Supporting Information

A cobalt porphyrin-bridged covalent triazine polymer derived electrode for efficient hydrogen production

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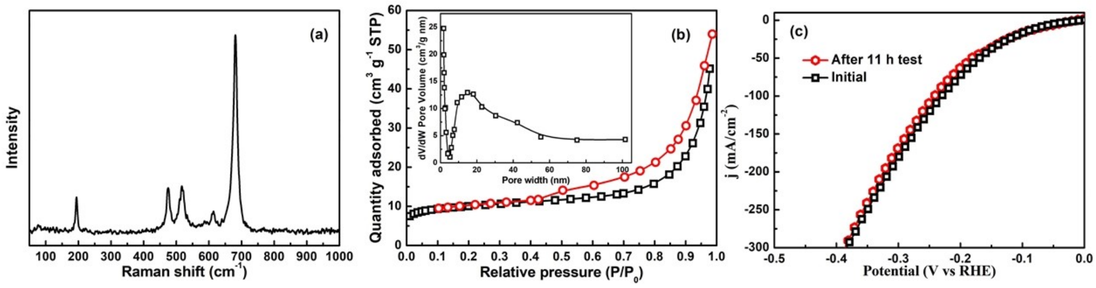

Figure S1. (a) Raman spectrum, (b) N_2 adsorption-desorption isotherm of $Co_{5.47}N$/N,Co-C-800 (Inset is pore size distribution), and (c) LSV curves of $Co_{5.47}N$/N,Co-C-800 before and after stability measurement.

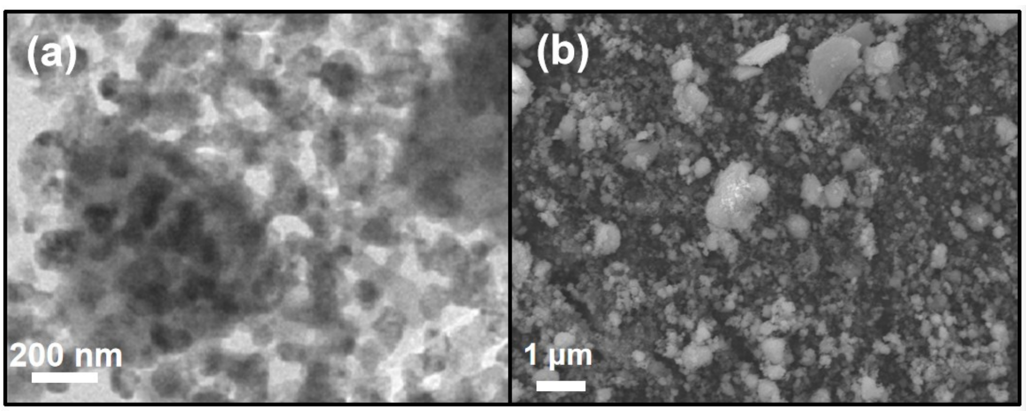

Figure S2. (a) TEM and (b) SEM images of $Co_{5.47}N$/N,Co-C-800 after stability measurement.

