Electronic Supplementary Information for

Ni_2P nanowire arrays grown on Ni foam as an efficient monolithic cocatalyst for visible light dye-sensitized H_2 evolution

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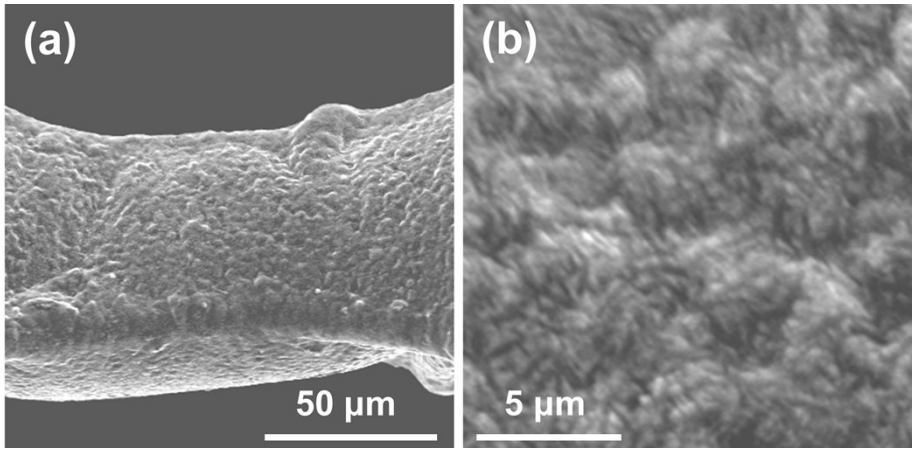

Fig. S1 SEM images of N_2P NL/NF.

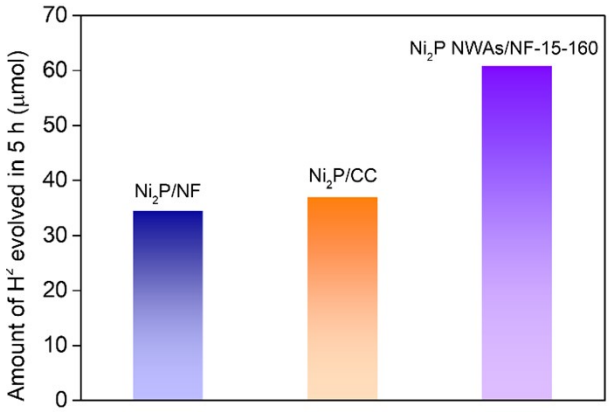

Fig. S2 Photocatalytic HER activities of Ni_2P/CC, Ni_2P/NF, and NWAs/NF-15-160 from ErB-TEOA (10 vol.%, 25 mL, pH 10) system. The Ni_2P/CC and Ni_2P/NF were prepared by drop-coating Ni_2P powder on carbon paper (d=1.6 cm) and NF (d=1.6 cm), respectively. The loading amount of Ni_2P in Ni_2P/CC and Ni_2P/NF was same as in NWAs/NF-15-160.

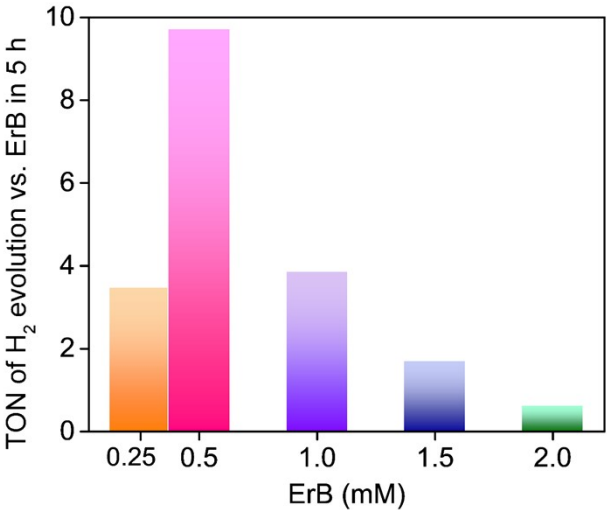

Fig. S3 TON of H_2 evolution based on ErB on Ni_2P NWAs/NF-15-160 from ErB-TEOA (10 vol.%, 25 mL, pH 10) system.

