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Electronic Supplementary Information

A novel strategy to boost the oxygen evolution reaction activity of NiFe-LDHs with in situ synthesized 3D porous reduced graphene oxide matrix as both substrate and electronic carrier

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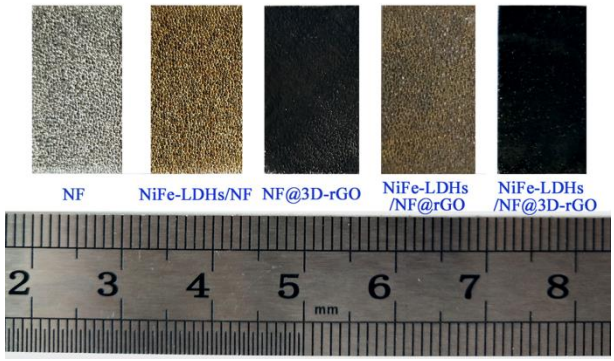

Fig. S1. Photograph images of the NF, and the synthesized NiFe-LDHs/NF, NF/3D-rGO, NiFe-LDHs/NF@rGO，NiFe-LDHs/NF@3D-rGO electrodes.

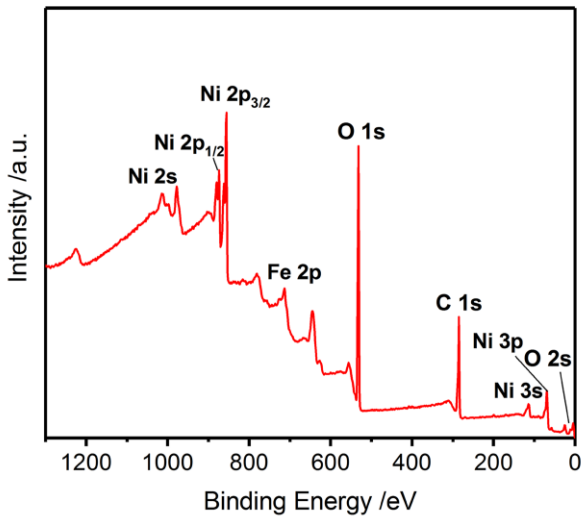

Fig. S2. XPS survey spectrum of the NiFe-LDHs/3D-rGO composite with the elements peaks of Ni, Fe, O and C.

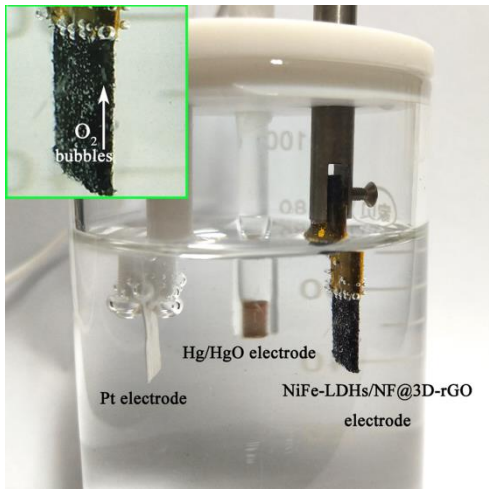

Fig. S3. Photograph of the device for the electrocatalytic oxygen evolution reaction system. The inset image is the enlarged view of the NiFe-LDHs/NF@3D-rGO electrode.

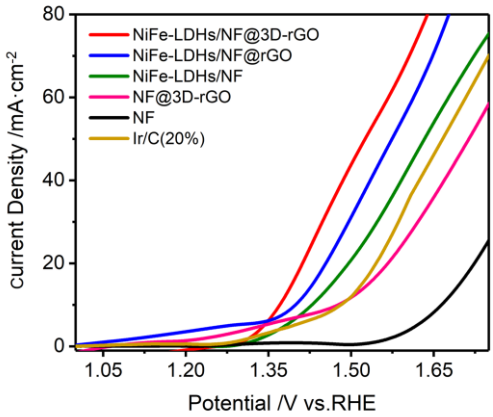

Fig. S4. OER Polarization curves of NF, NF@3D-rGO, NiFe-LDHs/NF, NiFe-LDHs/NF@rGO, NiFe-LDHs/NF@3D-rGO and Ir/C without IR-corrected.

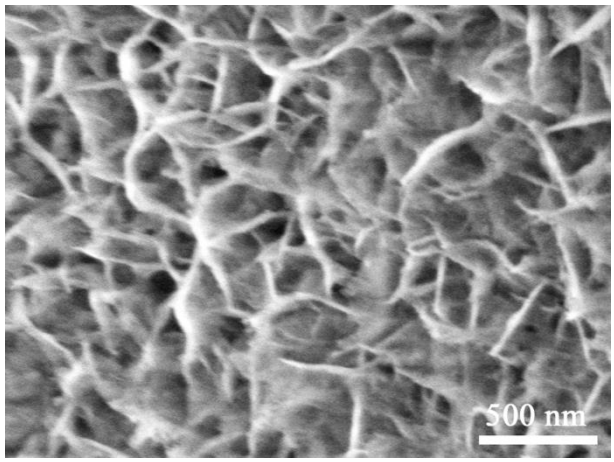

Fig. S5. SEM image of NiFe-LDHs/NF after the OER test.

