Electronic Supplementary Information

Self-assembled 3D Pt/TiO_2 architecture for high-performance photocatalytic hydrogen production

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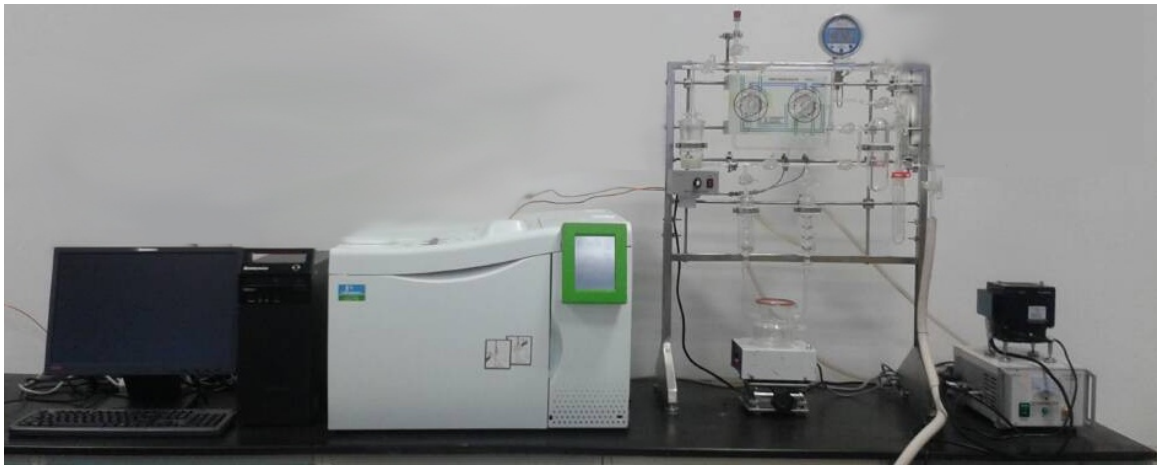

Fig. S1 The photograph of the experimental setup of the photocatalytic H_2 production.

The photacatalytic on-line analysis system mainly includes the following sections: a Pyrex reaction cell, a closed gas circulation and evacuation system, Xe lamp, gas chromatography, and computer.

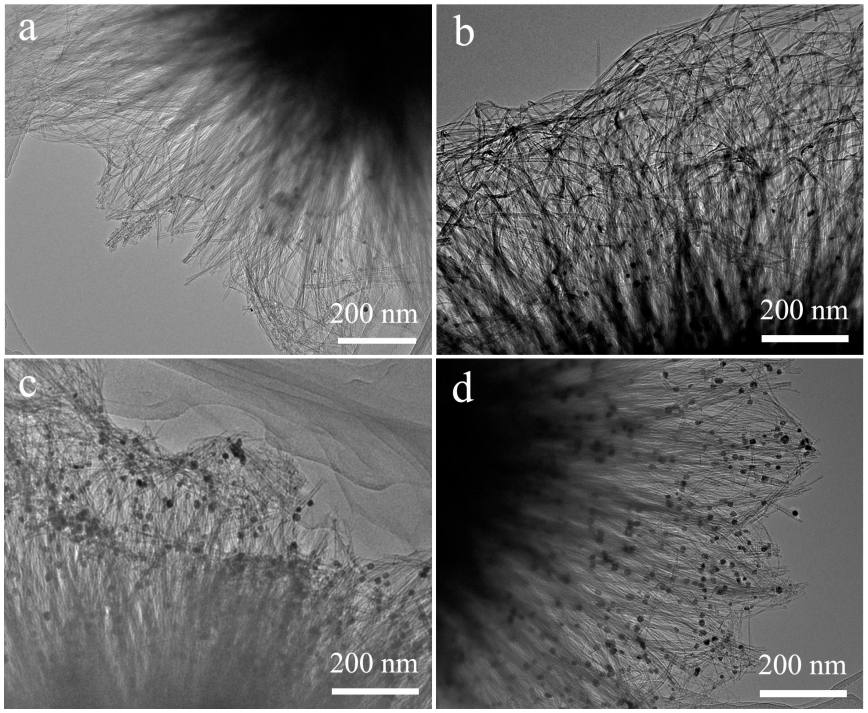

Fig. S2 TEM images of the as-prepared Pt/TiO_2 architecture with different amounts of Pt. (a) 0.2 wt %, (b) 0.3 wt %, (c) 0.5 wt % and (d) 0.8 wt %.

