Electronic Supplementary Material (ESI) for New Journal of Chemistry.

Vertically stacked bilayer heterostructure $CoFe_2O_4$ @Ni_3S_2 on 3D nickel foam as high-performance electrocatalyst for oxygen evolution reaction

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Keywords: $CoFe_2O_4$ nanosheets, Ni_3S_2 nanosheets, Oxygen evolution reaction (OER), Nickel foam, Synergistic effect

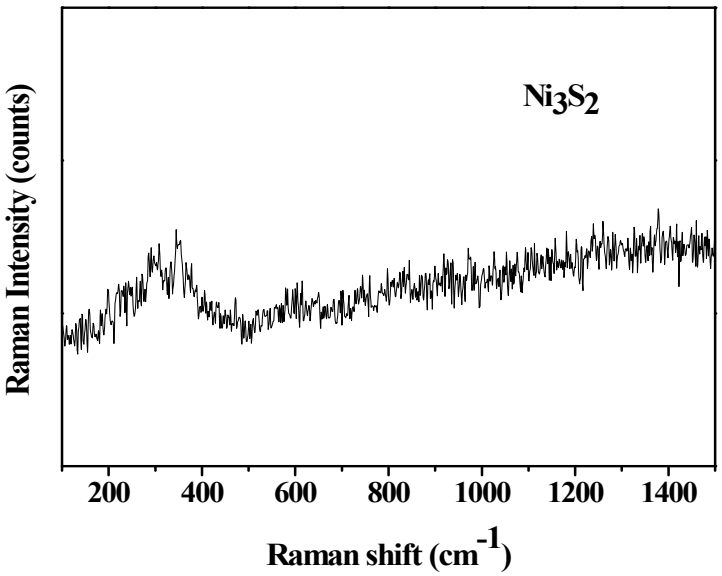


Figure S1 the Raman intensity of Ni_3S_2/NF.

