# Supporting Information

## Two-step Synthesis of Binary Ni-Fe Sulfides Supported on Nickel Foam as Highly Efficient Electrocatalysts for Oxygen Evolution Reaction

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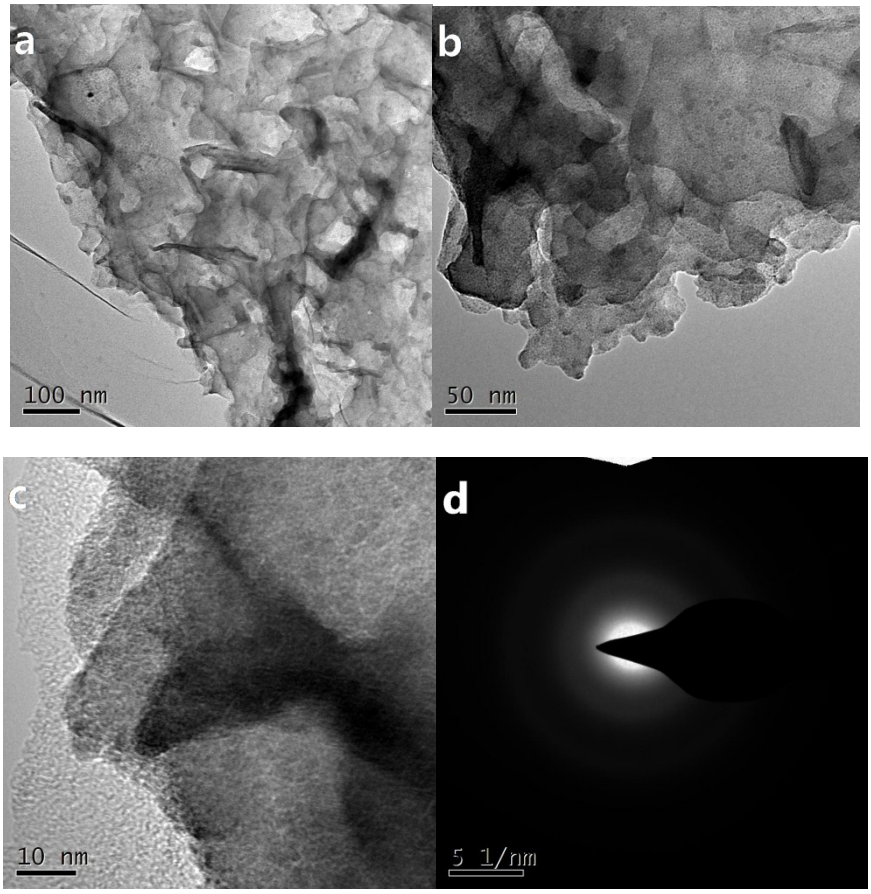