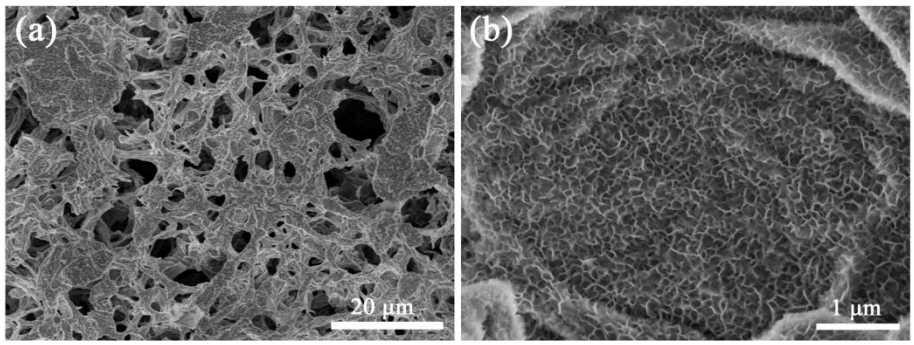

Fig. S6. (a, b) SEM images of NiFe-LDHs/NF@3D-rGO after the OER test.

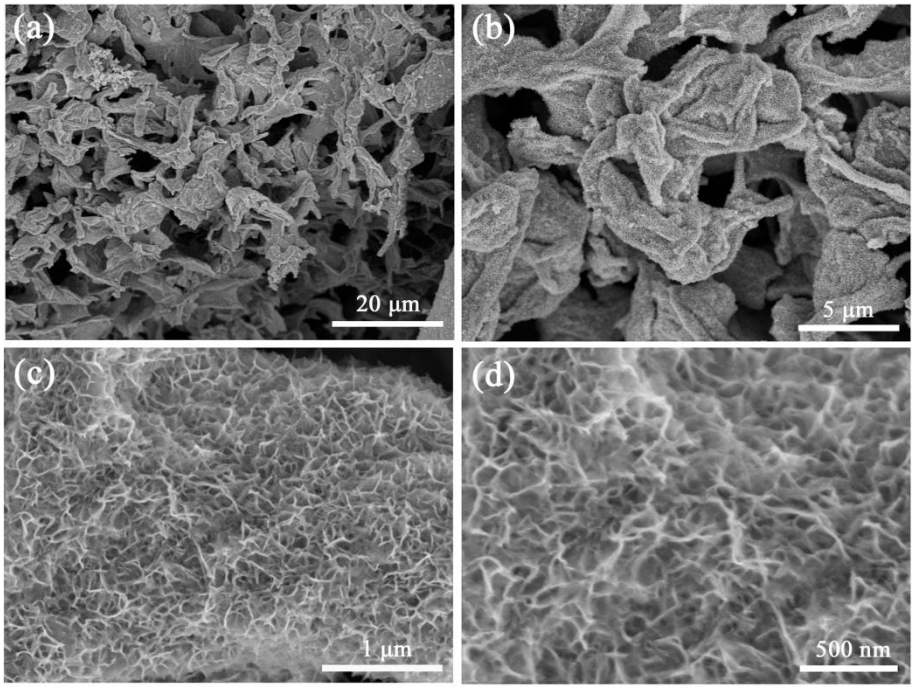

Fig. S7. (a, b, c, d) SEM images of NiFe-LDHs/NF@3D-rGO after the stability test.

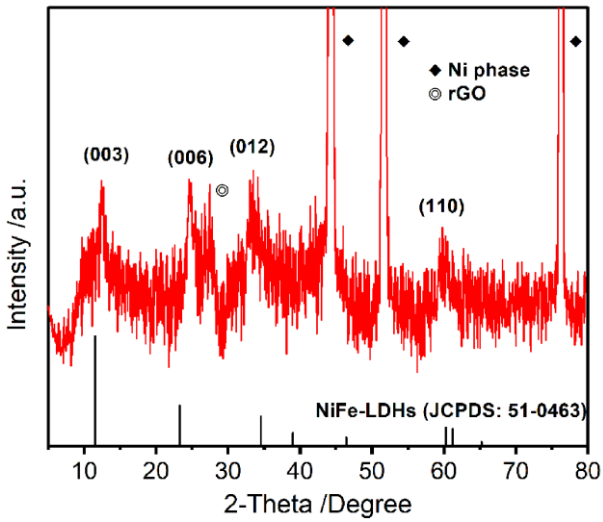

Fig. S8. XRD pattern of NiFe-LDHs/NF@3D-rGO after the OER test.

