Electronic Supplementary Information

Etch-Doping Strategy: Cobalt-Iron Bimetallic Phosphide as a Bifunction Electrocatalyst for Highly Efficient Water Splitting

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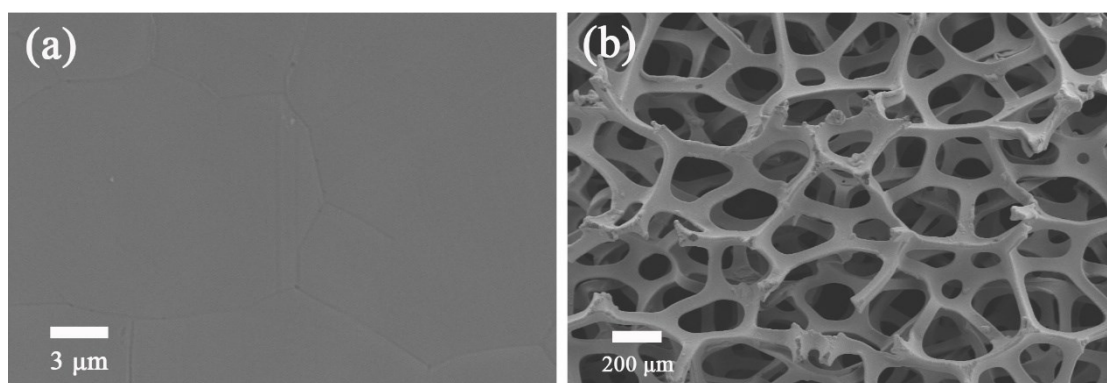
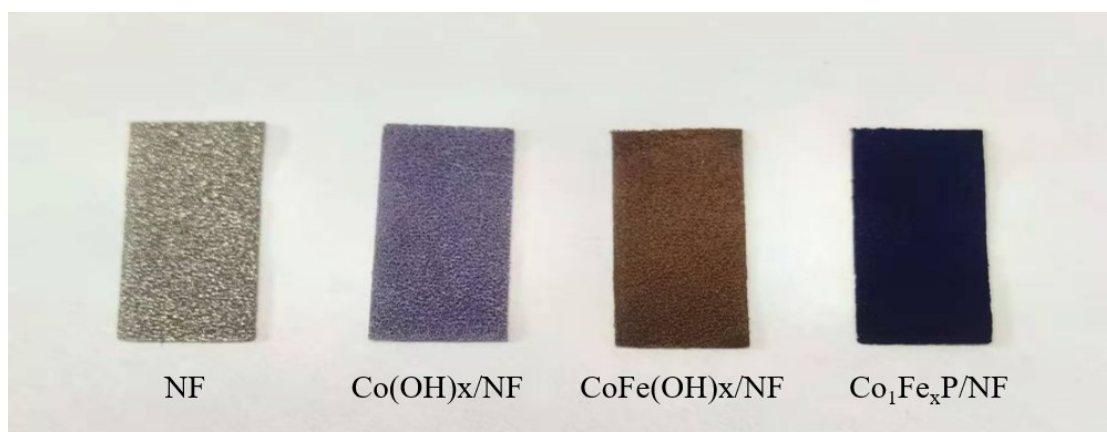Fig. S1 (a) High and (b) low resolution SEM images of bare NF.

