Electronic Supplementary Material (ESI) for Inorganic Chemistry Frontiers.

Electronic Supplementary Information

Ultrathin tungsten-doped hydrogenated titanium dioxide nanosheets for solar-driven hydrogen evolution

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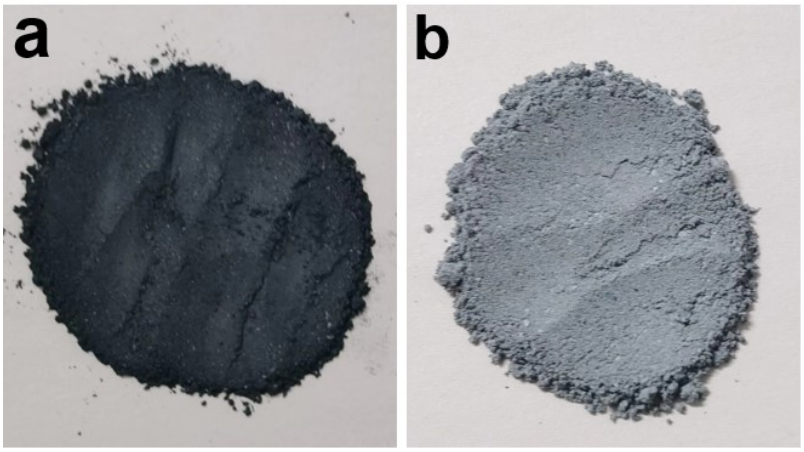

Fig. S1. Optical photos of (a) W-h-TiO_2 nanosheets and (b) h-TiO_2 nanosheets.

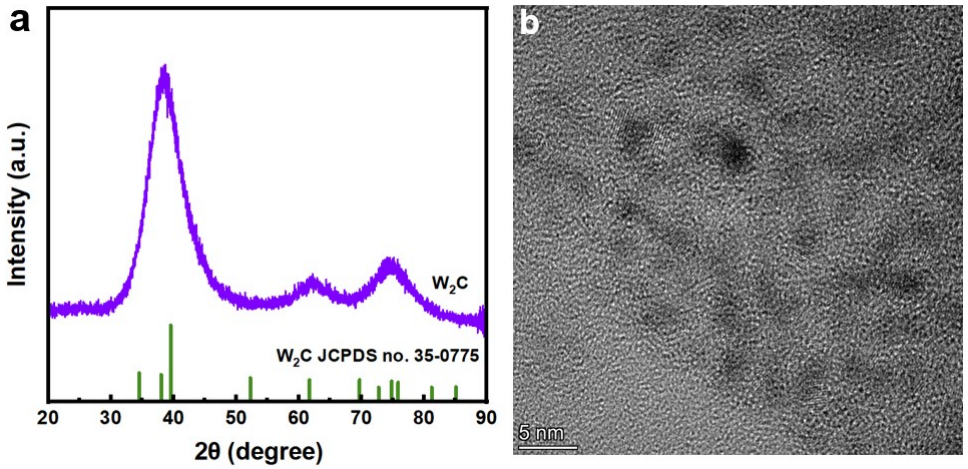

Fig. S2. (a) XRD pattern and (b) TEM image of W_2C nanoparticles.

