Electronic Supplementary Material (ESI) for Materials Chemistry Frontiers.

Supporting Information

Well-aligned metal-organic framework array-derived CoS_2 nanosheets toward robust electrochemical water splitting

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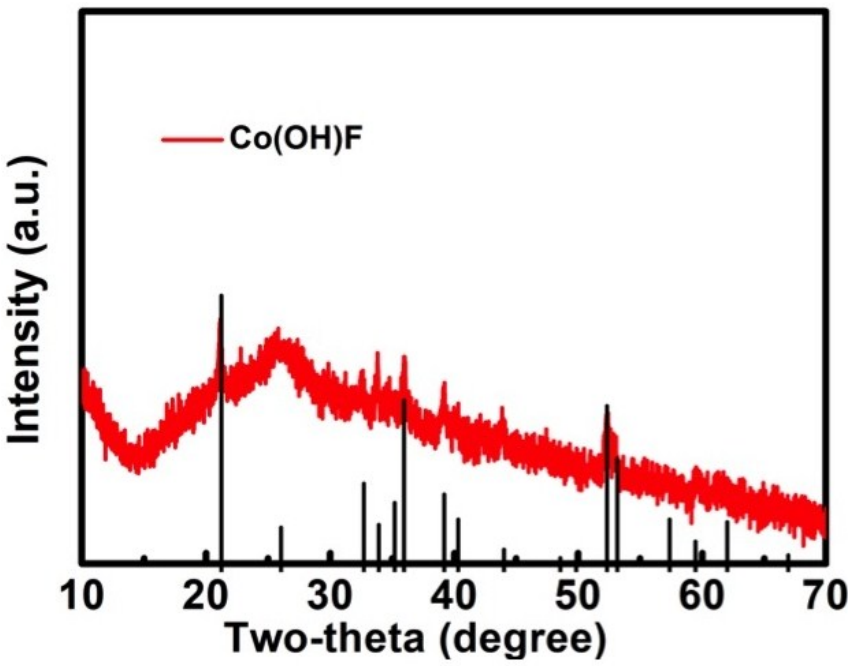

Fig. S1 XRD patterns of Co(OH)F/CC;

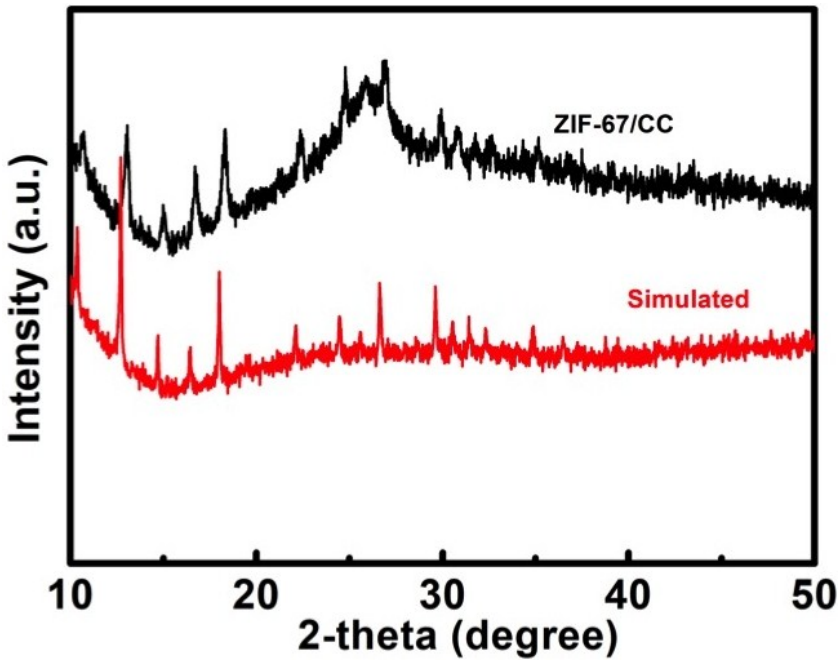

Fig. S2 XRD patterns of ZIF-67/CC;

