Electronic Supplementary Material (ESI) for Sustainable Energy & Fuels.

Mo, Co co-doped NiS bulks supported on Ni foam as an efficient electrocatalyst for overall water splitting in alkaline media

Caiyun Wu, Yunmei Du, Yunlei Fu, Di Feng, Hui Li, Zhenyu Xiao, Yanru Liu*, Yu Yang, Lei Wang*

Key Laboratory of Eco-chemical Engineering, Taishan scholar advantage and characteristic discipline team of Eco chemical process and technology, College of Chemistry and Molecular Engineering, Qingdao University of Science and Technology, Qingdao 266042, P. R. China.

* Corresponding author. Email: liuyanru@qust.edu.cn (Y.R. Liu), inorchemwl@126.com (L. Wang)

Figure caption:

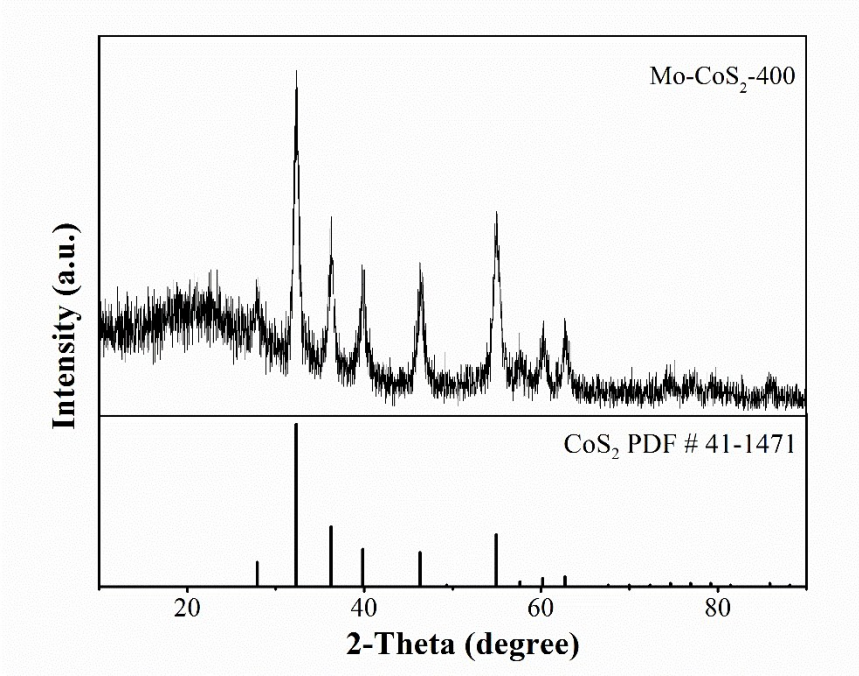

Fig. S1 The XRD pattern of Mo-CoS_2-400.

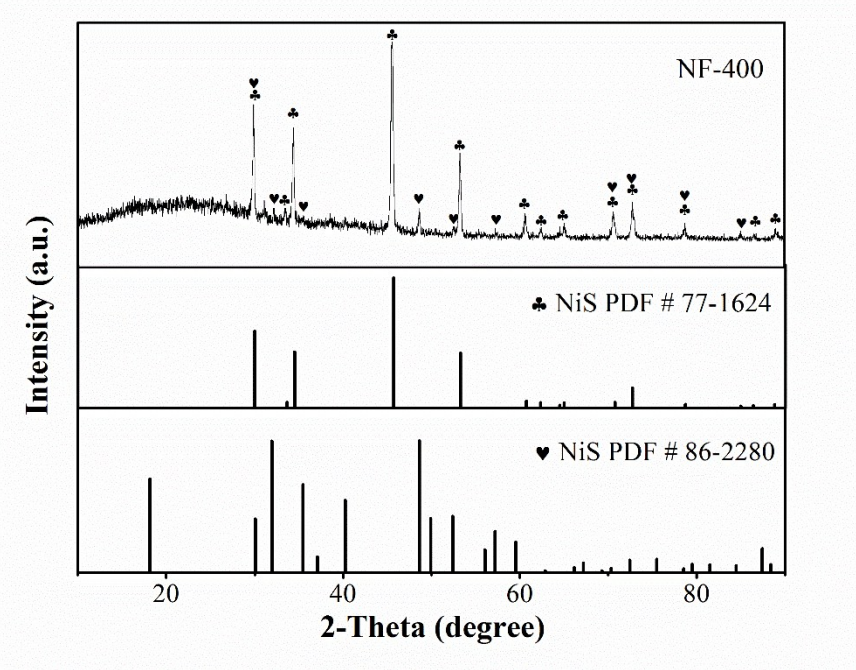

Fig. S2 The XRD pattern of NF-400.

