

Supplementary Material

A hybrid of MIL-53(Fe) rhombus and conductive CoNi₂S₄ nanosheets as a synergistic electrocatalyst for oxygen evolution reaction

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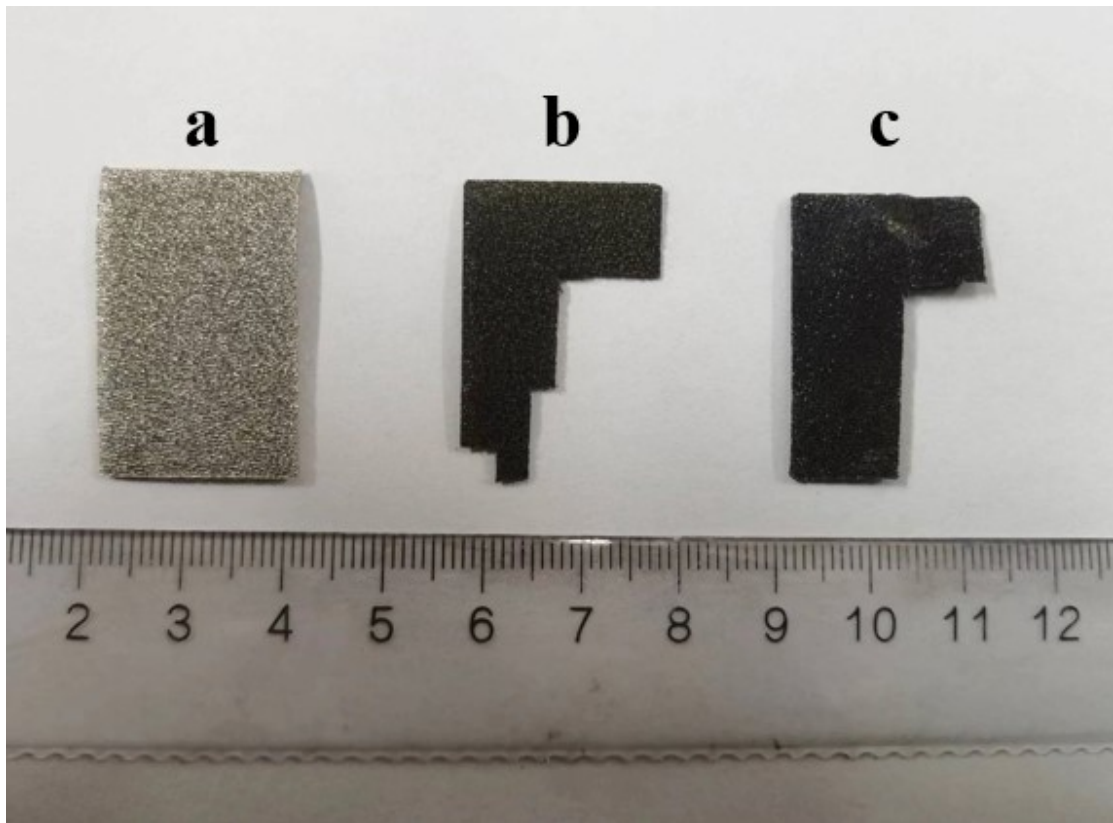


Fig. S1. Photograph of (a) NF, (b) $\text{CoNi}_2\text{S}_4/\text{NF}$ and (c) $\text{MIL-53(Fe)}@\text{CoNi}_2\text{S}_4/\text{NF}$.

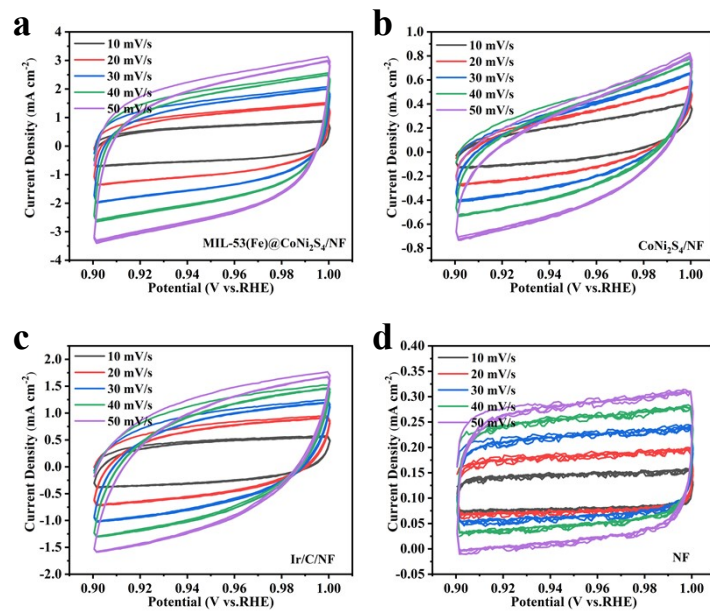


Fig. S2. Cyclic voltammetry curves of (a) MIL-53(Fe)@CoNi₂S₄/NF, (b) CoNi₂S₄/NF, (c) Ir/C/NF, and (d) NF.