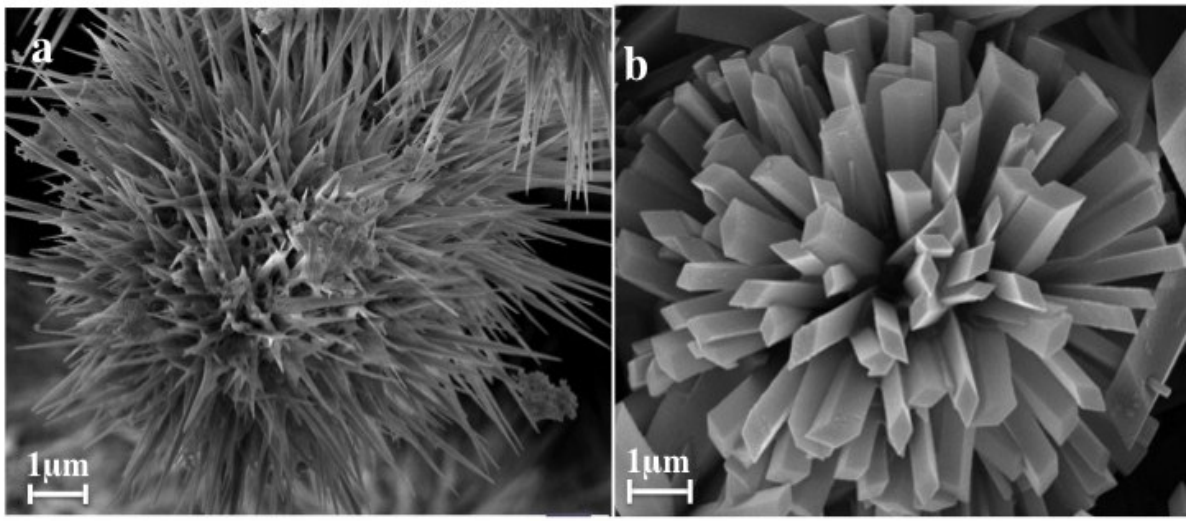

Fig. S3 SEM images of Co(OH)F/CC(a), and ZIF-67/CC (b)

