Electronic Supplementary Material (ESI) for Journal of Materials Chemistry A.

A 3D well matched electrode pair of Ni-Co-S//Ni-Co-P nanoarrays grown on nickel foam as a high-performance electrocatalyst for water splitting

Yaqiong Gong,[ab*] Zhoufeng Xu,[a] Hailong Pan,[a] Yu Lin,[a] Zhi Yang,[a] Jinlei Wang[ab]

[a] School of Chemical Engineering and Technology, North University of China, Taiyuan 030051, People's Republic of China.

[b] State Key Laboratory of Structural Chemistry, Fujian Institute of Research on the Structure of Matter, Chinese Academy of Sciences, Fuzhou, Fujian 350002.

*Email: gyq@nuc.edu.cn

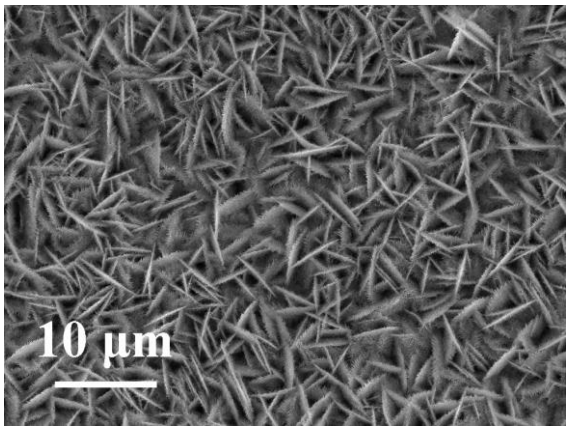


Fig. S1 SEM image of Ni-Co-precursor/NF.

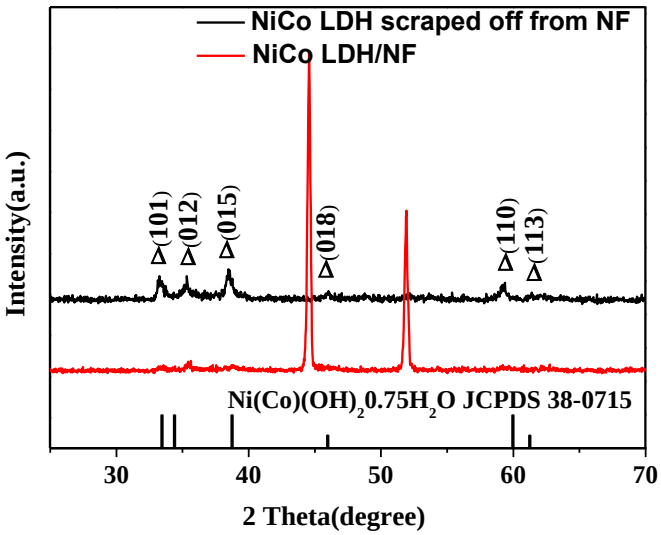


Fig. S2 The XRD spectra of Ni-Co-precursor/NF.