**Fig. S1** (a, b, c) HR-TEM images of NiFe/NF; (d) Selected area electron diffraction image of NiFe/NF.

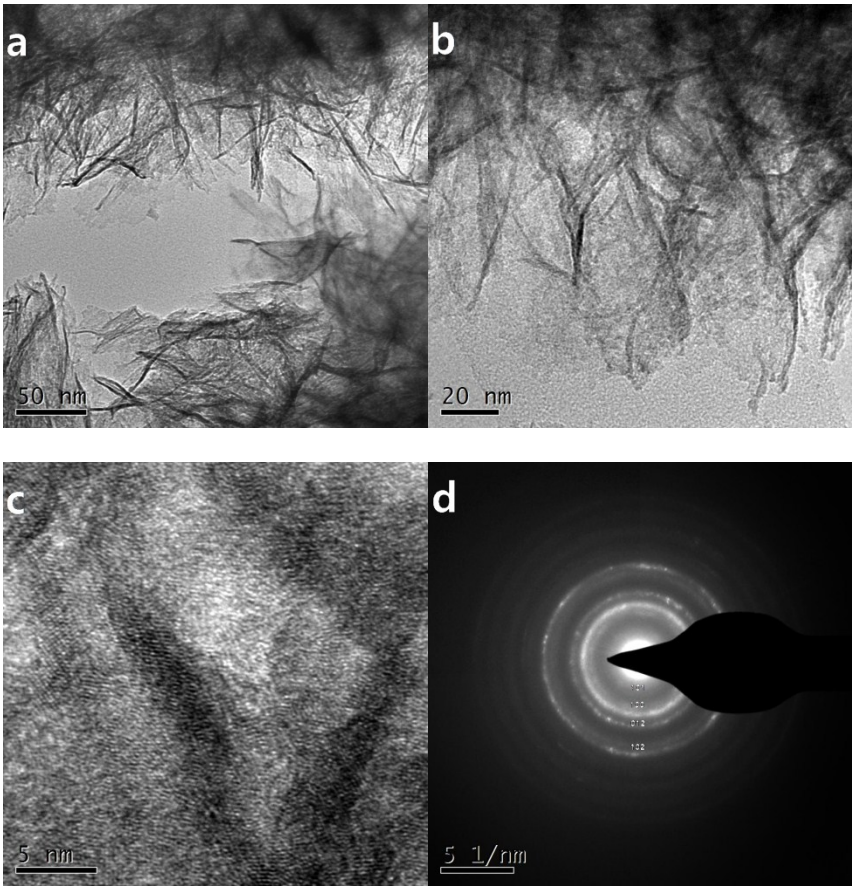


**Fig. S2** (a, b, c) HR-TEM images of NiFeS-Fe/NF; (d) Selected area electron diffraction image of NiFeS-Fe/NF.

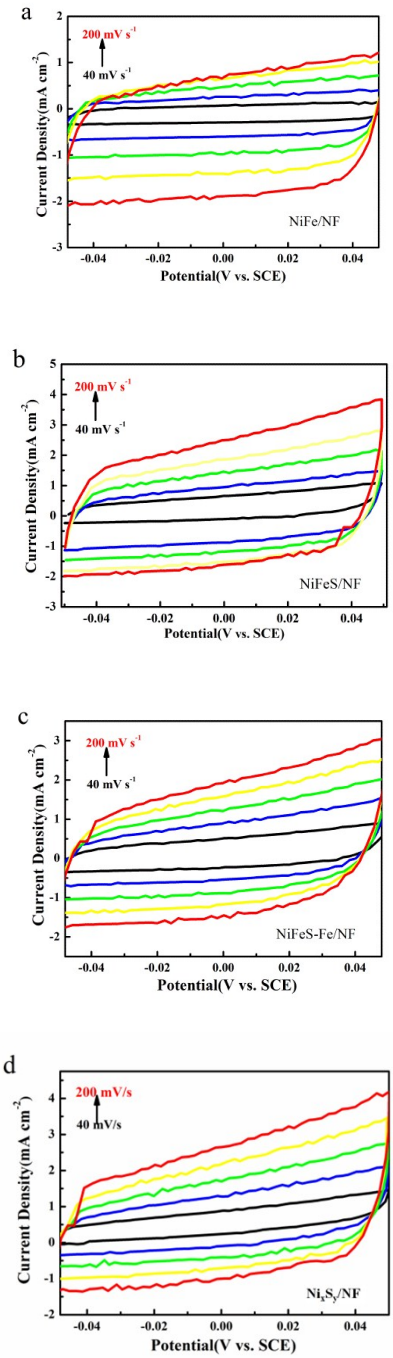


**Fig. S3** CVs of the double-layer capacitance measurement for the four different samples in 1 M KOH in the non-Faradaic region of -0.05-0.05 V vs. SCE with different scan rates, varying from 40 mV $s^{-1}$ to 200 mV $s^{-1}$: (a) NiFe/NF; (b) NiFeS/NF; (c) NiFeS-Fe/NF and (d) $Ni_xS_y$/NF.

**Calculation of electrochemical surface area (ECSA) and roughness factor (RF)**[1,2]

According to the previous literature, the electrochemical surface area (ECSA) and the roughness factor (RF) can be calculated based on following equations.