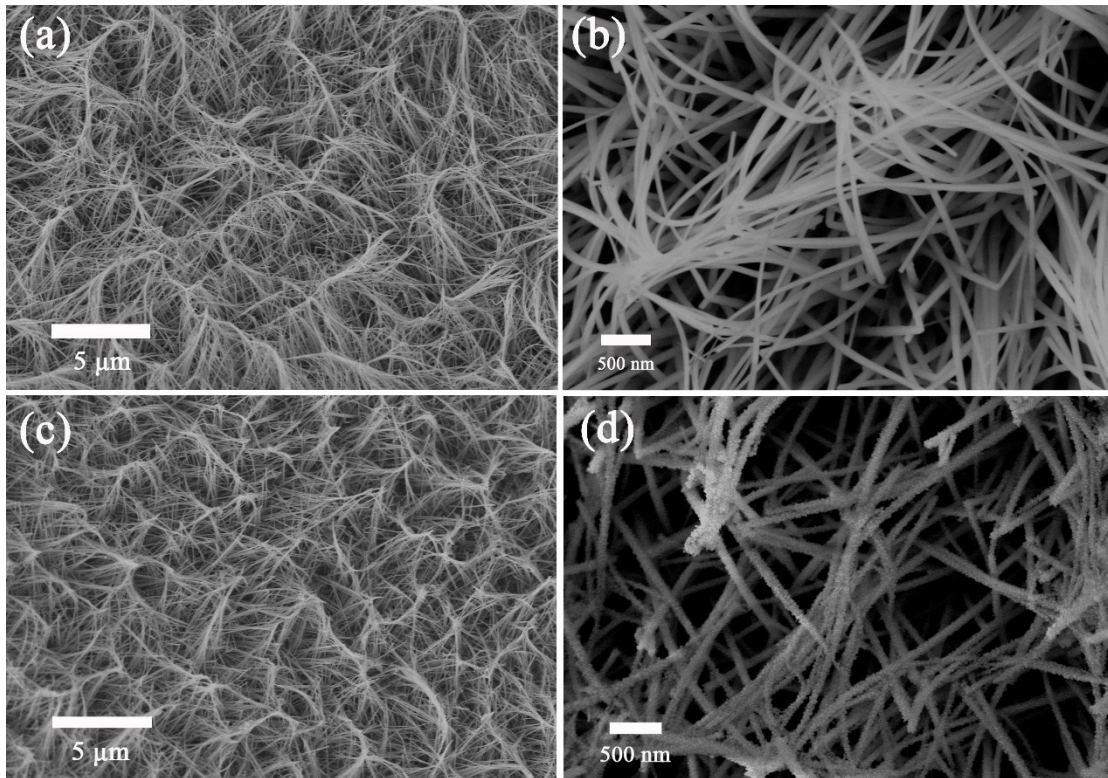Fig. S2 Physical map of each product during the experiment

Fig. S3 (a) Low and (b) high resolution SEM images of Co(OH)$_x$/NF. (a) Low and (b) high resolution SEM images of CoFe(OH)$_x$/NF.
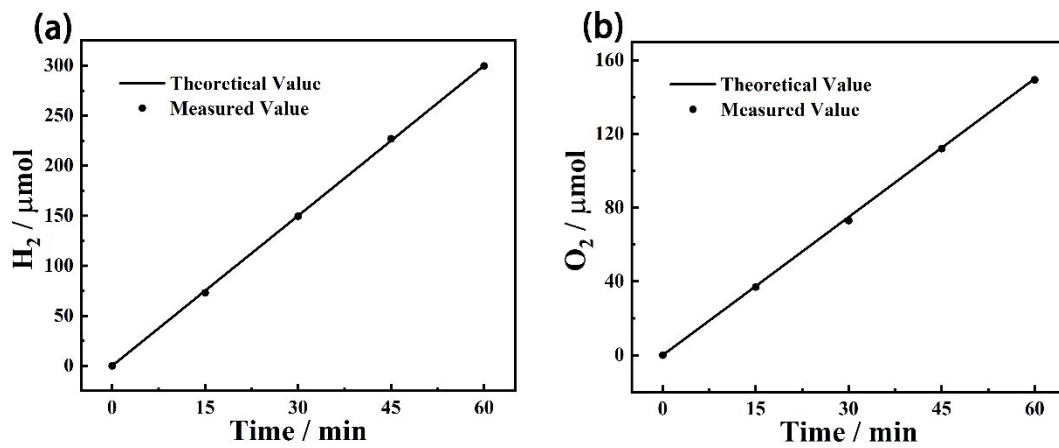