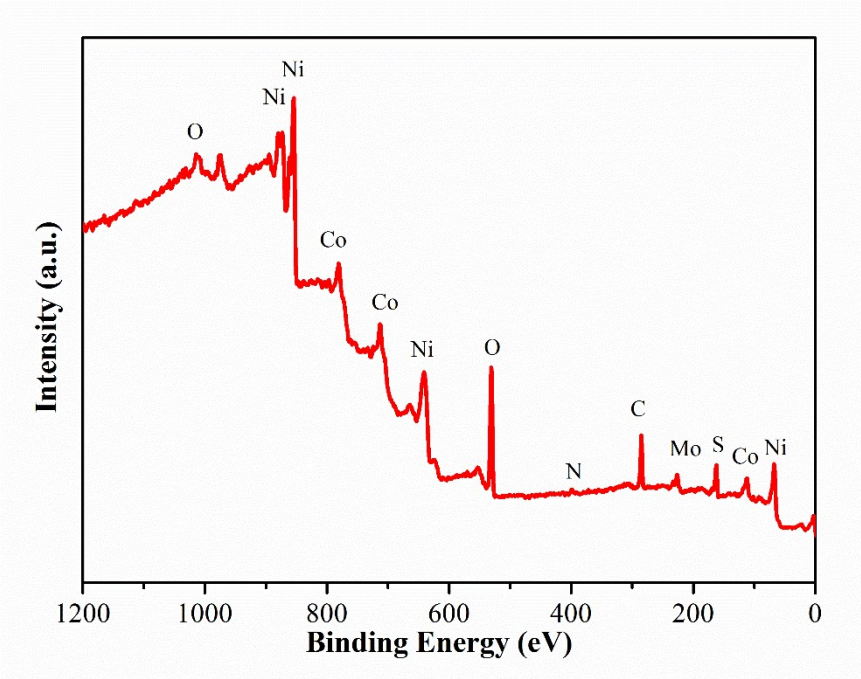

Fig. S3 The survey spectrum of Mo,Co-NiS/NF-400.

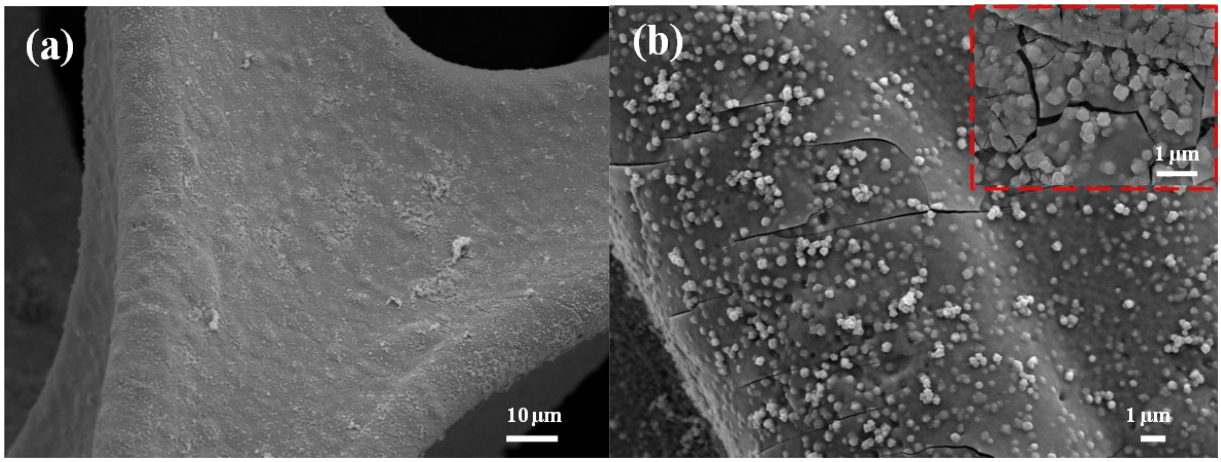

Fig. S4 The SEM images of Mo,Co-NiO/NF with different resolution.