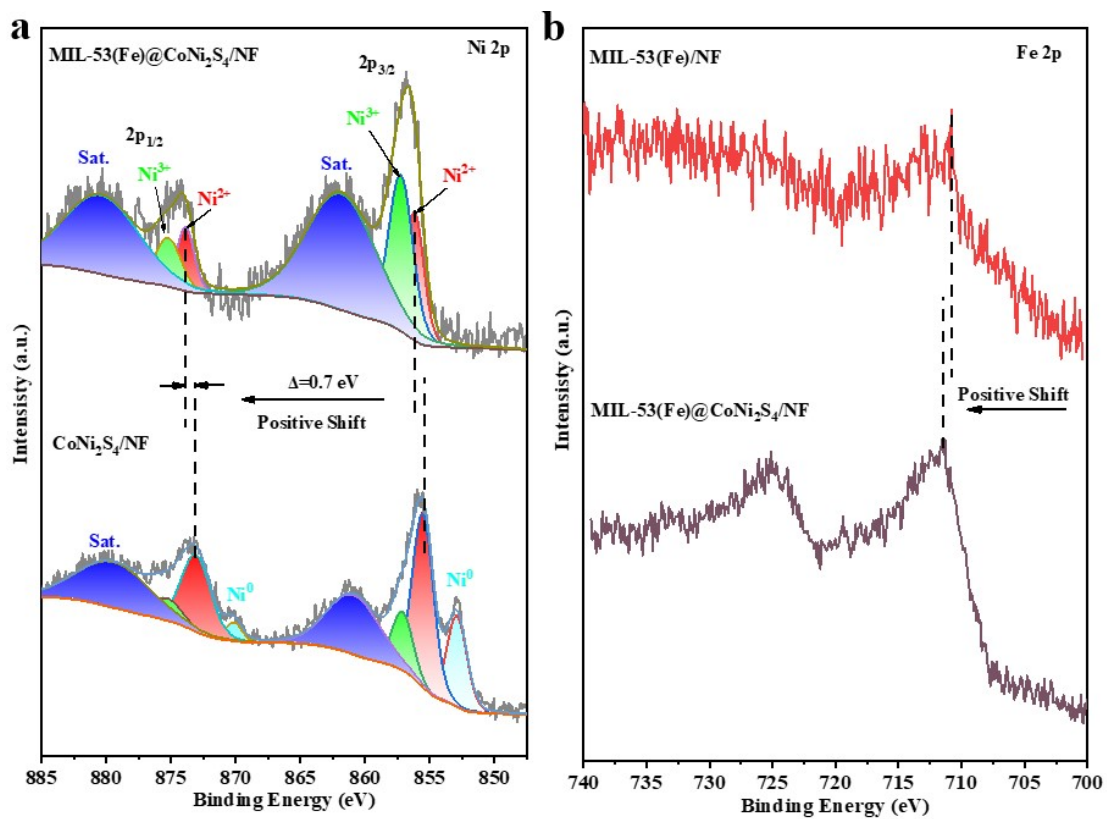


Fig. S3. Comparative XPS spectra of the two catalysts (a) Ni 2p and (b) Fe 2p.

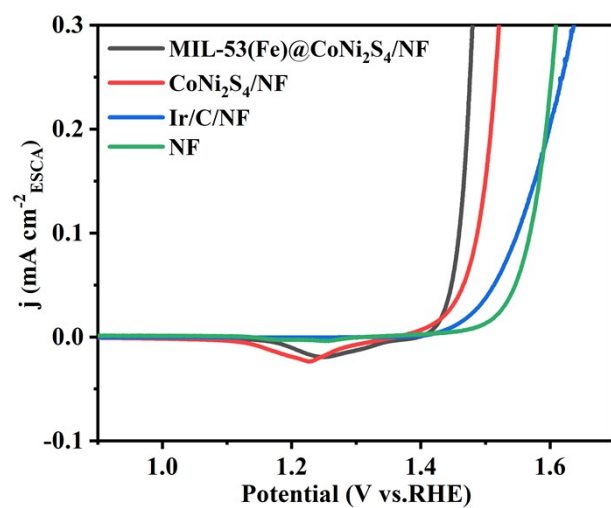


Fig. S4. ECSA-normalized current density curves of catalysts 1.0 M KOH.