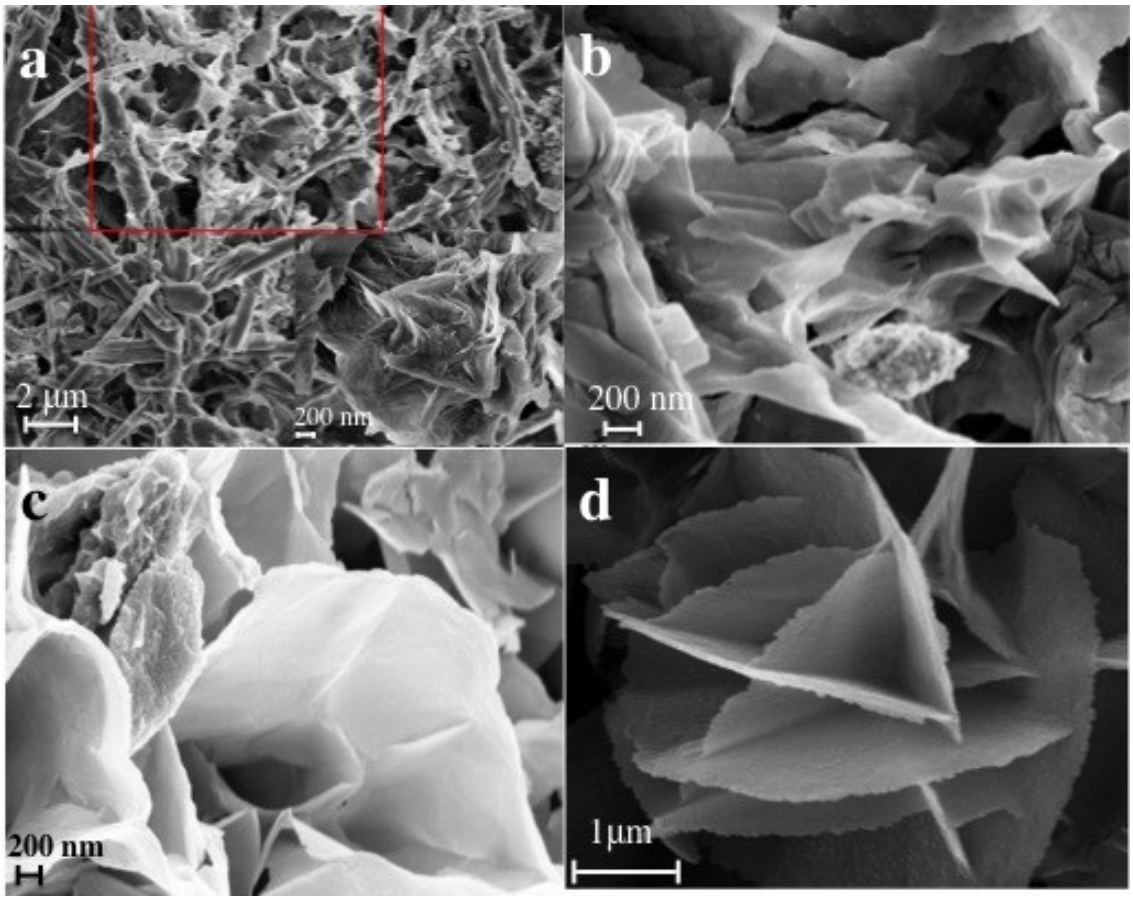

Fig. S4 SEM images of ZIF-67/CC for vulcanization 30 min (a); 60 min (b); 90 min (c); 120 min (d).

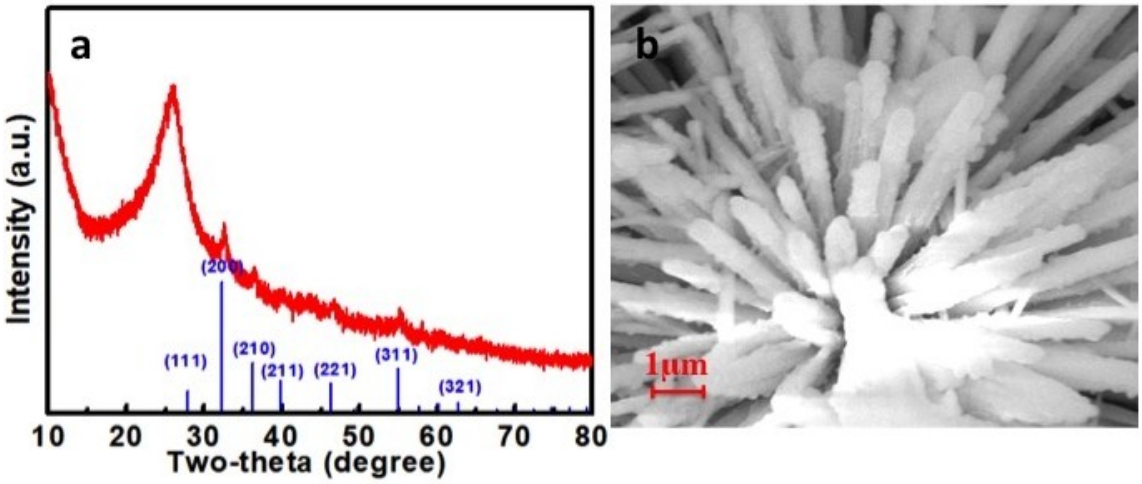

Fig. S5 XRD pattern and SEM image of CoS_2 NR/CC.