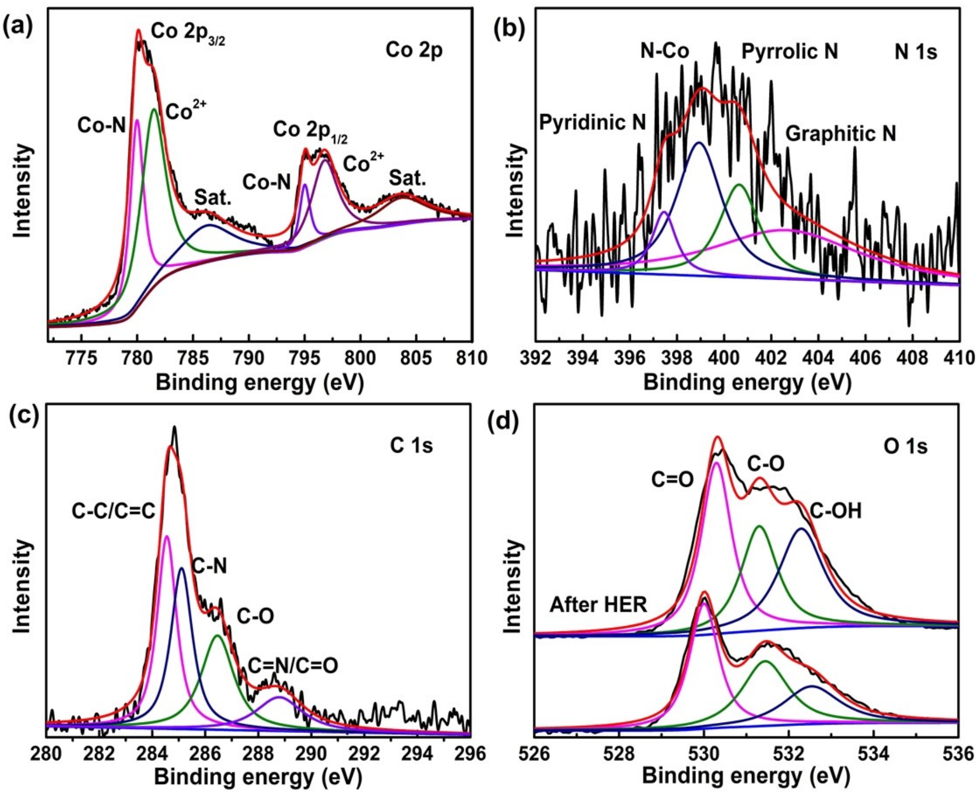

Figure S3. High-resolution XPS spectra of (a) Co 2p, (b) N 1s, and (c) C 1s core levels in $Co_{5.47}N$/N,Co-C-800 after HER; (d) High-resolution O 1s XPS spectra of $Co_{5.47}N$/N,Co-C-800 before and after HER.

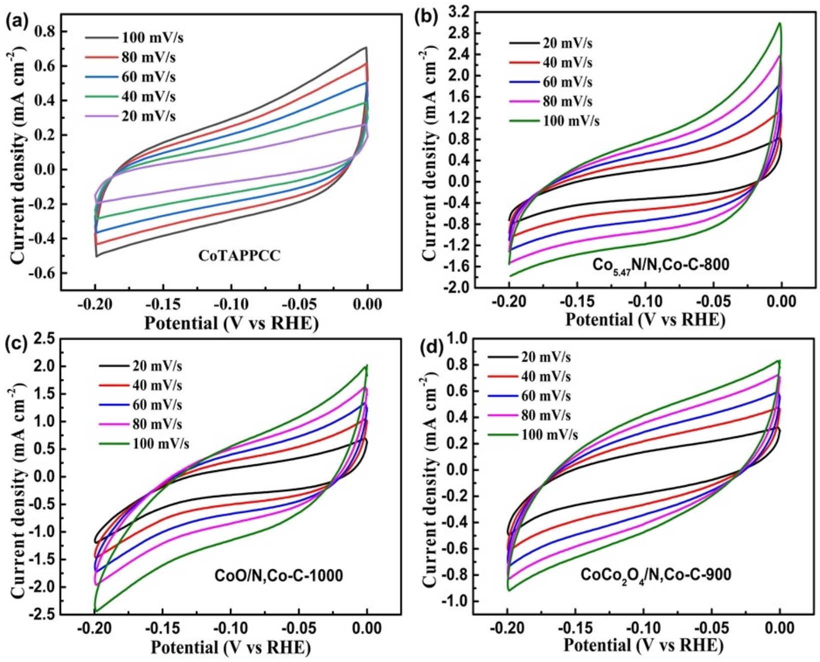

Figure S4. CV curves for the as-prepared samples at different scan rates: (a) CoTAPPCC, (b) $Co_{5.47}N$/N,Co-C-800, (c) CoO/N,Co-C-1000, and (d) $CoCo_2O_4$/N,Co-C-900.

Table S1. Comparison of HER performance of $Co_{5.47}N$/N,Co-C-800 with some other reported electrocatalysts at 10 mA cm^{-2}.