$ECSA=C_{dl}/C_s$

$RF=ECSA/GSA$

$C_{dl}$: the measured double layer capacitance of NiFe/NF, NiFeS/NF and NiFeS-Fe/NF electrode in 1 M KOH (in mF);

$C_s$: the specific capacitance, according to the literature, the value is 0.040 mF $cm^{-2}$ in 1M NaOH;

GSA: the geometric surface area of NiFe/NF, NiFeS/NF and NiFeS-Fe/NF electrode, which is 1 $cm^2$

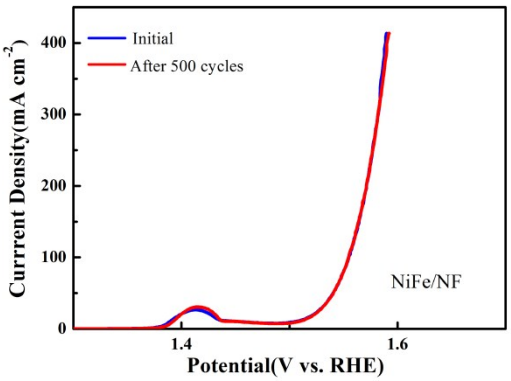


**Fig. S4** Stability test of NiFe/NF after 500 cycles.

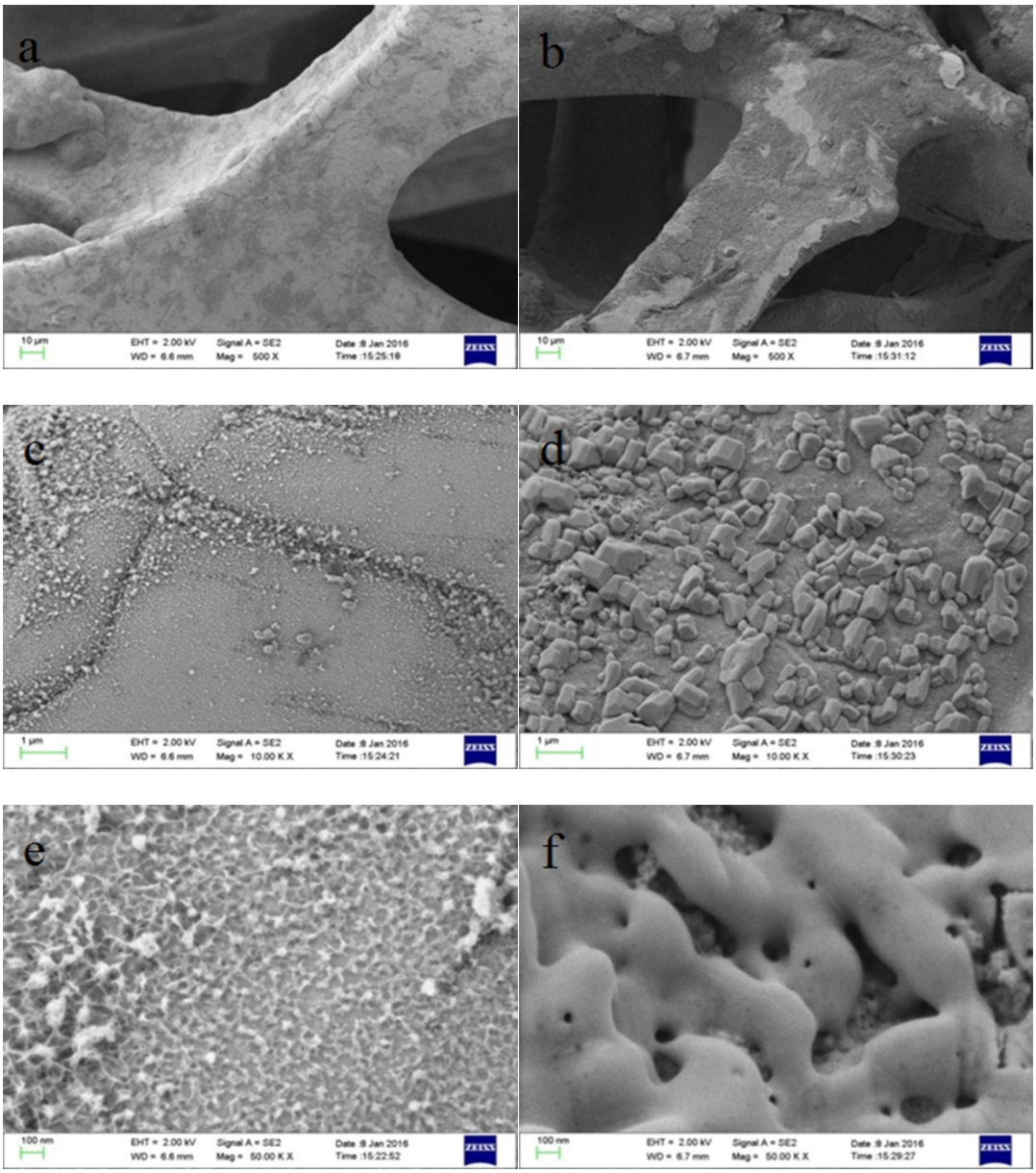


**Fig. S5** (a, c, e) SEM image of NiFe/NF before stability test;
(b, d, f) SEM image of NiFe/NF after stability test.