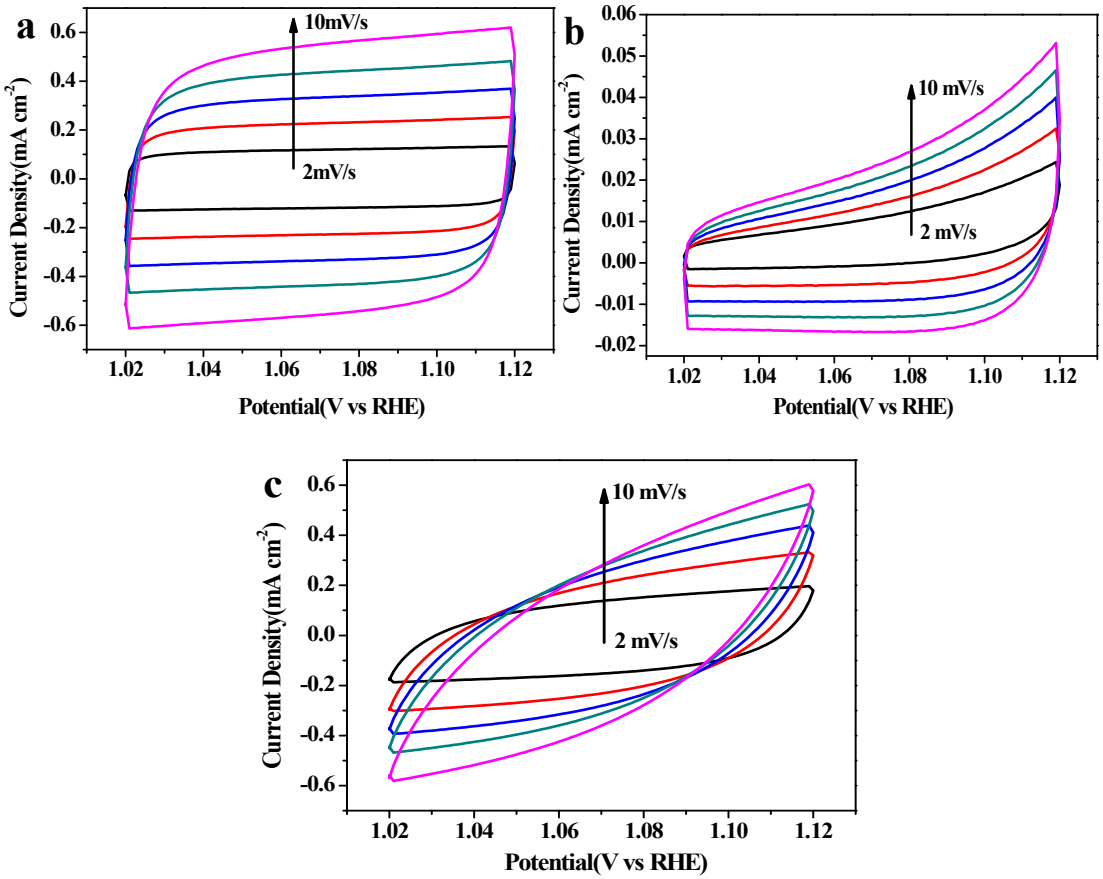


Figure S2 Electrochemical double-layer capacitance measurements. The cyclic voltammograms (CVs) measurements with various scan rates for $CoFe_2O_4$/NF(a) Ni_3S_2/NF (b) $CoFe_2O_4$@Ni_3S_2/NF (c) in 1.0 M KOH.

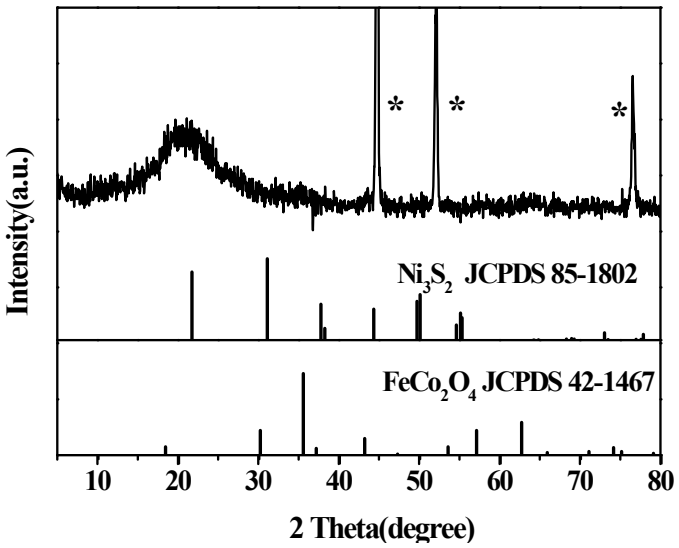
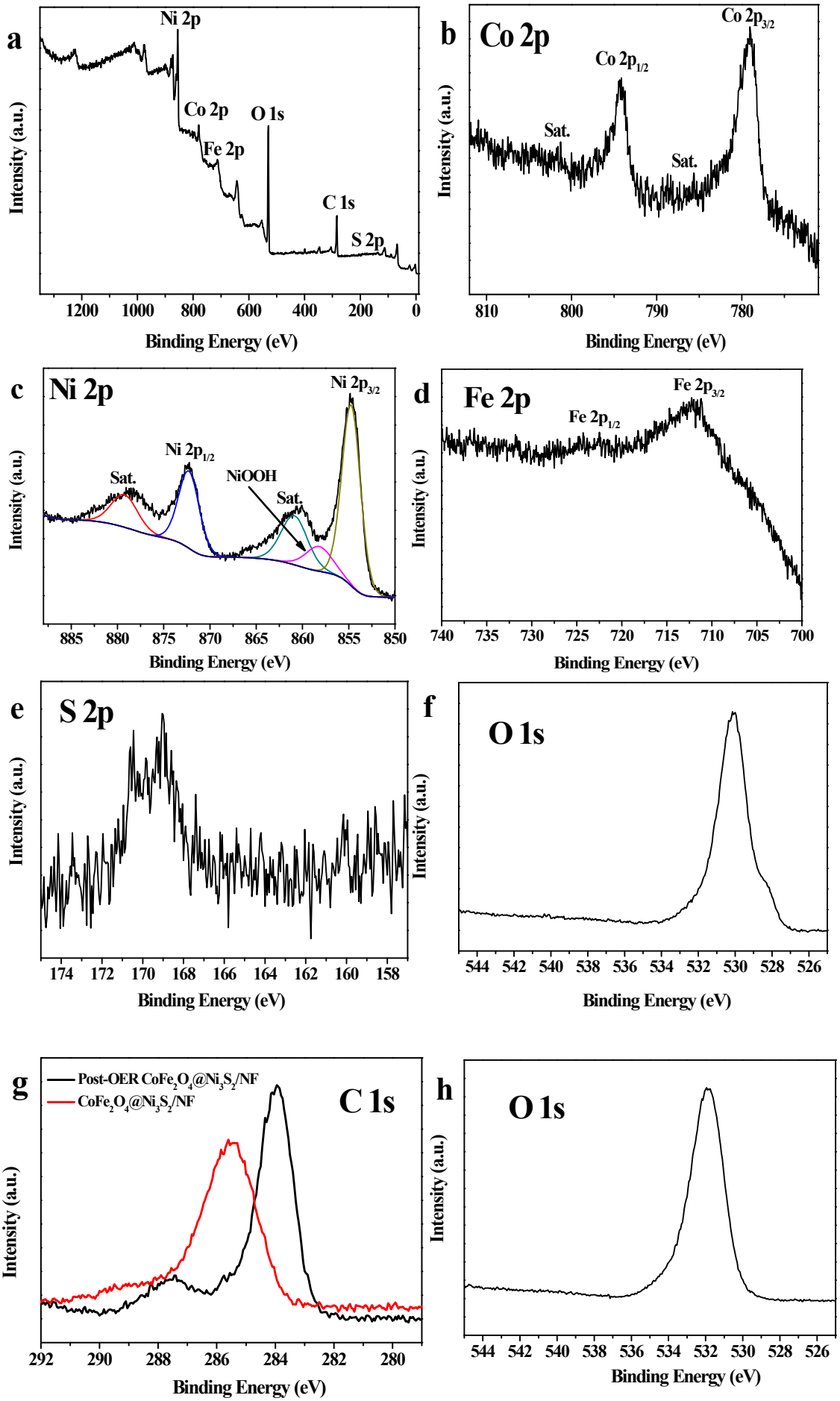