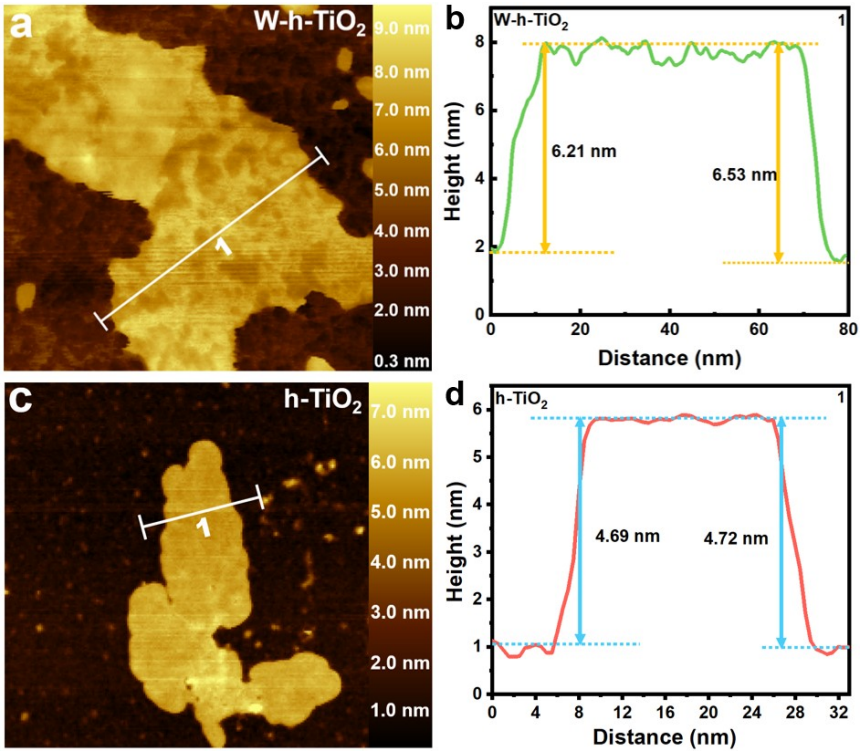

Fig. S3. (a, c) AFM images and (b, d) corresponding height profiles of W-h-TiO_2 nanosheets and h-TiO_2 nanosheets.

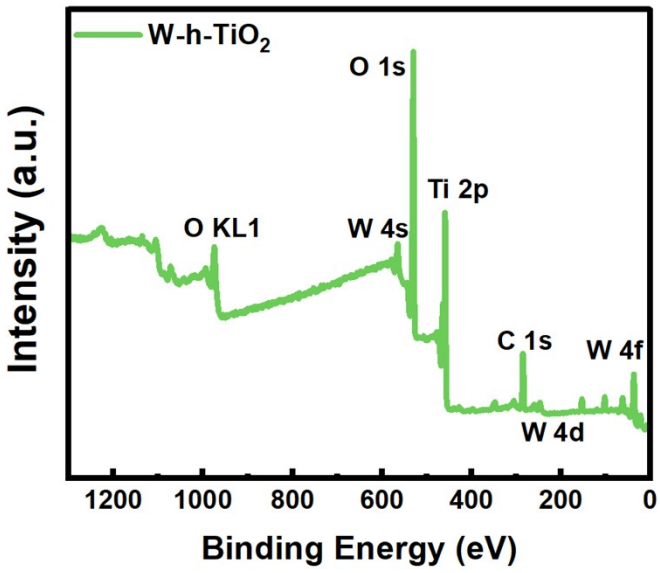

Fig. S4. Full XPS scan spectrum of W-h-TiO_2 nanosheets.

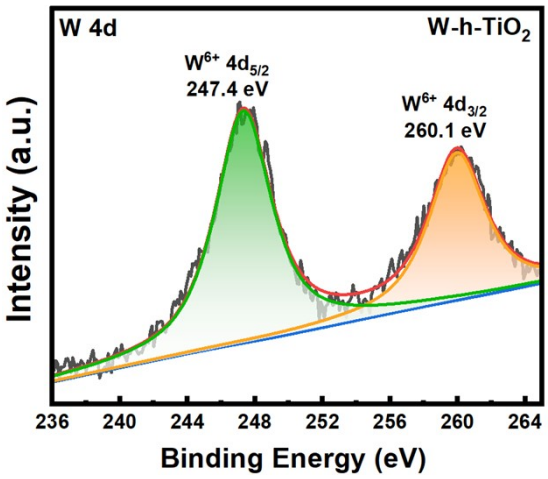

Fig. S5. W 4d XPS spectrum of W-h-TiO_2 nanosheets.

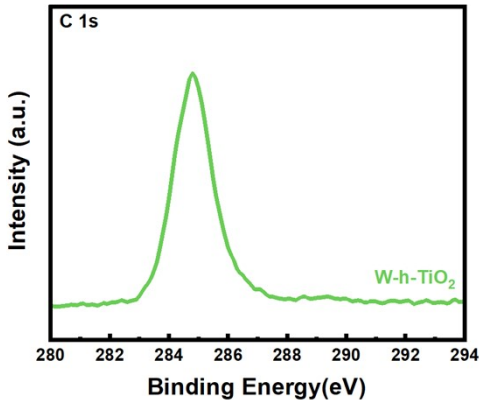

Fig. S6. C 1s XPS spectrum of W-h-TiO_2 nanosheets.

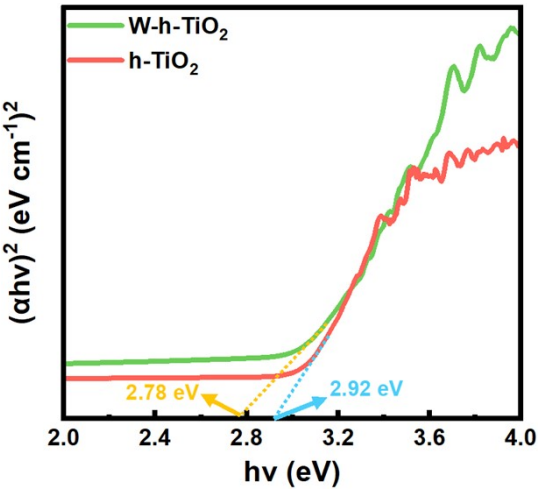

Fig. S7. Optical bandgap of pure h-TiO_2 and W-h-TiO_2 nanosheets.