Fig. S4 (a) Electrocatalytic efficiency of H$_2$ production over Co$_1$Fe$_{0.1}$P/NF at a current density of 20 mA cm^{-2}. (b) Electrocatalytic efficiency of O$_2$ production over Co$_1$Fe$_{0.1}$P/NF at a current density of 20 mA cm^{-2}.
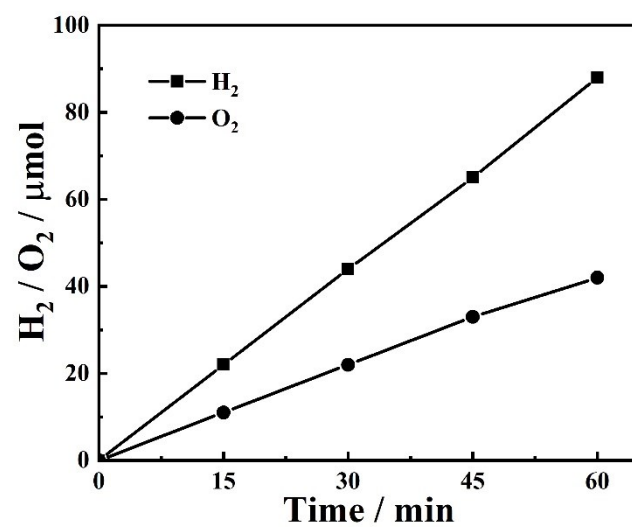
Fig. S5 H_2 and O_2 production over $Co_1Fe_{0.1}P/NF$ at a current density of 20 mA cm^{-2}.
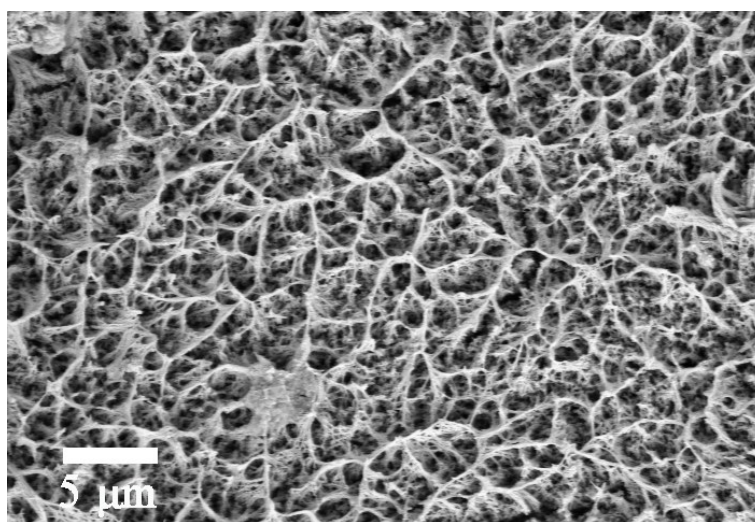

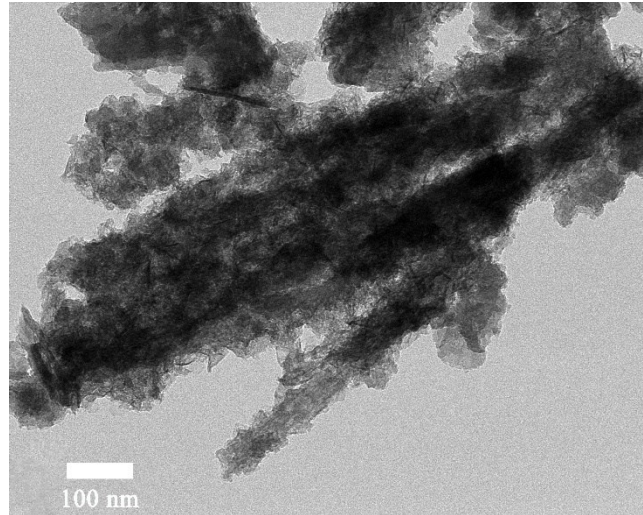Fig. S6 SEM images of $Co_1Fe_{0.1}P/NF$ catalyst after 24 h OER test.