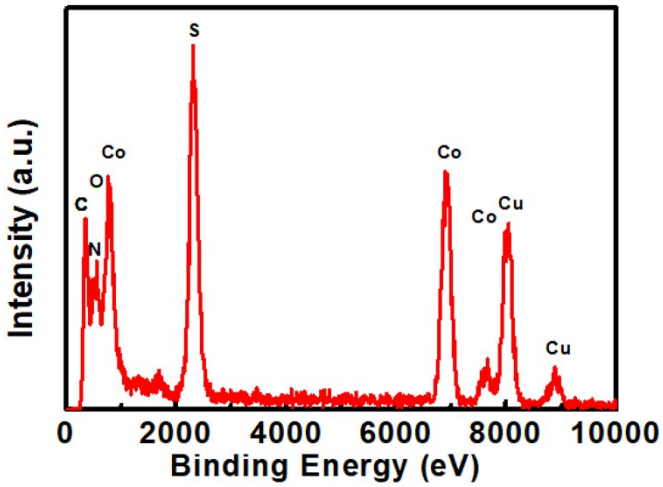

Fig. S6 EDX spectrum of CoS_2 NS/CC

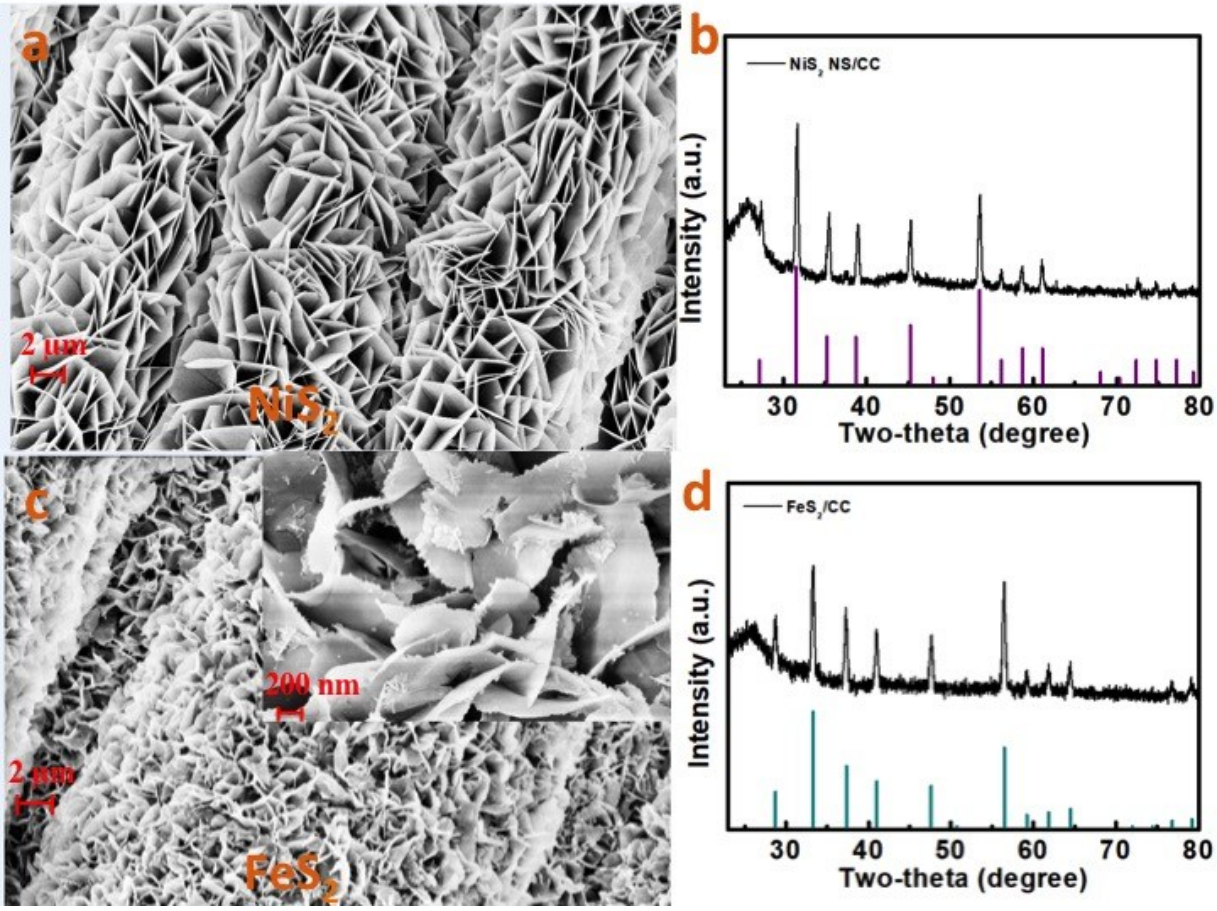

Fig. S7 (a) SEM images of NiS_2 NS/CC; (b) XRD pattern of NiS_2 NS/CC (PDF#11-0099) ; (c) SEM images of FeS_2 NS/CC; (e) XRD pattern of FeS_2 NS/CC (PDF#42-1340) .