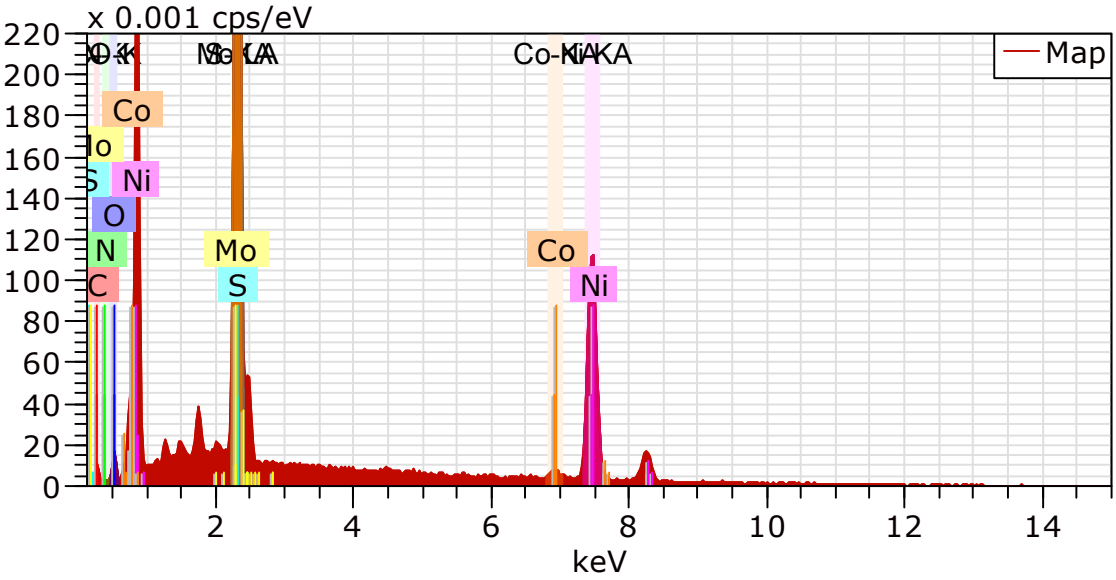

Fig. S5 EDX spectrum of Mo,Co-NiS/NF-400.

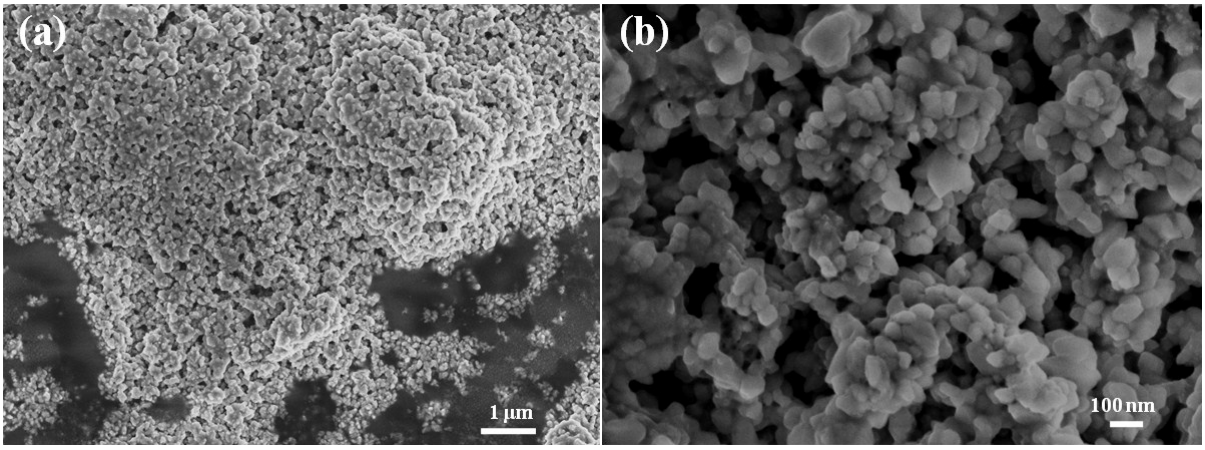

Fig. S6 The SEM images of Mo-CoS_2-400 powder with different resolution.