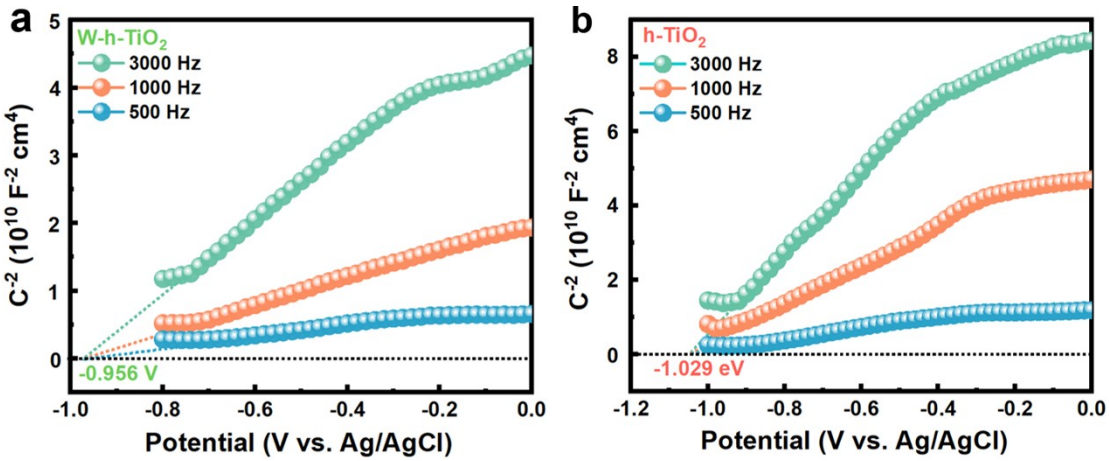

Fig. S8. Mott-Schottky plots under different frequency of (a) W-h-TiO_2 nanosheets and (b) pure h-TiO_2 nanosheets.

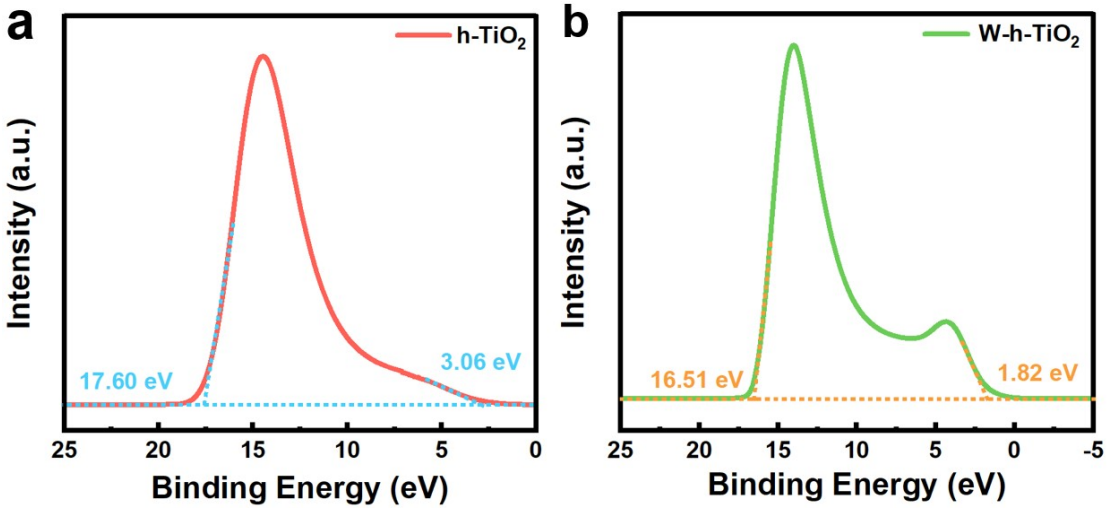

Fig. S9. UPS spectra of (a) h-TiO_2 nanosheets and (b) W-h-TiO_2 nanosheets.