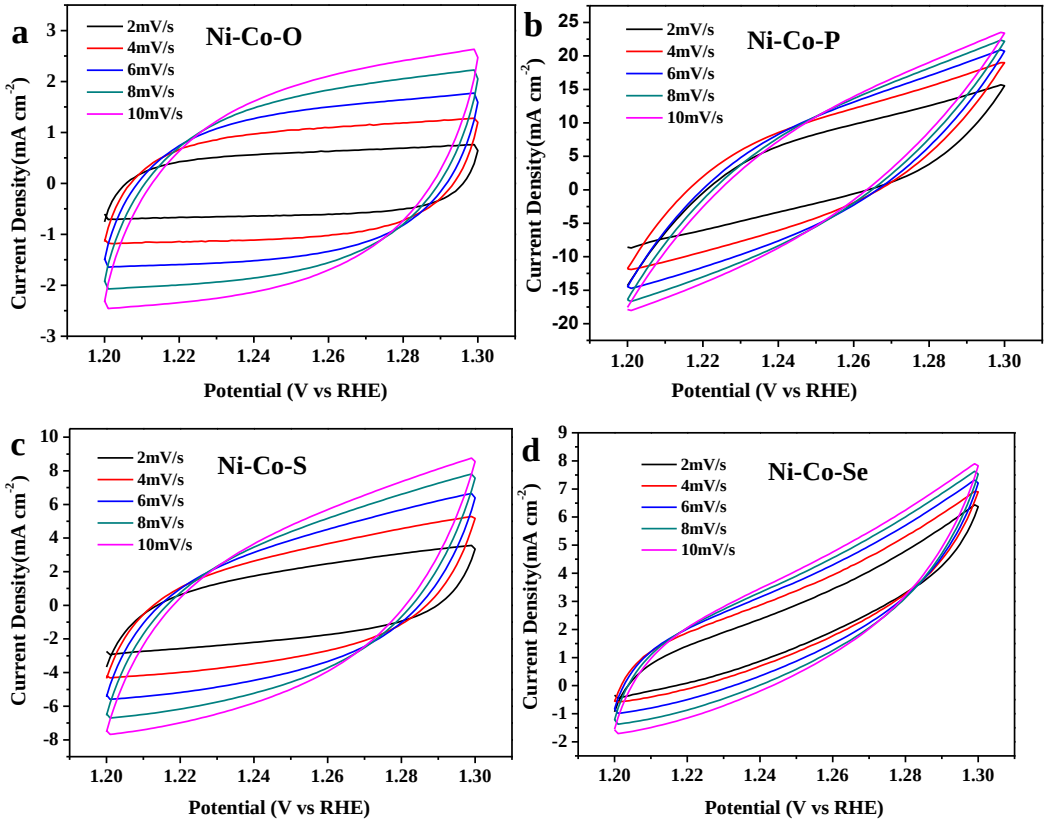


Fig. S3 Electrochemical double-layer capacitance measurements. The cyclic voltammograms (CVs) measurements with various scan rates for (a) Ni-Co-O/NF, (b) Ni-Co-P/NF (c) Ni-Co-S/NF (d) Ni-Co-Se/NF in 1.0 M KOH.