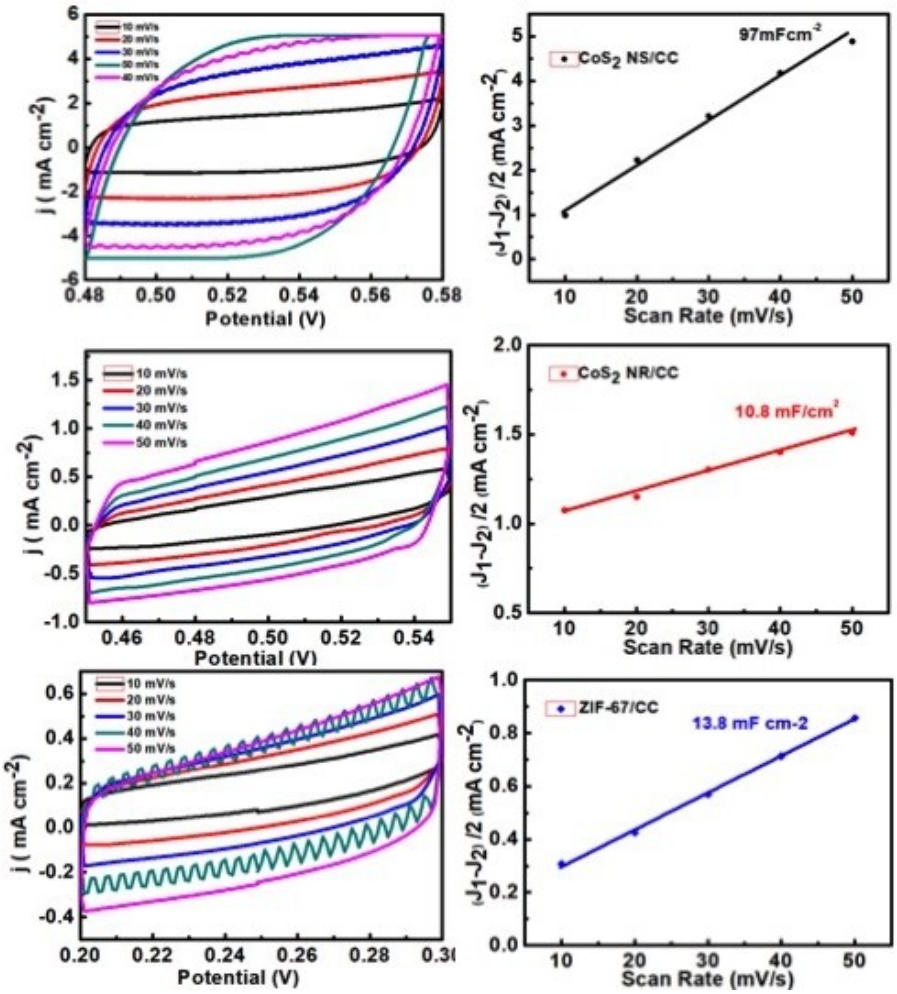

Fig. S8 (a) Cyclic voltammetries with for capacitive currents at 0.53 V as a function of scan rate in 1.0 M KOH for CoS_2 NS/CC and the Cdl of CoS_2 NS/CC by Linear fitting; (b) CoS_2 NR/CC;(c) ZIF-67/CC.