Fig. S7 TEM images of $Co_1Fe_{0.1}P/NF$ catalyst after 24 h OER test.
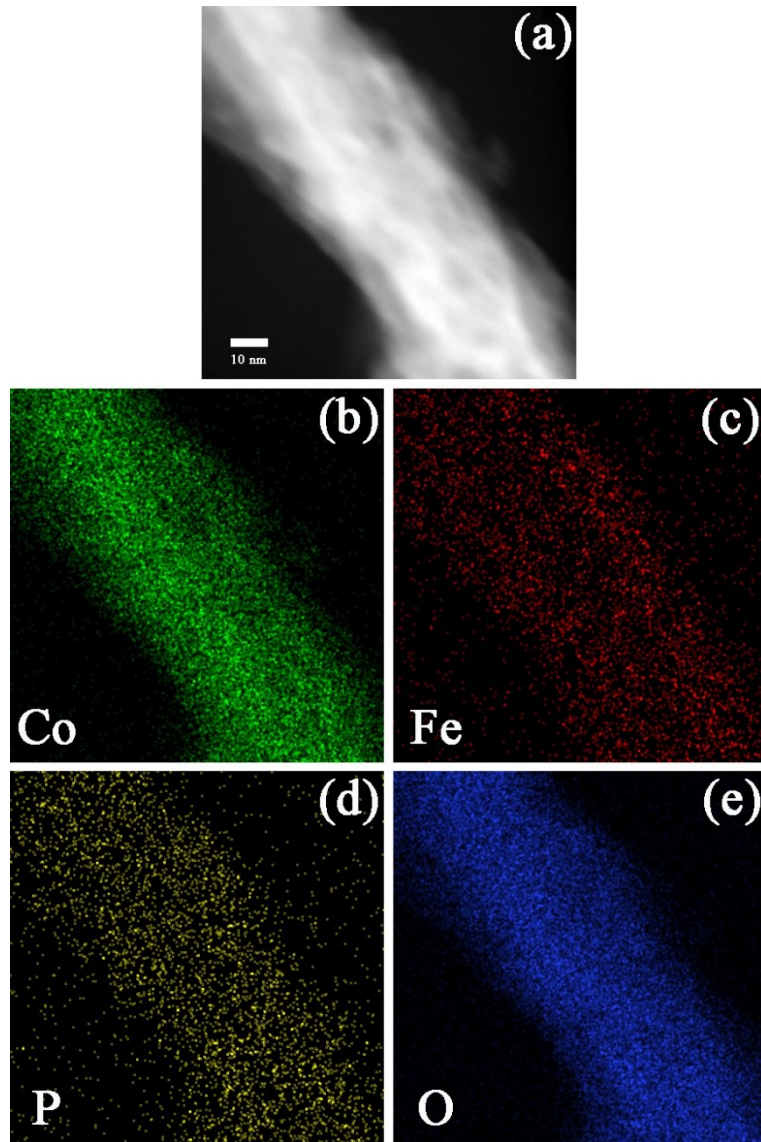

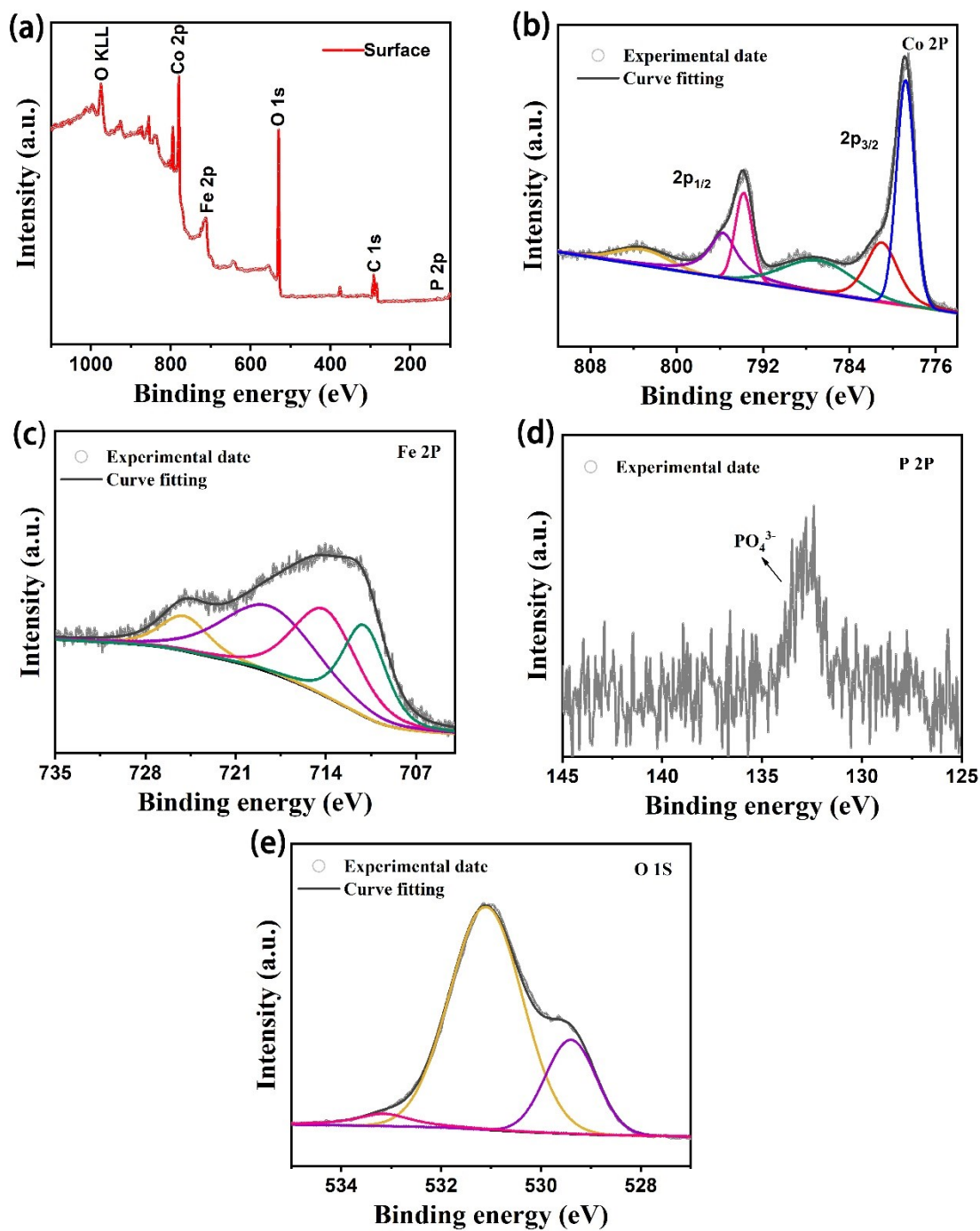Fig. S8 Mapping images of $Co_1Fe_{0.1}P/NF$ catalyst after 24 h OER test.