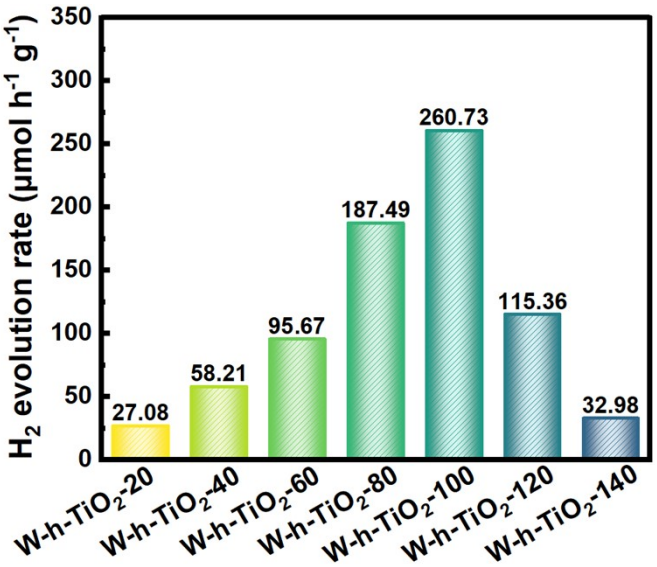

Fig. S10. H_2 evolution rates of W-h-TiO_2 nanosheets under a constant temperature of 25 °C.

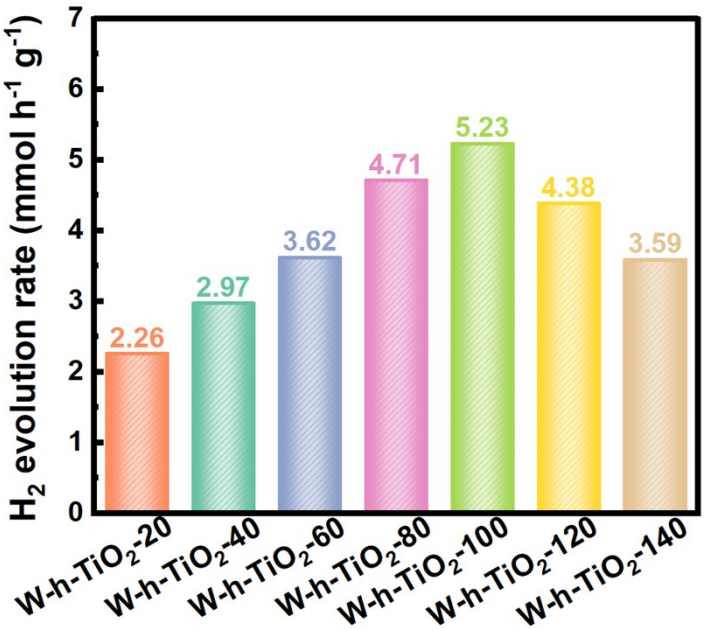

Fig. S11. H_2 evolution rates of W-h-TiO_2 nanosheets with 0.5wt% H_2PtCl_6 as cocatalyst.

Table S1. Actual molar ratio of W to Ti in W-h-TiO_2 nanosheets measured by ICP-OES.

Samples	molar ratio of W to Ti
W-h-TiO2-20	0.27%
W-h-TiO2-40	0.58%
W-h-TiO2-60	0.93%
W-h-TiO2-80	1.35%
W-h-TiO2-100	1.77%
W-h-TiO2-120	2.18%
W-h-TiO2-140	2.69%

Table S2. Time-resolved PL decay curve parameters obtained by double-exponential function simulation.

samples	τ_1 (ns)	τ_2 (ns)	A_1(%)	A_2 (%)	τ_{ave}(ns)
h-TiO_2	2.71	22.61	85.92	14.08	5.52
W-h-TiO_2	3.97	58.36	67.62	32.38	21.58

Table S3. Photocatalytic hydrogen production performance of photocatalysts reported in literatures.

Photocatalysts	H_2 (mmol/g/h)	Illumination	Sacrificial agent	Ref.
Ru-TiO_2	0.85	300 W Xe lamp (AM 1.5G)	3wt% Ru and 20 mL CH_3OH	1
Pt/Ga-TiO_2	5.122	300 W Xe lamp (AM 1.5G)	0.5wt% H_2PtCl_6 and 20 mL CH_3OH	2
Fe-Ni/Ag/TiO_2	0.793	300 W Xe lamp (AM 1.5G)	20 mL CH_3OH	3
S-TiO_2	163.9	300 W Xe lamp (AM 1.5G)	20 mL CH_3OH	4
N-TiO_2/Pt	0.57	300 W Xe lamp (AM 1.5G)	20 mL CH_3OH	5
Ni/TiO_2	3.39	300 W Xe lamp (AM 1.5G)	1wt% H_2PtCl_6 and 20 mL CH_3OH	6
Cu-mpTiO_2	1.00	300 W Xe lamp (AM 1.5G)	1wt% H_2PtCl_6 and 20 mL CH_3OH	7
1T-WS_2/2H-WS_2/CdS	**5.23**	**300 W Xe lamp (AM 1.5G)**	**0.5wt% H_2PtCl_6 and 20 mL CH_3OH**	**This work**

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