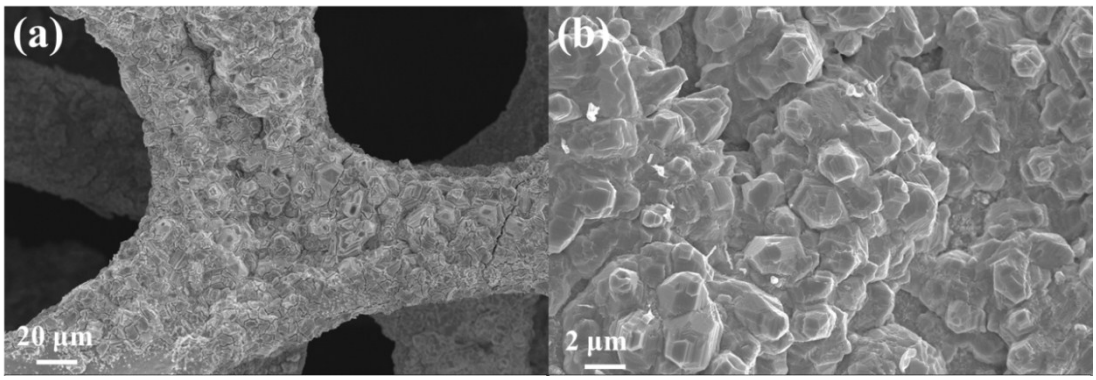

Fig. S7 The SEM images of Mo,Co-NiS/NF-400 after HER stability test.

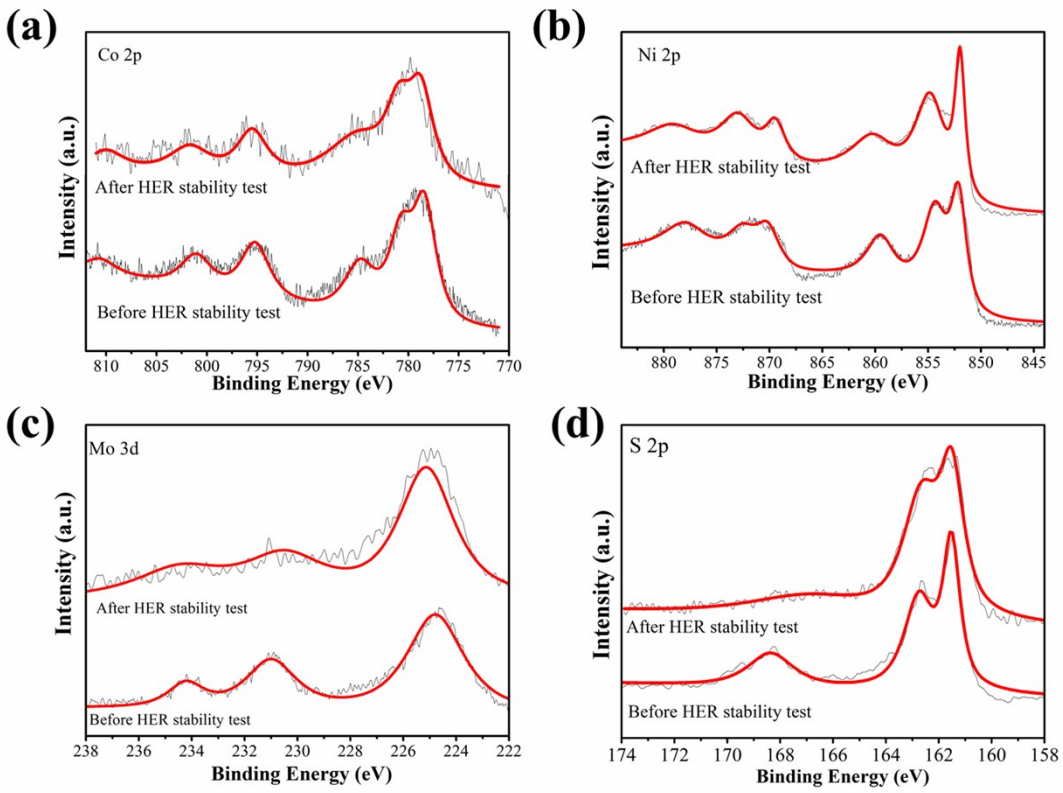

Fig. S8 The XPS spectrum of Mo,Co-NiS/NF-400 before and after HER stability test:

(a) Co 2p, (b) Ni 2p, (c) Mo 3d, (d) S 2p.

