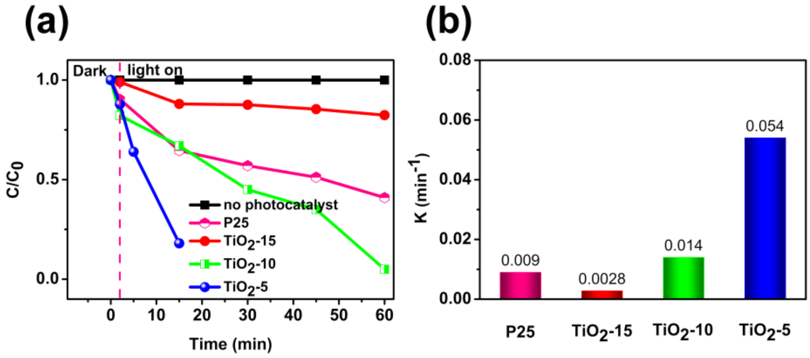

Figure S5. (a) and (b) Photocatalytic degradation of phenol under UV-visible light of P25, TiO_2-15, TiO_2-10 and TiO_2-5 for o.o8 g, respectively: (a) C/C_0 of them and without photocatalyst; (b) First-order rate constant k (min^{-1}) of them.

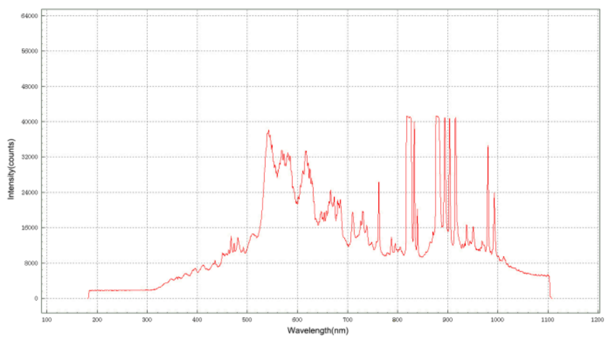

Figure S6. The UV-Vis spectra of 300 W Xenon lamp.

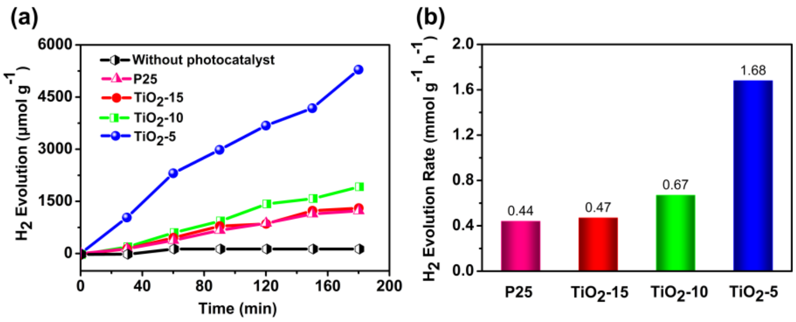

Figure S7. Photacatalytic generation of H_2 under UV−visible light irradiation for them: (a) Time evolution of photocatalytic generation of H_2 without Pt for the samples and without catalyst; (b) Comparison of H_2 evolution activities of them.

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