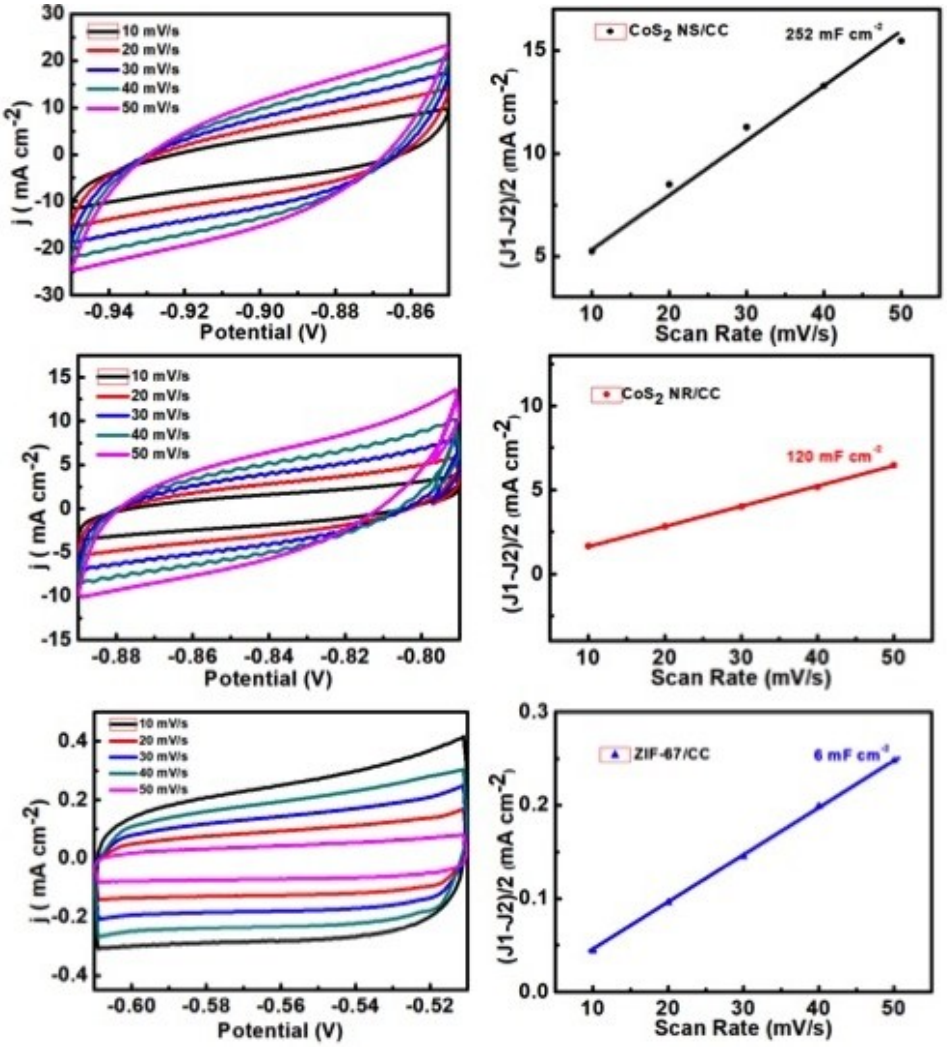

Fig. S9 (a) Cyclic voltammetries with for capacitive currents at -0.9 V as a function of scan rate in 1.0 M KOH and the C_{dl} of CoS_2 NS/CC, (b) CoS_2 NR /CC, (c) ZIF-67/CC.

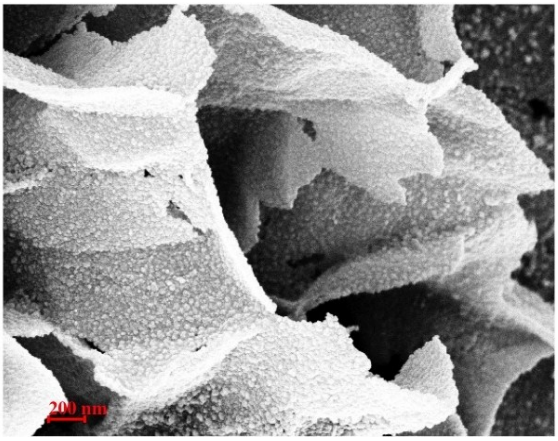

Fig. S10 SEM images of CoS_2 NS/CC after OER test.

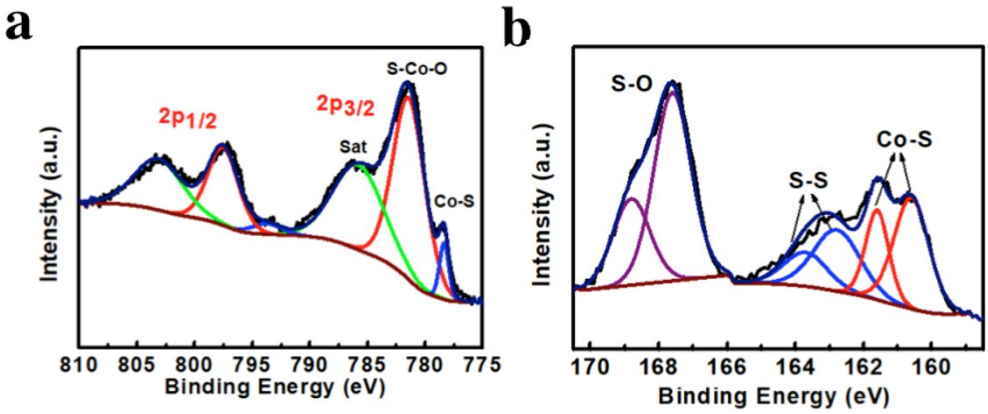

Fig. S11 XPS pattern of CoS_2 NS/CC after OER

(a) Co 2p spectrum; (b) S 2p spectrum.