Fig. S9 (a) XPS survey spectrum of $Co_1Fe_{0.1}P/NF$ nanowires after 24 h OER test; The XPS spectra of (b) Co 2p, (c) Fe 2p, and (d) P 2p in the $Co_1Fe_{0.1}P/NF$.
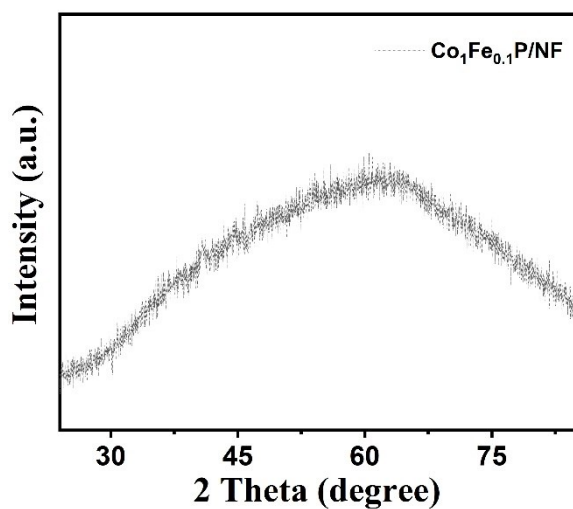
Fig. S10 XRD patterns of $Co_1Fe_{0.1}P/NF$ after 24 h OER test.

Table S1 Related parameters of nickel foam.

	thickness	Specific surface area	Porosity
NF	1.0 mm	320 g/m²±20	95%-98%

Table S2 Load capacity of different batches of the same sample.

	Quality (mg)	average value (mg)
NF	95.1/89.7/90.7	91.83
$Co_1Fe_{0.1}P/NF$	105.2/100.0/99.0	100.14
Sample load	10.1/10.3/8.3	9.57

Table S3 Inductively coupled plasma of 1M KOH after OER test.

Metal ions	P
Content (mg/L)	0.70

Table S4 Summary of TMP-based electrocatalysts for HER, OER and overall water splitting in 1 M KOH.

Catalyst	Electrolyte	Overpotential @J_{10}/mV for HER	Overpotential @ J_{10}/mV for OER	Overpotential @J_{10}/V for overall water splitting	Reference
CoFeP@Ru	1M KOH	94	270	1.60	[1]
Ni_2P/Cu_3P	1M KOH	88	262	1.60	[2]
A-$NiSe_2P$	1M KOH	111	272	1.62	[3]
P-Fe_3N@NC	1M KOH	102	270	1.61	[4]
$MnCo_2O_4$@Ni_2P	1M KOH	57	240	1.63	[5]
Ni_2P@rGO	1M KOH	142	260	1.61	[6]
CoP@3D Ti_3C_2 -MXene	1M KOH	168	280	1.58	[7]
$Co_{0.6}Fe_{0.4}P$ NPs	1M KOH	133	298	1.57	[8]
$CoS_{0.46}P_{0.54}$	1M KOH	101	302	1.62	[9]
$Co_1Fe_{0.1}P$/NF	1M KOH	73	257	1.60	This work