Figure S3 The XRD spectra of $CoFe_2O_4$@Ni_3S_2/NF after OER stability test.


a
Ni 2p
Co 2p
O 1s
Fe 2p
C 1s
S 2p
Intensity (a.u.)
1200 1000 800 600 400 200 0
Binding Energy (eV)
b
Co 2p
Co 2p3/2
Co 2p1/2
Sat.
Sat.
Intensity (a.u.)
810 800 790 780
Binding Energy (eV)
c
Ni 2p
Ni 2p3/2
Ni 2p1/2
Sat.
NiOOH
Sat.
Intensity (a.u.)
885 880 875 870 865 860 855 850
Binding Energy (eV)
d
Fe 2p
Fe 2p3/2
Fe 2p1/2
Intensity (a.u.)
740 735 730 725 720 715 710 705 700
Binding Energy (eV)
e
S 2p
Intensity (a.u.)
174 172 170 168 166 164 162 160 158
Binding Energy (eV)
f
O 1s
Intensity (a.u.)
544 542 540 538 536 534 532 530 528 526
Binding Energy (eV)
g
Post-OER CoFe2O4@Ni3S2/NF
CoFe2O4@Ni3S2/NF
C 1s
Intensity (a.u.)
292 290 288 286 284 282 280
Binding Energy (eV)
h
O 1s
Intensity (a.u.)
544 542 540 538 536 534 532 530 528 526
Binding Energy (eV)

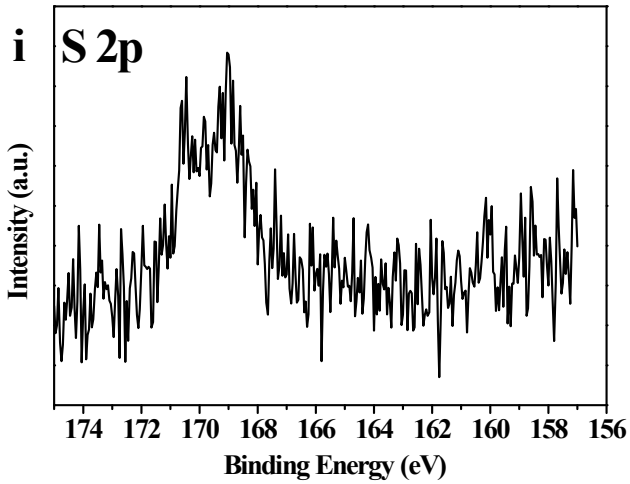


Figure S4 The XPS spectra of $CoFe_2O_4$@Ni_3S_2/NF after OER stability test: (a) survey, (b) Co 2p, (c) Ni 2p, (d) Fe 2p, (e) S 2p (f) O 1s and (g) C1s regions and the XPS spectra of $CoFe_2O_4$@Ni_3S_2/NF before OER stability test (h) O 1s and (h) S 2p.