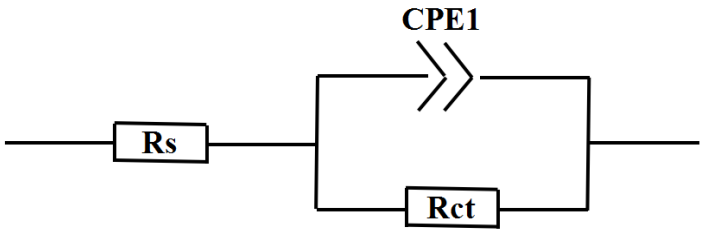
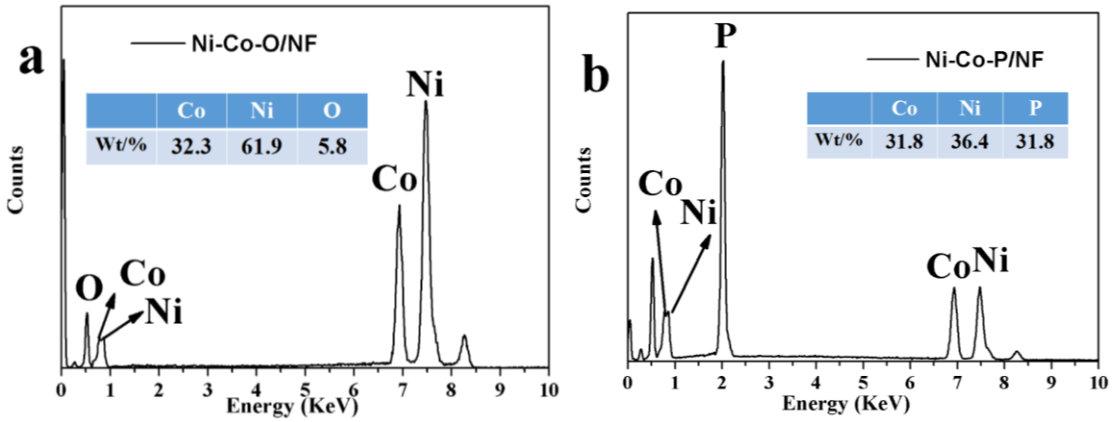
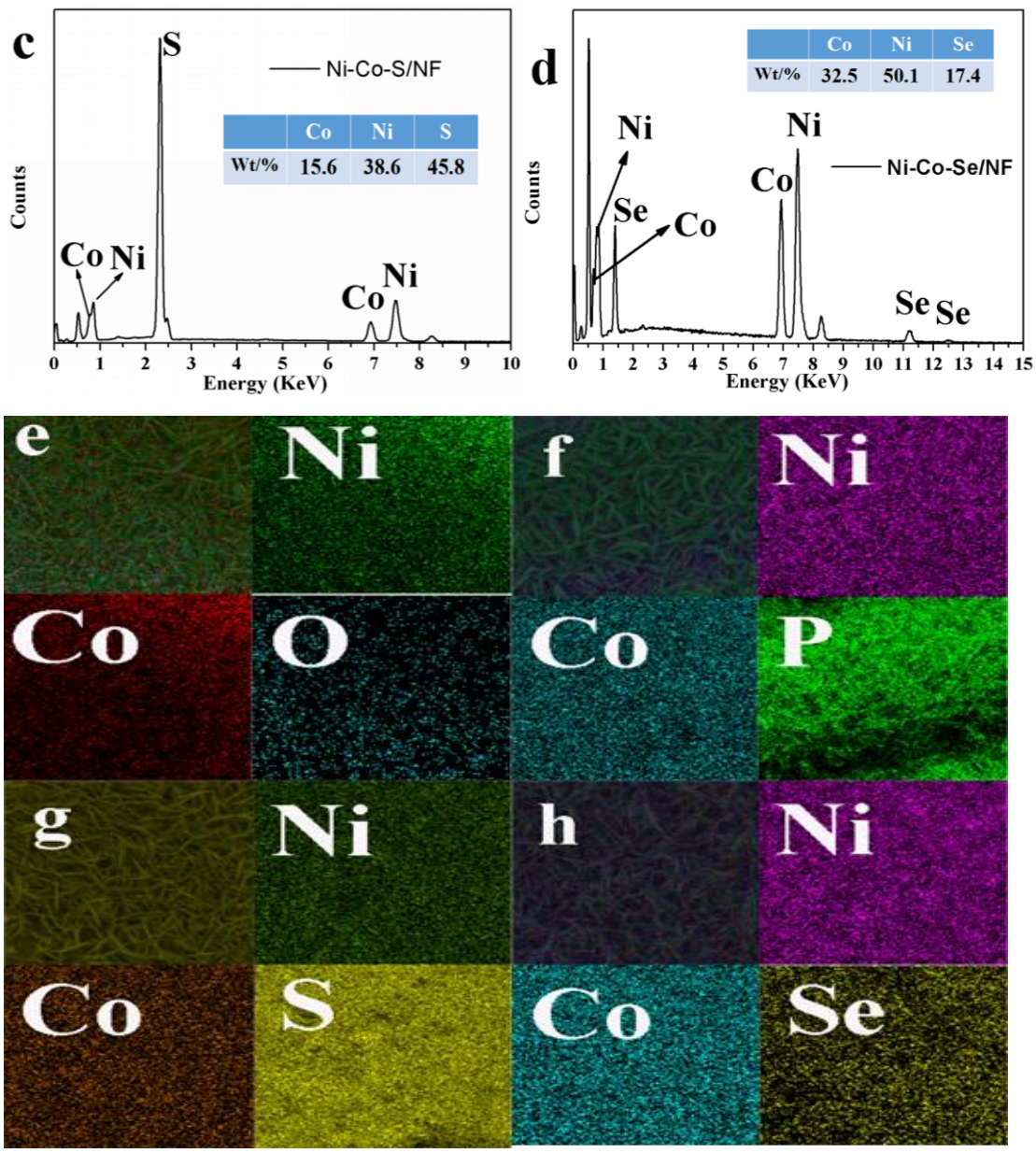