(b)

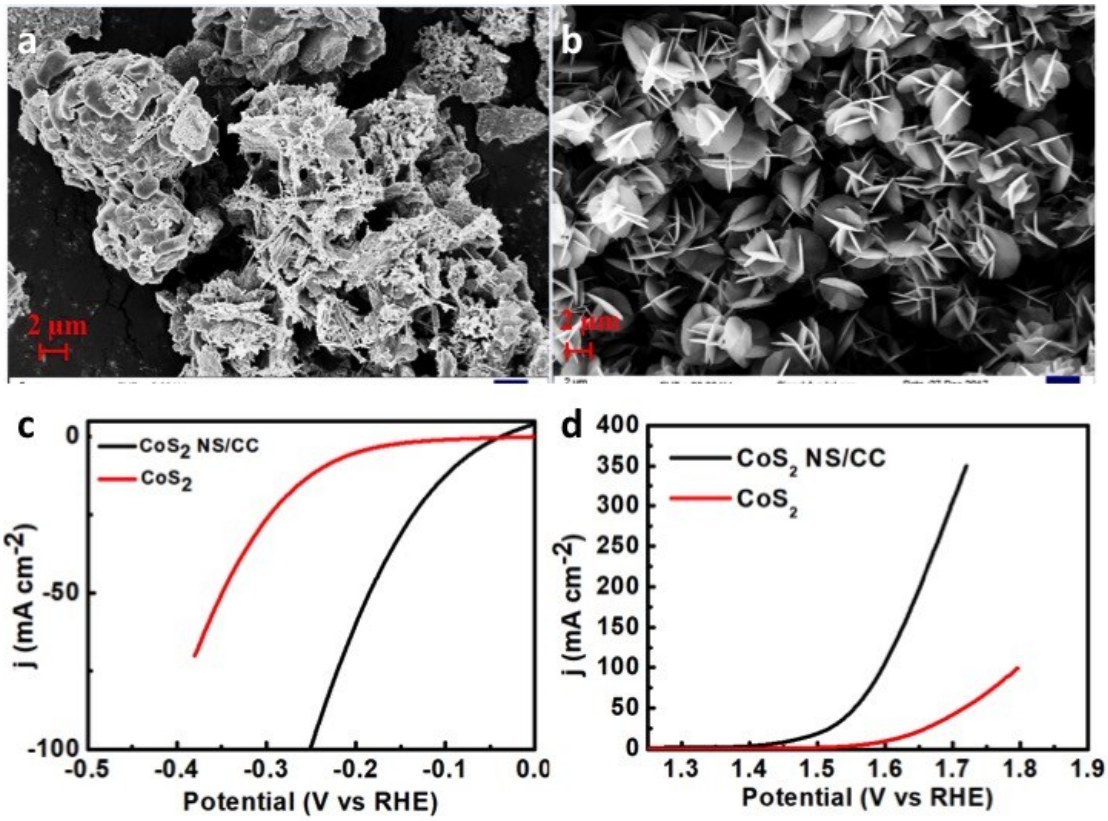

Fig. S12 (a) SEM images of CoS_2 without carbon cloth; (b) SEM images of CoS_2 NS/CC; (c-d) LSV curves of CoS_2 NS/CC and CoS_2 without carbon cloth.