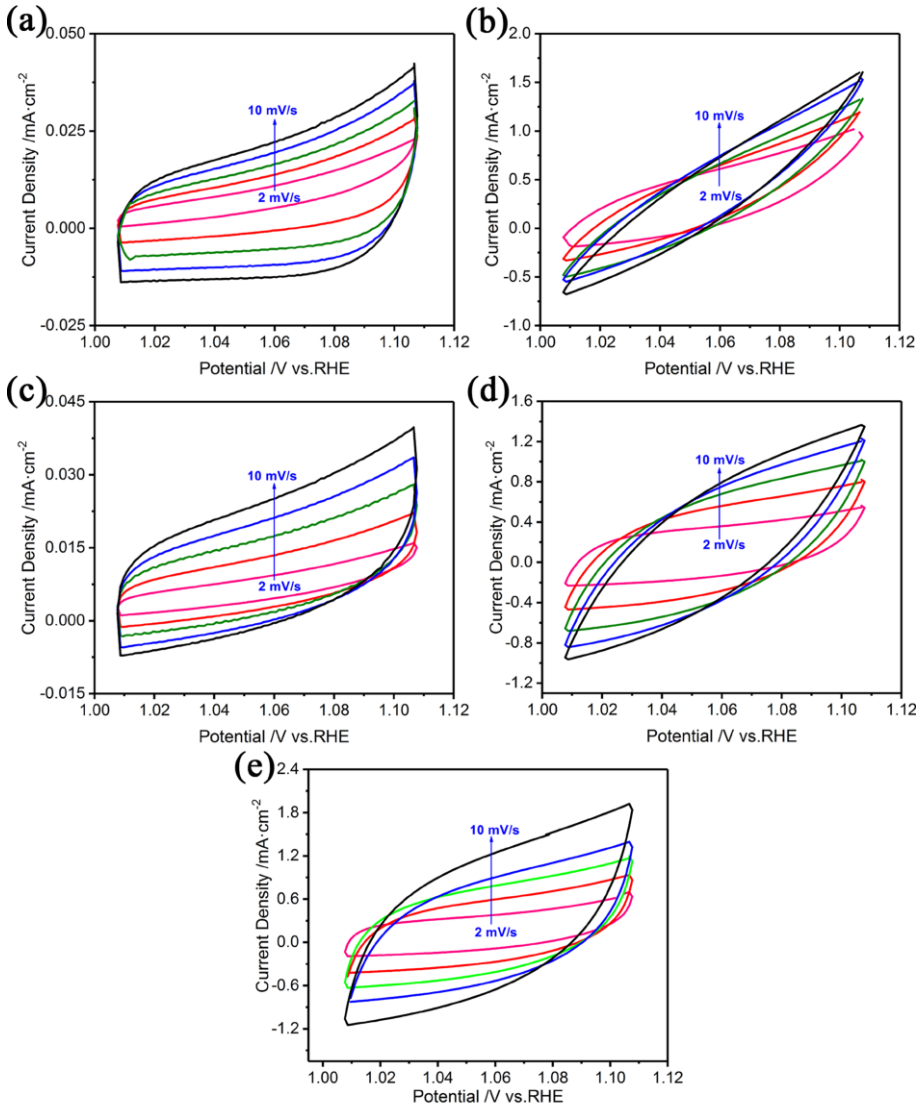

Fig. S9. Cyclic voltammograms of (a) NF, (b) NF/3D-rGO, (c) NiFe-LDHs/NF, (d) NiFe-LDHs/NF@rGO and (e) NiFe-LDHs/NF@3D-rGO in a potential window (1.01 - 1.11 V) at various scan rates of 2, 4, 6, 8, and 10 mV s^{-1} in 1.0 M KOH solution.

Table S1 The comparison of OER activity of composite catalysts associated with NiFe-LDHs (overpotential η was calculated by the formula of η = E(RHE) -1.23 V).

Electrocatalyst	**Electrolyte**	**η(mV) @j(mA ·cm^{-2})**	**Tafel Slope (mV ·dec^{-1})**	**Electrode**	**Reference**
Single-layer NiFe-LDH	1 M KOH	~300@10	40	Ni Foam	S1
Ni−Fe LDH	1 M KOH	210@10	40.4	Fe Foam	S2
NiFeCr LDH	1 M KOH	225@25	69	Carbon paper	S3
NiFe LDH-NS@DG10	1 M KOH	210@10	52	Ni Foam	S4
$Ni_{0.75}Fe_{0.25}$ LDHs	1 M KOH	140@10	31	Ni Foam	S5
FeOOH/NiFe LDHs@CCH NAs	1 M KOH	290@100	-	Ni Foam	S6
NiFe/RGO	1 M KOH	245@10	-	-	S7
NiFe-LDH/CNT	1 M KOH	300@10	31	GC	S8
(NiFe)S-2	1 M KOH	320@10	61	GN	S9
FeNi-P	1 M KOH	310@10	-	Ni Foam	S10
NiFe-$NiCoO_2$	1M KOH	286@10	49.3	Carbon paper	S11
Ir/C	1 M KOH	345@10	107	Ni Foam	S12
Ir/C	1M KOH	327@10	-	GC	S13
NiFe-LDHs/NF@3D-rGO	1 M KOH	170@20	57	Ni Foam	This work

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