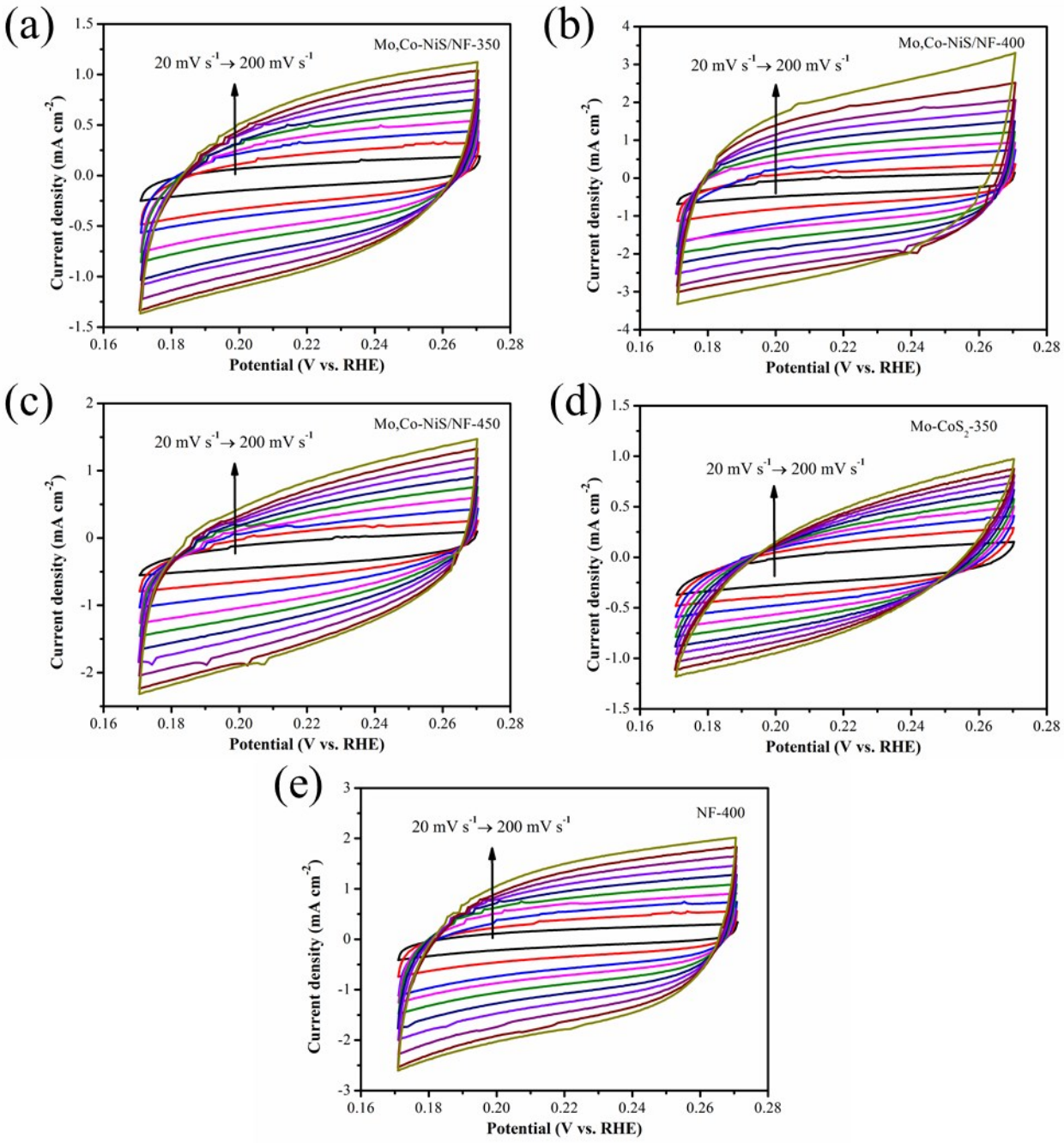

Fig. S9 CV curves at various scan rates in the potential range 0.17~0.27 V (vs. RHE) for HER in 1M KOH solution: (a) Mo,Co-NiS/NF-350; (b) Mo,Co-NiS/NF-400; (c) Mo,Co-NiS/NF-450; (d) Mo-CoS_2-400; (e) NF-400.

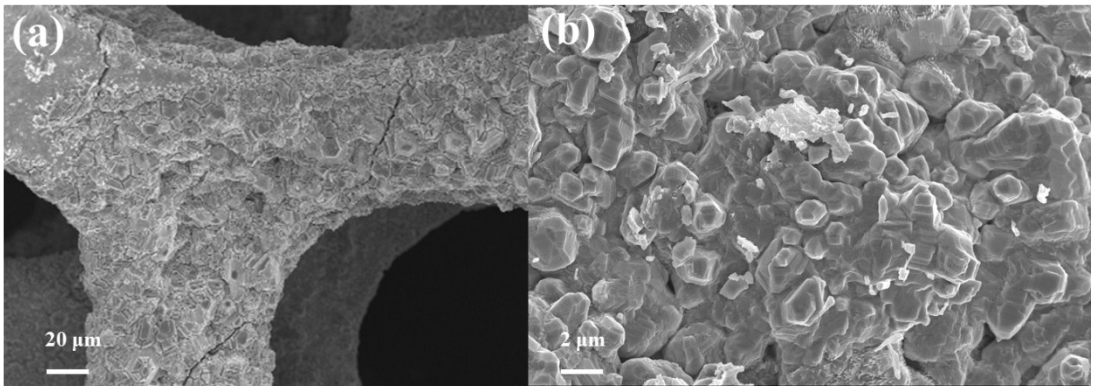

Fig. S10 The SEM images of Mo,Co-NiS/NF-400 after OER stability test.