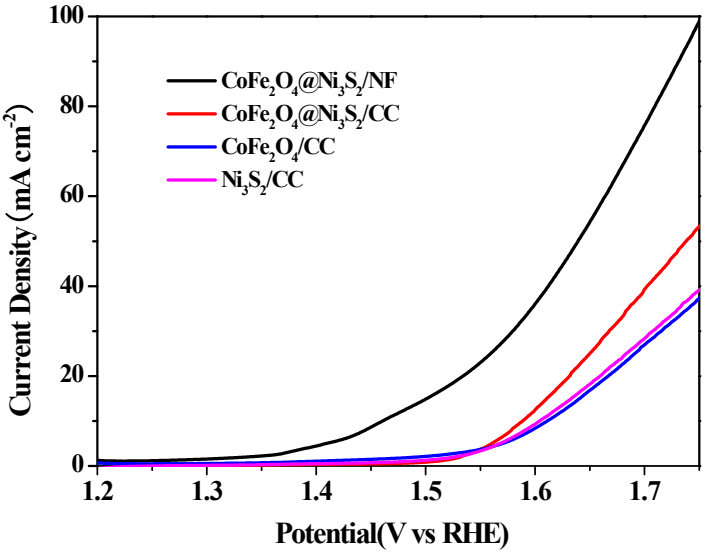


Figure S5. Polarization curves of as-prepared $CoFe_2O_4$@Ni_3S_2/NF, $CoFe_2O_4$@Ni_3S_2/CC. $CoFe_2O_4$/CC and Ni_3S_2/CC.

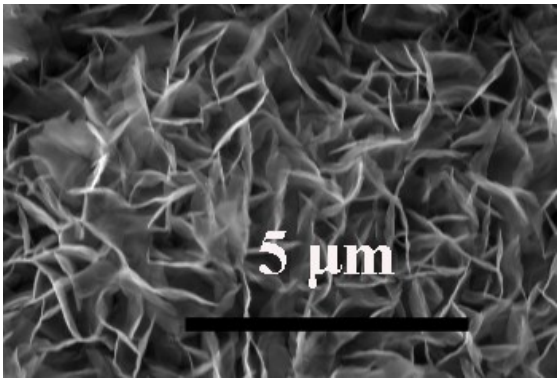


Figure S6 SEM image of $CoFe_2O_4$@Ni_3S_2/NF after OER stability test.

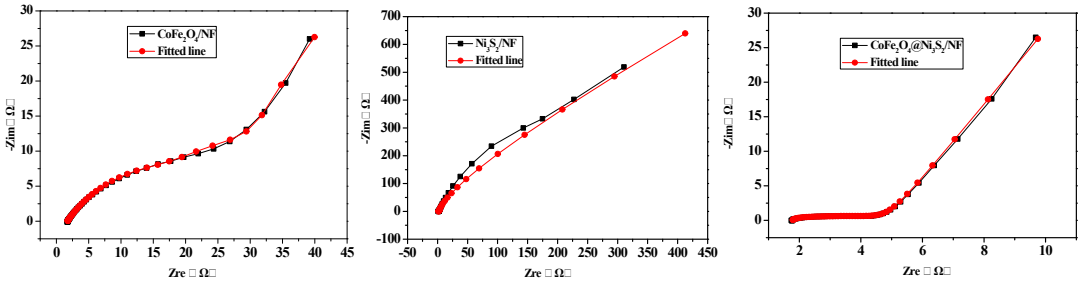


Figure S7. Fitted circuit pattern for EIS.

	$CoFe_2O_4$@Ni_3S_2/NF	$CoFe_2O_4$ /NF	Ni_3S_2/NF
R_{ct}	15.01Ω	137.1Ω	506Ω