Electrocatalysts	Overpotential (mV@10 mA cm^{-2})	Refs.
$Co_{5.47}N$ NP@N-PC	149 (1.0 M KOH)	1
$Co_{5.47}N$@N-rGO-750	190 (1.0 M KOH)	2
$Co_{5.47}N$-WO_2@C/NF	36 (1.0 M KOH)	3
Co-Mo-N /NF	82 (1.0 M KOH)	4
CoFeN-NCNTs//CCM	151 (1 M KOH)	5
$Co_{5.47}N/Mo_5N_6$	44 (1 M KOH)	6
Fe, Ni-$Co_{5.47}N$@N-VrGO-2	121 (0.5 M H_2SO_4)	7
$Co_{5.47}N$/rGO@NF	123 (1.0 M KOH)	8
Mo_2C@NCs	110 (1.0 M KOH)	9
C, N, S-doped C	180 (0.5 M H_2SO_4)	10
CoP-nph-CMP-800	360 (1.0 M KOH)	11
P@pCoPc-1/Co_3O_4|CC	120 (1.0 M KOH)	12
MoP/NF	114 (1.0 M KOH)	13
MoS_2-MoP/C	102 (1.0 M KOH)	14
phosphosulfide (MoPS)	170 (1.0 M KOH)	15
MoP@NCHSs-900	92 (1.0 M KOH)	16
Ni, Co-doped MoP	102 (0.5 M H_2SO_4)	17
CoP_2/RGO	88 (1.0 M KOH)	18
CoNi(1:1)-TB-800N_2	114 (1.0 M KOH)	19
Co_9S_8-40/CC	100 (1.0 M KOH)	20
Co-Ni_3N	225 (1.0 M KOH)	21
N-doped Mo_2C	99 (1.0 M KOH)	22
Ni/Mo_2C(1:2)-NCNFs	143 (1.0 M KOH)	23
$Co_5Mo_{1.0}P$ NSs@NF	173	24
Ni@Ni-Mo	> 190	25
$Co_{0.75}Ni_{0.25}$/CC	108	26
$Co_{5.47}N$/N,Co-C-800	**76 (1.0 M KOH)**	**This work**

Table S2. Comparison of HER performance of $Co_{5.47}N$/N,Co-C-800 with some other reported electrocatalysts at 100 mA cm^{-2}.

Electrocatalysts	**Overpotential (mV@100 mA cm^{-2})**	**Refs.**
$Co_{5.47}N$@N-rGO-750	～320 (1 M KOH)	2
$Co_5Mo_{1.0}P$ NSs@NF	～300 (1 M KOH)	24
Ni@Ni-Mo	276 (1 M KOH)	25
$Co_{0.75}Ni_{0.25}$/CC	237 (1 M KOH)	26
F-CTF-1-AA	> 430 (1.0 M KOH)	27
Co-NCNTFs	～300 (1 M KOH)	28
Co_2P@C	～350 (0.5 M H_2SO_4)	29
$Co(OH)_2$@PANI	～250 (0.5 M H_2SO_4)	30
$MoSe_2$-Mo_2C	～250 (0.5 M H_2SO_4)	31
graphene-Mo_2C	～370 (0.5 M H_2SO_4)	32
Pd-PHE MA/NF-5000	～350 (1 M KOH)	33
CoFeCo PBA	～320 (1 M KOH)	34
$Ni(OH)_2$-Fe_2P/Ti mesh	252 (1 M KOH)	35
$Co_{5.47}N$/N,Co-C-800	**229 (1.0 M KOH)**	**This work**

Table S3. Comparison of the XPS data of $Co_{5.47}N$/N,Co-C-800 before and after the electrolysis.

Species	**Peak positions before electrolysis (eV)**	**Peak positions after electrolysis (eV)**
Co^{2+} ions	781.5/796.6	781.3/796.5
Co-N bonds	779.9/794.8	779.8/794.9
N 1s	398.2/398.9/400.7/401.9	397.5/398.7/400.6/402.6
C 1s	284.6/285.1/286.3/289.2	284.5/285.0/286.5/288.8
O 1s	529.9/531.4/532.5	530.3/531.2/532.3

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