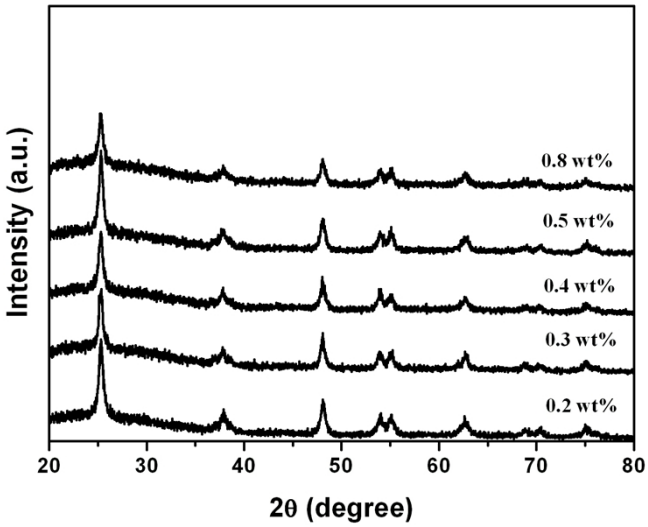

Fig. S3 XRD patterns of the 3D Pt/TiO_2 architecture with different Pt loading amounts.

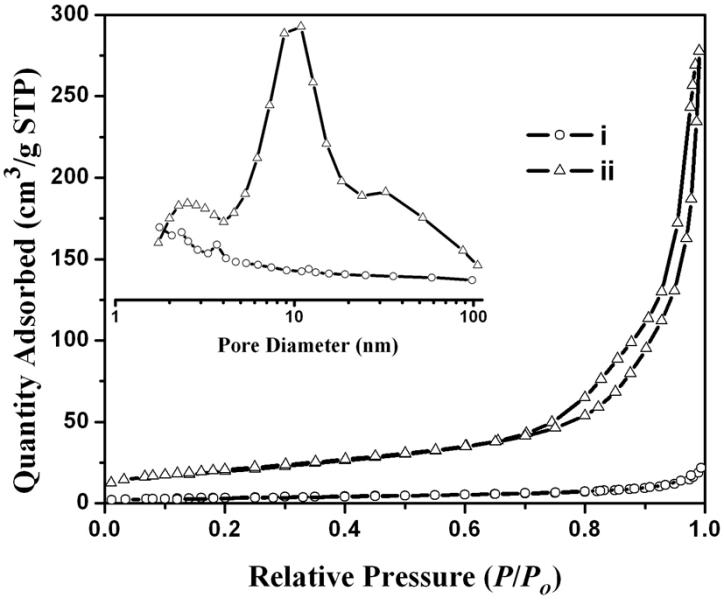

Fig. S4 Nitrogen adsorption-desorption isotherms and the corresponding pore size distribution curves (inset) of the TiO_2 nanowire (i) and 3D Pt/TiO_2 architecture (ii).

Table S1. Structural parameters of the 3D Pt/TiO_2 architecture with different Pt loading amounts.

Sample	[a] wt % (Pt/TiO_2)	S_{BET}[b] (m^2/g)	*APS*[c] (nm)	V_p[d] (cm^3/g)	R[e] (μmol/h)
TiO_2 nanowire	0	12.2	7.38	0.022	3.7
0.2 wt % Pt/TiO_2	0.19	86.6	13.6	0.25	380
0.3 wt % Pt/TiO_2	0.28	86.1	14.4	0.26	523
0.4 wt % Pt/TiO_2	0.36	87.1	13.6	0.25	667
0.5 wt % Pt/TiO_2	0.41	89.2	13.1	0.25	571
0.8 wt % Pt/TiO_2	0.59	88.8	12.4	0.24	537

[a] wt % determined by ICP-OES data.

[b]S_{BET} denotes specific surface area.

[c]APS denotes average pore size.

[d]V_p denotes pore volume.