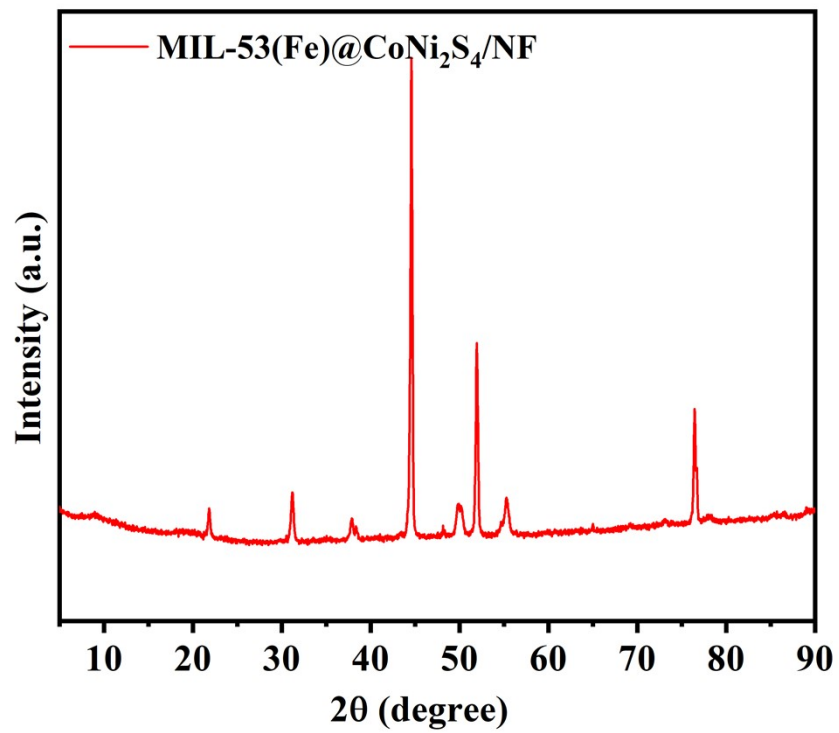


Fig. S5. XRD pattern of MIL-53(Fe)@CoNi₂S₄/NF after OER stability test.

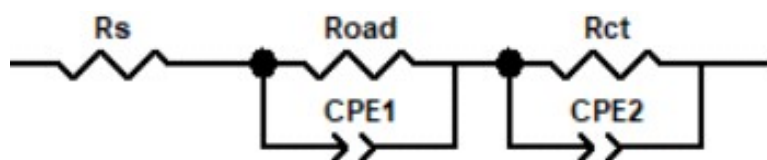


Table S1. The resistance value in the analog circuit of each catalyst.

Samples	$R_s(\Omega)$	$R_{oad}(\Omega)$	$R_{ct}(\Omega)$
MIL-53(Fe)@CoNi ₂ S ₄ /NF	2.102	0.923	2.616
MIL-53(Fe)/NF	1.942	0.246	14.74
CoNi ₂ S ₄ /NF	1.913	5.478	23.23
IrC/NF	1.999	1.326	13.54
NF	1.675	6.735	213.3

Table S2. Comparison of OER activity of the MIL-53(Fe)@CoNi₂S₄/NF catalyst with other reported electrocatalysts in 1.0 M KOH

Electrocatalysts	Overpotential (mV) at 10 mA cm ⁻²	Tafel slope (mV dec ⁻¹)	Reference
MIL-53(Fe)@CoNi ₂ S ₄ /NF	192	33.98	This work
rGo@SN-CoNi ₂ S ₄	310	61	Rare Metals, 41 (2021) 911-920.
P-CoNi ₂ S ₄ /CC	228	56	Applied Surface Science, 554 (2021).
NiMn LDH/NiCo ₂ O ₄ /NF	310	99	Journal of Power Sources, 392 (2018) 23-32.
CoNi ₂ S ₄ @CoS ₂ /NF	259	45	J Colloid Interface Sci, 556 (2019) 401-410.
Ni ₃ S ₂ /MIL-53(Fe)	214	33.8	Journal of Materials Chemistry A, 8 (2020) 14574-14582.
MIL@TA-Ni	282	44.3	Applied Surface Science, 608 (2023).
Ni-S/MIL-53(Fe)	256	39	Nanoscale, 11 (2019) 14785-14792.
MIL-53(Fe-Ni)/NF-2200Gs	174	58	RSC Adv, 13 (2023) 4249-4254.
h-FeOOH@Ni(OH) ₂	310	70	Electrochimica Acta, 301 (2019) 258-266.