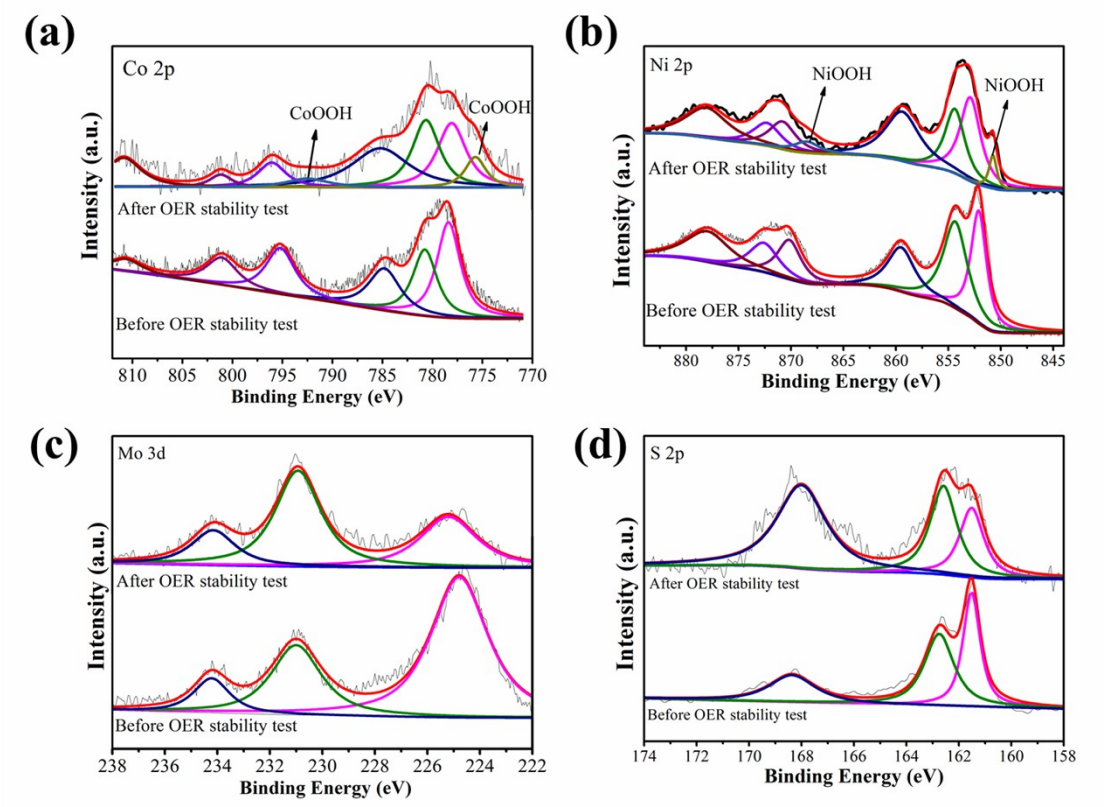

Fig. S11 The XPS spectrum of Mo,Co-NiS/NF-400 before and after OER stability test:

(a) Co 2p, (b) Ni 2p, (c) Mo 3d, (d) S 2p.