[e]R denotes the H_2-production rate of the photocatalyst samples.

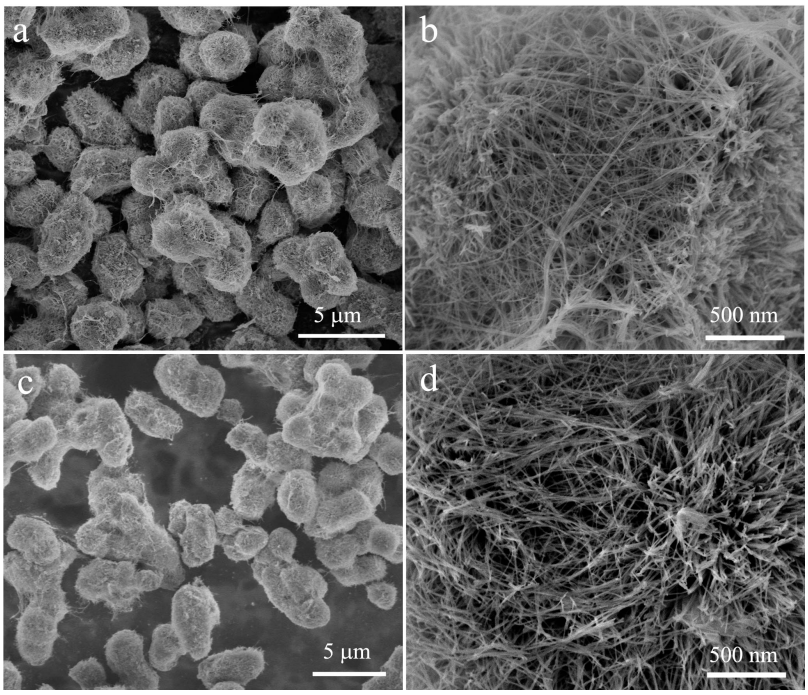

Fig. S5 SEM images of the 0.4 wt % Pt/TiO_2 architecture obtained with different reaction times. (a,b) 5 h; (c,d) 10 h.

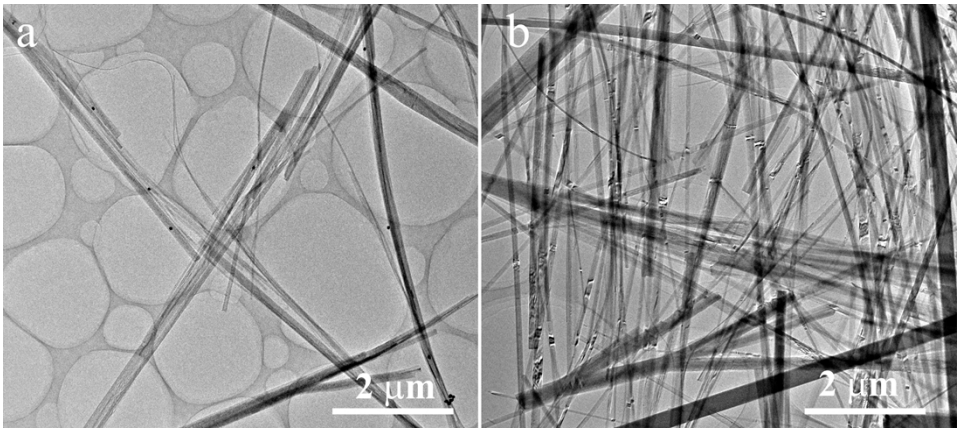

Fig. S6 TEM images of the products obtained under different reaction conditions. (a) $Ti(OC_4H_9)_4$+ET+NaOH+H_2PtCl_6, (b) $Ti(OC_4H_9)_4$+EG+NaOH.