Fig. S4 The equivalent circuit for fitting the EIS results.





	Co	Ni	S
Wt/%	15.6	38.6	45.8

	Co	Ni	Se
Wt/%	32.5	50.1	17.4

Fig. S5 EDX profiles of the as-obtained (a) Ni-Co-O/NF, (b) Ni-Co-P/NF, (c) Ni-Co-S/NF and (d) Ni-Co-Se/NF. The energy dispersive spectroscopy mapping of (e) Ni-Co-O/NF, (f) Ni-Co-P/NF, (g) Ni-Co-S/NF and (h) Ni-Co-Se/NF.

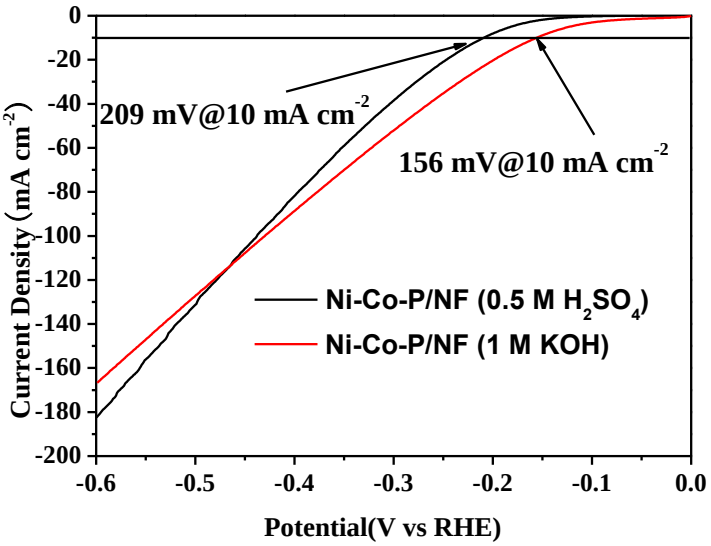


Fig. S6 HER electrocatalytic performance of the samples. LSV curves of Ni-Co-P/NF in 1 M KOH and 0.5 M H_2SO_4, respectively.

Table S1. Comparison of two-electrode water-splitting for catalysts of relevant catalytic materials

Catalyst	Electrolyte	Overall voltage	Ref.
Ni-Co-S/NF//Ni-Co-P/NF	1 M KOH	1.57 V@20 mA cm^{-2}	This work
MoS_2/Ni_3S_2/NF	1 M KOH	1.56 V@10 mA cm^{-2}	41
NiCoFe LTH/CC	1 M KOH	1.55 V@10 mA cm^{-2}	42
$NiCo_2S_4$/NF	1 M KOH	1.63 V@10 mA cm^{-2}	43
NiFe/$NiCo_2O_4$/NF	1 M KOH	1.67 V@10 mA cm^{-2}	44
Ni_2P	1 M KOH	1.63 V@10 mA cm^{-2}	45
NiS/NF	1 M KOH	1.64 V@10 mA cm^{-2}	46
Ni_3Se_2	1 M KOH	1.65 V@10 mA cm^{-2}	47
CoFe LDH-F	1 M KOH	1.63 V@10 mA cm^{-2}	48
CoP films	1 M KOH	1.63 V@10 mA cm^{-2}	49