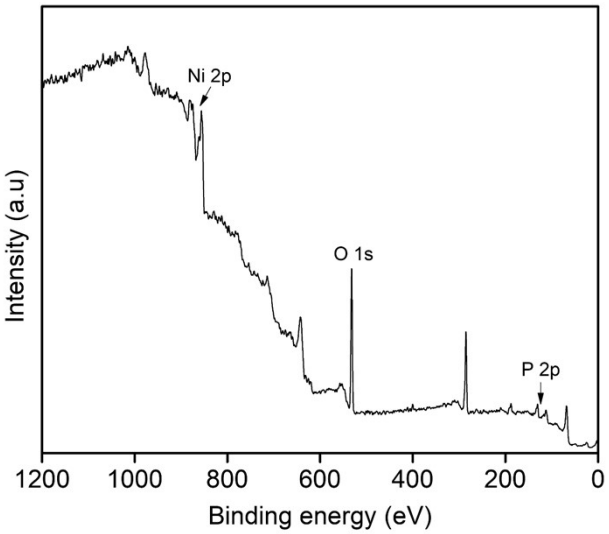

Fig. S4 XPS survey spectrum of Ni_2P NWAs/NF-15-160 after photocatalytic HER.

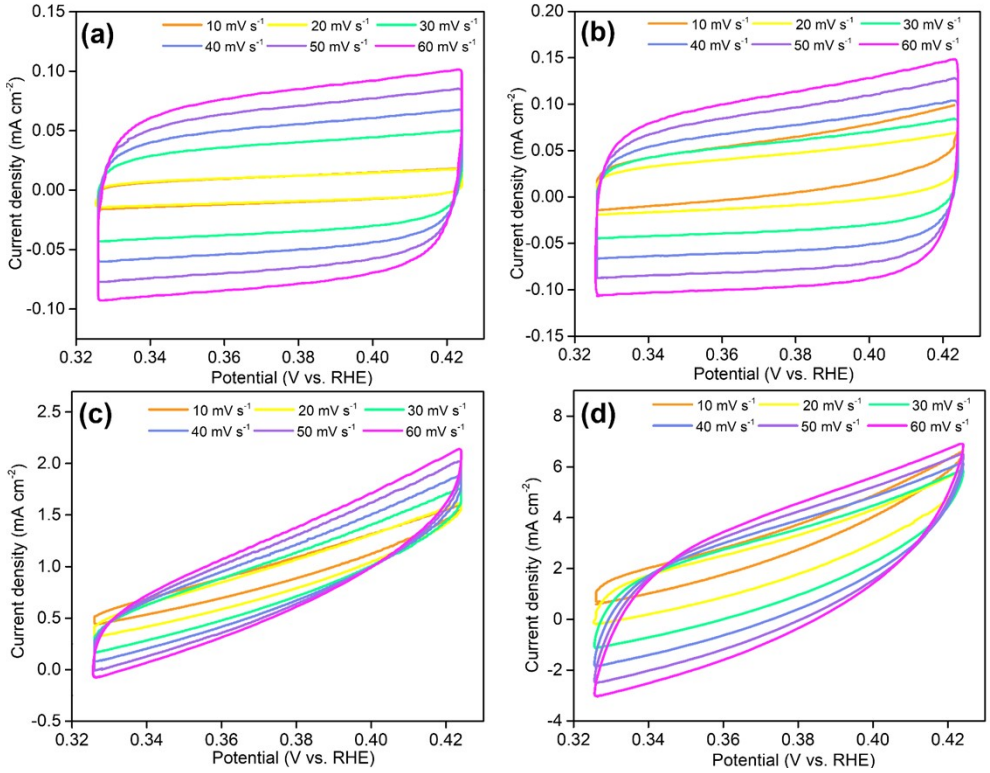

Fig. S5 Cyclic voltammograms (CV) of (a) pristine NF, (b) NF-O-15-160, (c) Ni_2P NL/NF and (d) Ni_2P NWAs/NF-15-160 at different scan rates in 0.5 M Na_2SO_4 solution.