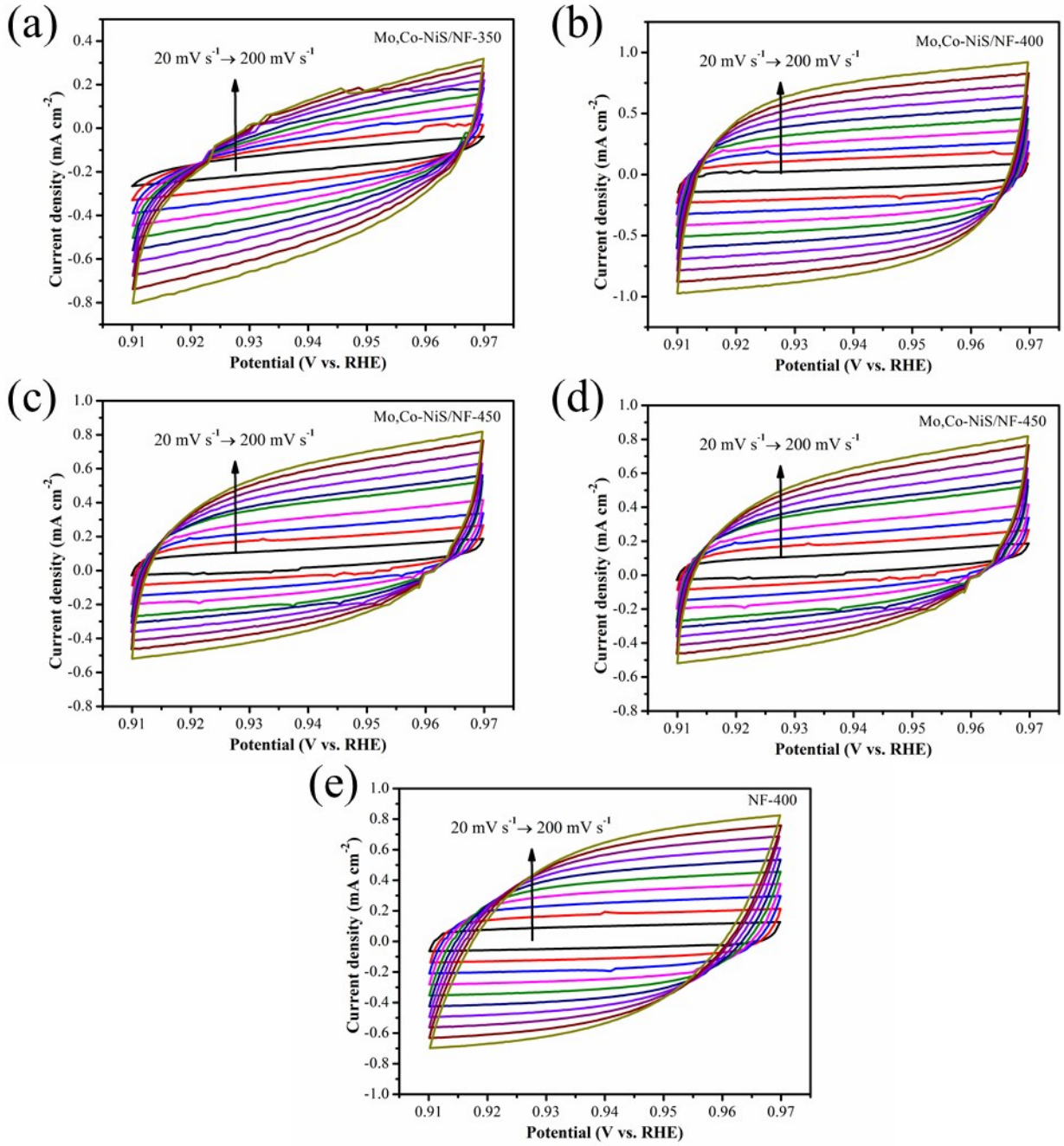

Fig. S12 CV curves at various scan rates in the potential range 0.91~0.97 V (vs. RHE) for OER in 1M KOH solution: (a) Mo,Co-NiS/NF-350; (b) Mo,Co-NiS/NF-400; (c) Mo,Co-NiS/NF-450; (d) Mo-CoS_2-400; (e) NF-400.