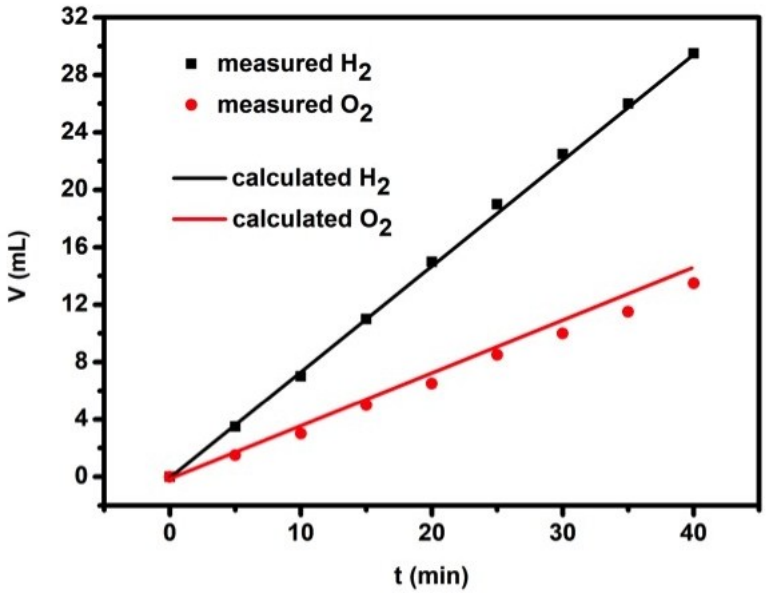

Fig. S13 Faraday efficiency of H_2 and O_2 production.

Table S1 Comparison of representative Co-based sulfide OER catalysts in alkaline electrolyte.

Catalyst	j (mA cm^{-2})	η (mV)	Reference
CoS_2 SN/CC	10	85	This work
	100	248	
CoS_2 SL/CC	10	90	This work
CoS_2 NTA / CC	10	193	1
P-Co−Ni−S/NF	100	284	2
N−CoS2 NW/CC	10	152	3
CoS2@NSC/CFP	10	95	4
	100	158	
$Ni_{2.3\%}$-CoS_2/CC	100	231	5
$NiCo_2S_4$ BHSs	1	90	6
Cu@CoS*x*/CF	10	134	7
	100	267	
$NiCo_2S_4$/Ni_3S_2/NF	10	119	8
Ni_3S_2 nanorod/NF	10	200	9
Zn-Co-S/CFP	10	234	10
MoS_2-Ni_3S_2 HNRs/NF	10	98	11
Ni_3S_2/NF	10	223	12
NiS/NF	20	158	13
CoP/CC	10	110	14
S-$NiFe_2O_4$	10	138	21
CoS_2 HNSs	10	193	15

Table S2 Comparison of representative Co-based sulfide OER catalysts in alkaline electrolyte.

Catalyst	j (mA cm^{-2})	η (mV)	Reference
CoS_2 SN/CC	10	220	This work
	100	320	
CoS_2 SL/CC	10	280	This work
CoS_2 NTA / CC	10	276	1
$Ni_{2.3\%}$-CoS_2/CC	100	370	5
Cu@CoS*x*/CF	10	160	7
	100	310	
CoS_2@NSC	10	470	16
Co_3S_4@MoS_2	10	330	17
$CuCo_2S_4$	10	310	18
N-CoS_2/CC	10	240	19
CoS_2 HNSs	10	290	11
Ni_3S_2/NF	10	260	12
NiS/NF	50	335	13
S-$NiFe_2O_4$	10	260	21
$NiCo_2$(SOH)x	10	290	20

Table S3 Comparison of representative Co-based sulfide water splitting catalysts in alkaline electrolyte.

Catalyst	j (mA cm^{-2})	E (mV)	Reference
CoS_2 SN/CC-CoS_2 SN/CC	10	1.58	This work
	100	1.86	
CoS_2 NTA/CC-CoS_2 NTA/CC	10	1.67	1
$Ni_{2.3\%}$-CoS_2/CC-$Ni_{2.3\%}$-CoS_2/CC	10	1.66	5
Cu@CoS*x*/CF-Cu@CoS*x*/CF	100	1.80	7
NiS/NF- NiS/NF	10	1.64	13
Ni_3S_2/NF- Ni_3S_2/NF	10	1.76	12
S-$NiFe_2O_4$- S-$NiFe_2O_4$	10	1.65	21
$NiMoO_4$−x/MoO_2-$NiMoO_4$−x/MoO_2	10	1.56	22
CP/CT/Co-S- CP/CT/Co-S	10	1.68	23
foil/$NiCo_2O_4$-foil/NiCo2O4	10	1.73	24
$NiCo_2O_4$ HM/NF-$NiCo_2O_4$ HM/NF	10	1.65	25

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