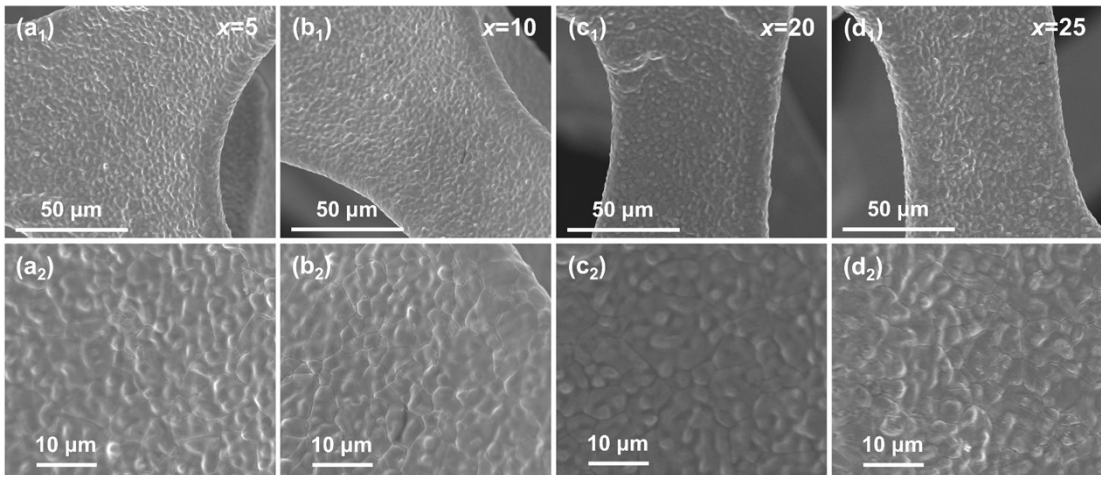

Fig. S6 SEM images of NF-O-*x*-160 samples, where the "*x*" and "160" represent the concentration of H_2O_2 and hydrothermal temperature, respectively.

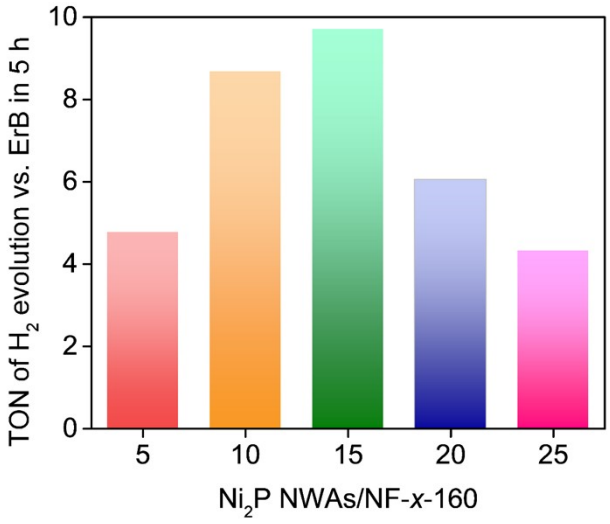

Fig. S7 TON of H_2 evolution on Ni_2P NWAs/NF-*x*-160 from TEOA solution (10 vol.%, 25 mL, pH 10) containing ErB (0.5 mM) under visible light irradiation.

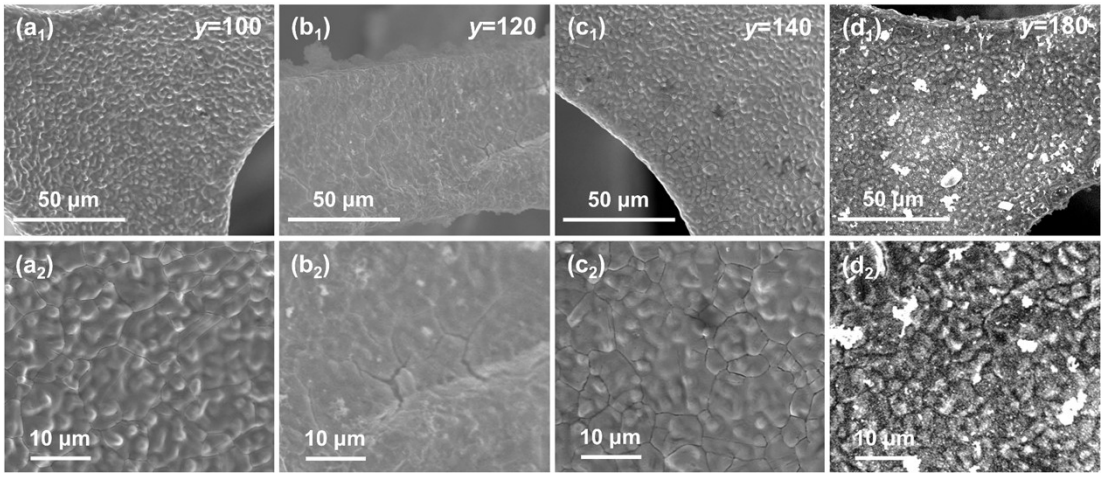

Fig. S8 SEM images of NF-O-15-*y* samples, where the "15" and "*y*" represent the concentration of H_2O_2 and hydrothermal temperature, respectively.