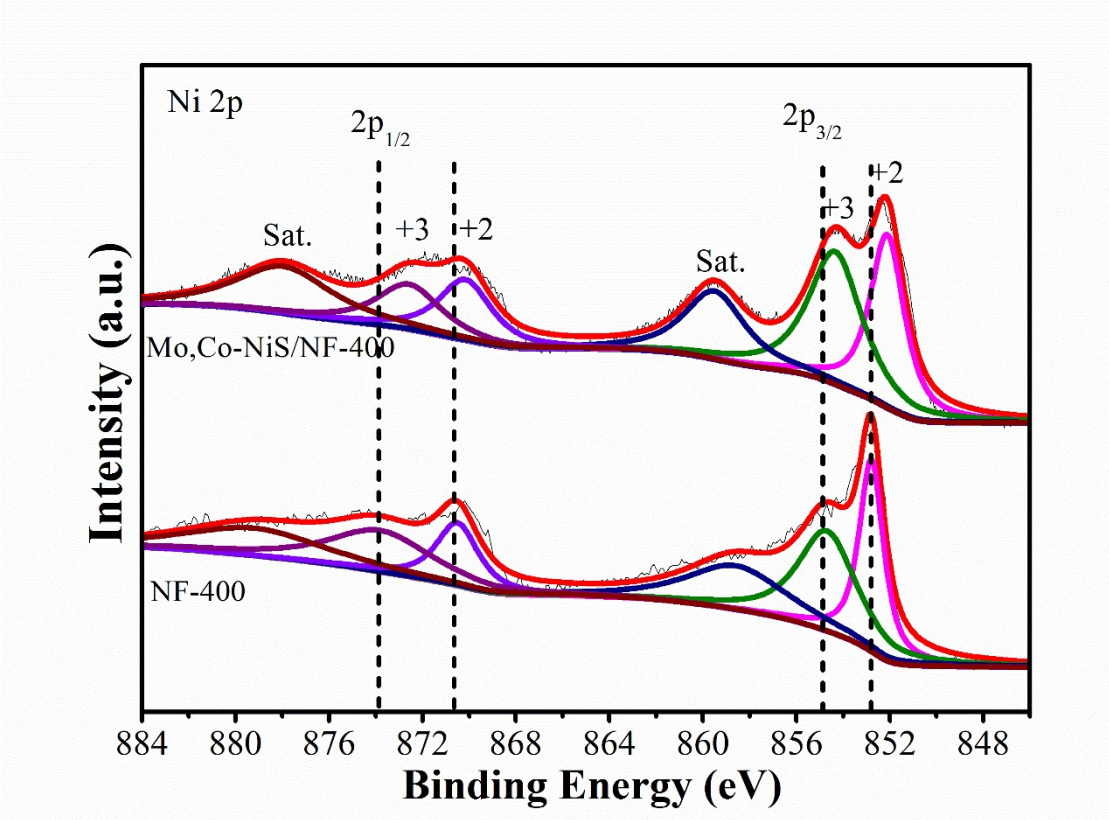

Fig. S13 XPS spectrum (Ni 2p) of Mo,Co-NiS/NF-400 and NF-400.

Table S1 ICP data of Mo,Co-NiS/NF-400

Element	Wt. %	At. %
Co	0.7138	0.0676
Mo	0.3043	0.0177
Ni	92.8881	88.2631
S	6.7050	11.6516

Table S2 The ECSA values of samples towards HER

Materials	**ECSA (cm^2)**
Mo,Co-NiS/NF-350	135.75
Mo,Co-NiS/NF-400	438.75
Mo,Co-NiS/NF-450	217.5
Mo-CoS_2-400	4.42
NF-400	303.75

Table S3 TOF values comparison of samples

Materials	250 mV (vs. RHE)	150 mV (vs. RHE)
Mo,Co-NiS/NF-350	0.673 s^{-1}	0.160 s^{-1}
Mo,Co-NiS/NF-400	1.097 s^{-1}	0.315 s^{-1}
Mo,Co-NiS/NF-450	0.676 s^{-1}	0.145 s^{-1}
Mo-CoS_2-400	0.469 s^{-1}	0.081 s^{-1}
NF-400	0.989 s^{-1}	0.237 s^{-1}

Table S4 The ECSA values of samples towards OER

Materials	**ECSA (cm^2)**
Mo,Co-NiS/NF-350	63.75
Mo,Co-NiS/NF-400	150
Mo,Co-NiS/NF-450	93.75
Mo-CoS_2-400	0.7065
NF-400	112.5

Table S5 Summary of various catalysts for HER, OER and overall water splittng

Materials	**HER**		**OER**		**OWS**	**Ref.**
	η_{10} (mV)	**Tafel slope (mV dec^{-1})**	**η_{10} (mV)**	**Tafel slope (mV dec^{-1})**	**cell voltage at 10 mA cm^{-2} (V)**	
Mo,Co-NiS/NF-400	92	90.3	117.2	68.9	1.36	This work
Mo-doped p-NiS/Ti	147.6	87.8	390 (η_{50})	185	1.92	S1
Mo-doped Ni_3S_2	212	98	260	85	1.67	S2
$Mo_{5.9}Ni_{94.1}S$/NF	61	54.7	213	44.4	1.485	S3
MoS_2/NiS	244	97	350	108	1.64	S4
NiS–MoS_2	106	56.7	203	77.4	1.54	S5
NiCoS/C-150	232	80.17	N/A	N/A	N/A	S6
100-NCT-$NiCo_2S_4$	183	89.8	280	86.8	1.6	S7
$Co_xNi_{1-x}S_2$-rGO	N/A	N/A	320	52	N/A	S8
Co-Ni_3S_2@CNTs/GNF	155	138	N/A	N/A	N/A	S9
Co-Ni_3S_2/NF	220 (η_{50})	N/A	310 (η_{50})	N/A	1.56	S10
CoMoO-S/NF	134	87	N/A	N/A	N/A	S11
Ni_3S_2/NF	238	128	N/A	N/A	N/A	S11

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