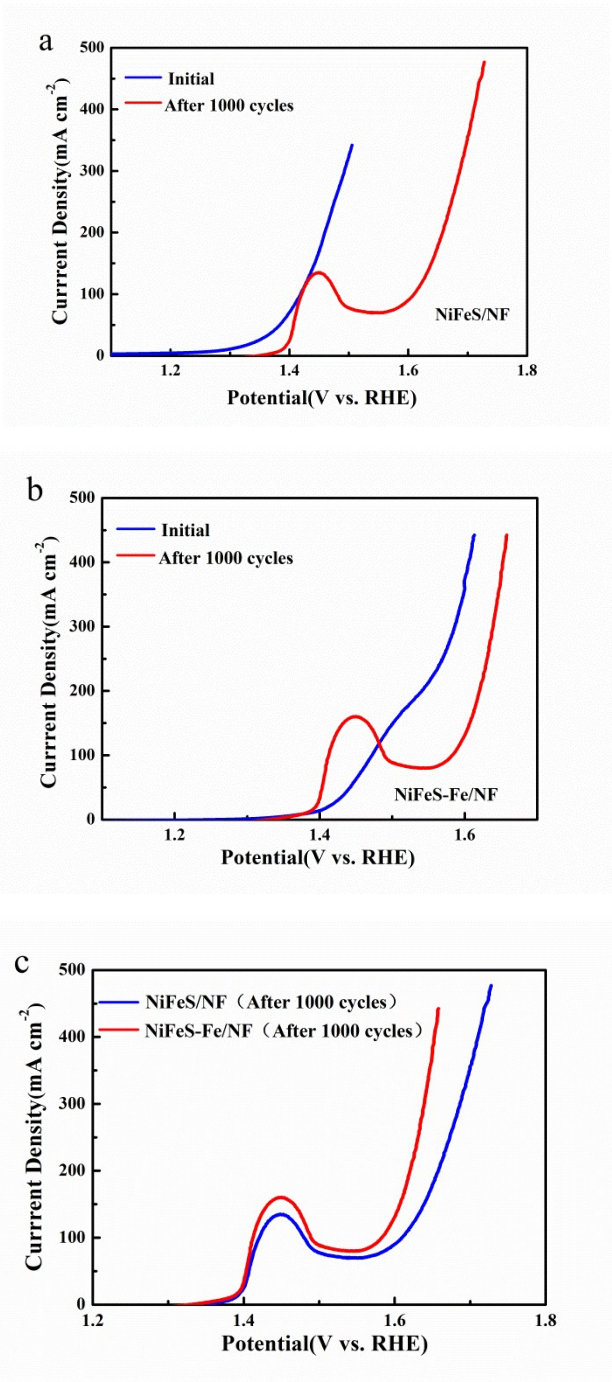


**Fig. S6** Stability test of NiFeS/NF and NiFeS-Fe/NF after 1000 cycles.

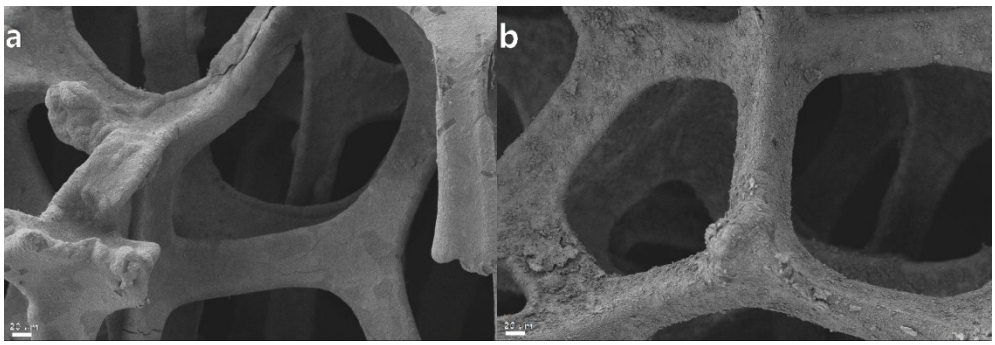


**Fig. S7** (a) SEM image of NiFeS/NF before stability test of 1000 cycles;
(b) SEM image of NiFeS/NF after stability test of 1000 cycles.

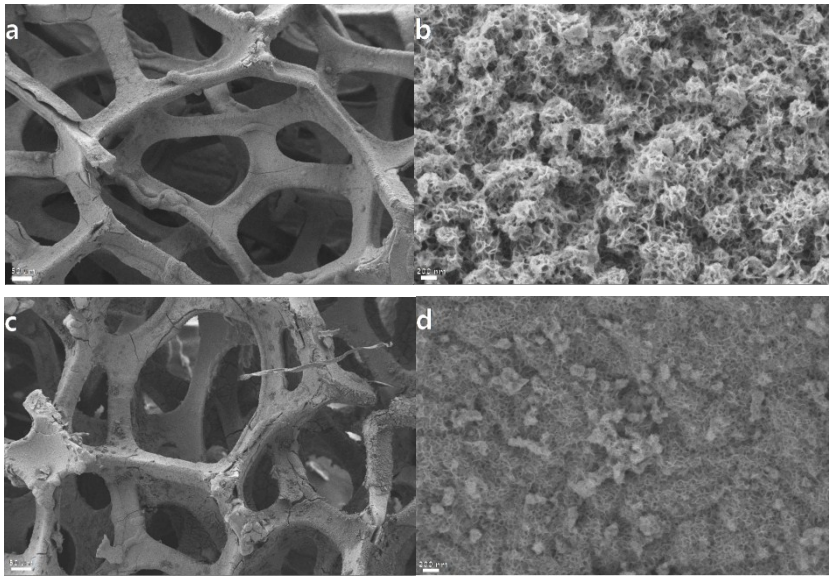


**Fig. S8** (a, b) SEM image of NiFeS-Fe/NF before stability test of 1000 cycles; (c, d) SEM image of NiFeS-Fe/NF after stability test of 1000 cycles.

**Table S1.** The calculated ECSA and RF of the as-prepared NiFe/NF, $Ni_xS_y$/NF, NiFeS/NF and NiFeS-Fe/NF samples [1,2].

| Sample | $C_{dl}$ (mF) | $C_s$ (mF $cm^{-2}$) | ECSA ($cm^2$) | GSA ($cm^2$) | RF |
|---|---|---|---|---|---|
| NiFe/NF | 6.95 | 0.04 | 173.75 | 1 | 173.75 |
| $Ni_xS_y$/NF | 9.37 | 0.04 | 234.25 | 1 | 234.25 |
| NiFeS/NF | 10.05 | 0.04 | 251.25 | 1 | 251.25 |
| NiFeS-Fe/NF | 8.20 | 0.04 | 205.00 | 1 | 205.00 |

## Reference

1 C. C. L. McCrory, S. Jung, J. C. Peters, T. F. Jaramillo, *J. Am. Chem. Soc.*, 2013, **135**, 16977.

2 X. Y. Lu, C. Zhao, *Nat. Commun.*, 2015, 6, 6616.