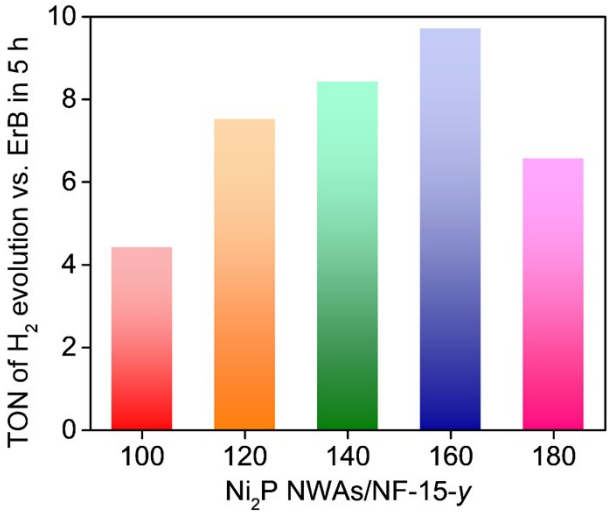

Fig. S9 TON of H_2 evolution on Ni_2P NWAs/NF-*x*-160 from TEOA solution (10 vol.%, 25 mL, pH 10) containing ErB (0.5 mM) under visible light irradiation.

Table S1 Comparison of photocatalytic HER activity of dye-sensitized Ni_2P NWAs/NF with other photocatalysts with Ni_2P as cocatalyst.

Photocatalyst	Form	Reaction conditions	Light source	H_2 evolution rate (mmol h^{-1} $g_{catalyst}^{-1}$)	Ref.
Ni_2P-CdS/g-C_3N_4	Powder	0.35 M Na_2S and 0.25 M Na_2SO_3	300 W Xe lamp (>400 nm)	44.45	1
$Cd_{0.5}Zn_{0.5}S$@ZnS-Ni_2P/g-C_3N_4	Powder	0.35 M Na_2S and 0.25 M Na_2SO_3	300 W Xe lamp (>420 nm)	55.43	2
$Ni_{12}P_5$/g-C_3N_4	Powder	10 vol% TEOA	350 W Xe lamp (>420 nm)	0.12	3
Ni_2P/CdS-DETA	Powder	0.35 M Na_2S and 0.25 M Na_2SO_3	300 W Xe lamp (>420 nm)	6.83	4
Ni_2P/CdS	Powder	10 vol.% Lactic acid	300 W Xe lamp (>420 nm)	1.18	5
Ni_2P-$Cd_{0.9}Zn_{0.1}S$	Powder	0.7 M Na_2S and 0.5 M Na_2SO_3	300 W Xe lamp (>400 nm)	94	6
MoS_2-g-C_3N_4/Ni_2P	Powder	10 vol.% TEOA	300 W Xe lamp (>420 nm)	0.29	7
C-Ni_2P@CdS	Powder	10 vol.% TEOA	300 W Xe lamp (>420 nm)	28.39	8
Ni_2P/$ZnIn_2S_4$	Powder	10 vol.% Lactic acid	300 W Xe lamp (>420 nm)	2.06	9
NiO/Ni_2P/g-C_3N_4	Powder	10 vol.% TEOA	300 W Xe lamp (>420 nm)	0.50	10
7-Ni_2P/MoP@g-C_3N_4	Powder	10 vol.% TEOA	300 W Xe lamp (>420 nm)	0.52	11
NiCoP/g-C_3N_4	Powder	10 vol.% CH_3OH	300W Xe lamp (300-700 nm)	0.16	12
Ni_2P/TiO_2/Ti_3C_2-ox	Powder	5 vol.% glycerol	35 W UV−visible lamp	16.1	13
Ti_3AlC_2/TiO_2/Ni_2P	Powder	5 vol.% glycerol	35 W UV−visible lamp	4.3	14
Ag/pCN-TiO_2	Monolith	5 vol.% CH_3OH	200 W Hg lamp	8.2	15

Ag-pCN/TiO_2	Monolith	5 vol.% glycerol	200 W Hg lamp	12.1	16
Ni_2P NWAs/NF	Monolith	10 vol% TEOA	10W LED (380 nm≤λ≤780 nm)	0.96	This work

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