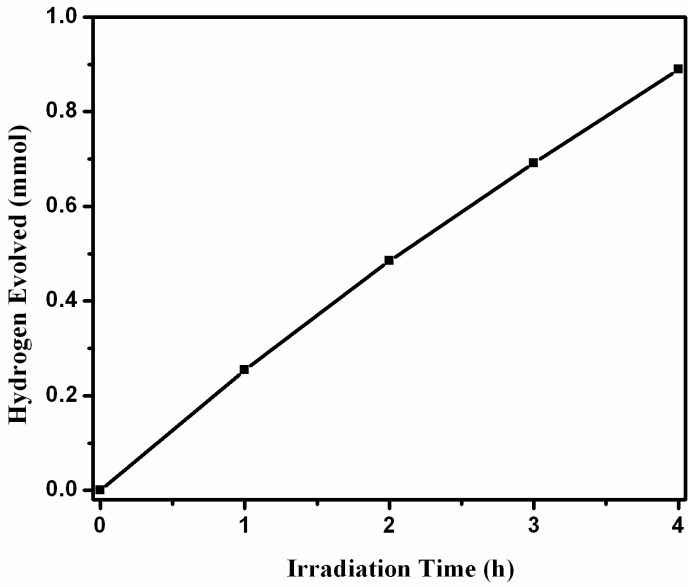

Fig. S7 Time-dependent hydrogen evolution over 0.4 wt % Pt/P25 photocatalyst. Reaction conditions: catalyst, 50 mg; 20 vol % CH_3OH solution, 50 ml; light source, 300 W Xe lamp with a 365 nm filter.

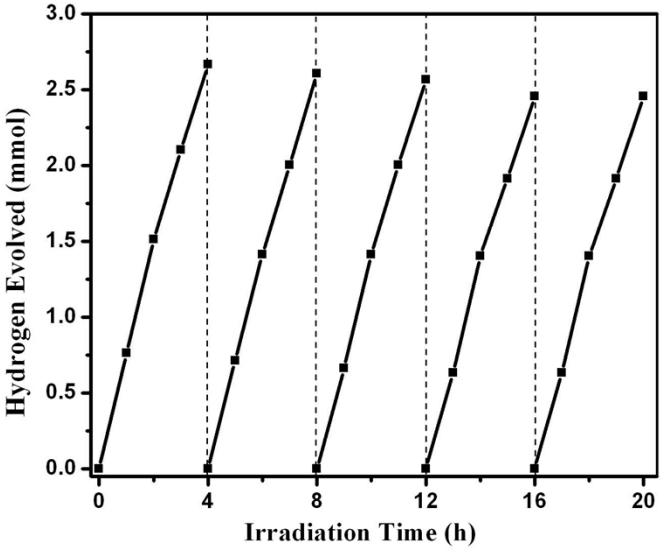

Fig. S8 Cycling performance of 0.4 wt % 3D Pt/TiO_2 architecture.

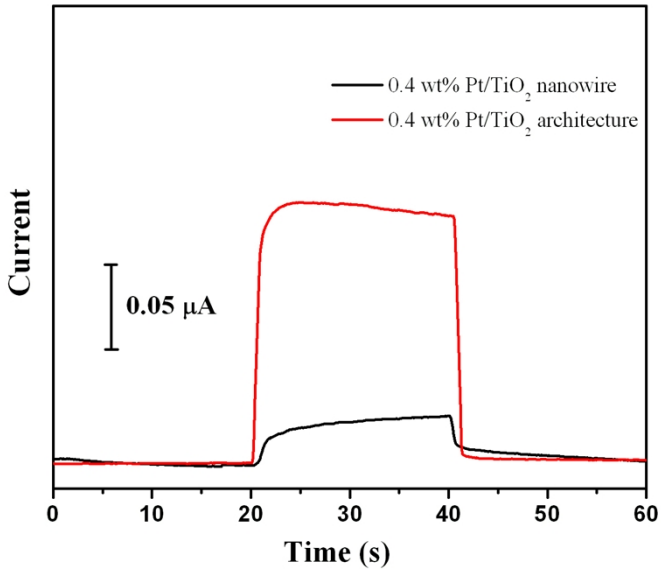

Fig. S9 Transient photocurrent responses of 0.4 wt % 3D Pt/TiO_2 architecture and nanowire irradiation with UV light for 20 s under an electrode potential of 0 V versus Ag/AgCl.

Movie S1: Hydrogen evolution over 20 mg of 0.4 wt % 3D Pt/TiO_2 photocatalyst in 20 vol % CH_3OH solution irradiated under a 300 W Xe lamp with a 365 nm filter (light intensity was about 20 mW/cm^2).