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

Supporting Information

Polyaniline Induced Multi-functionalities in Interfacially Coupled Electrocatalysts for Hydrogen/Oxygen Evolution Reactions

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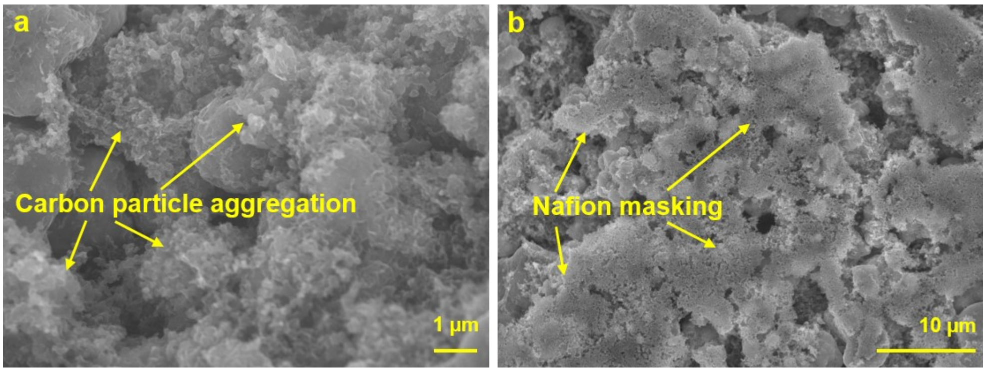

Fig. S1. FESEM images of (a) random distribution between MoS_2 and carbon particles, and (b) nafion masking of MoS_2/carbon particles/nafion dispersion prepared through ultrasonication method.

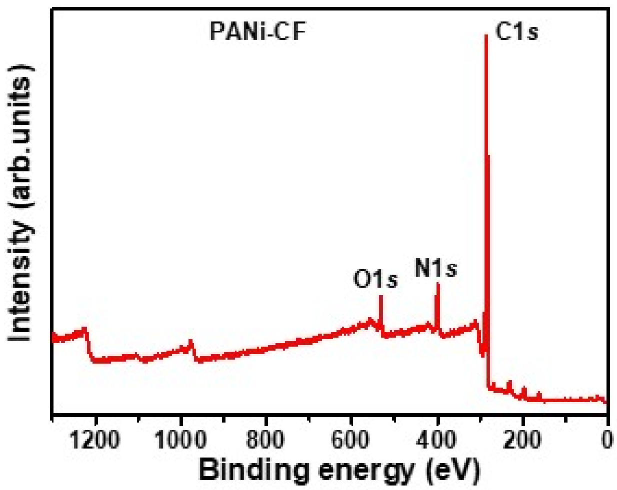

Fig. S2. XPS survey spectrum of PANi-CF.

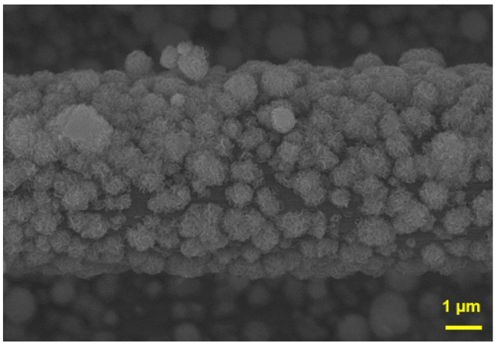

Fig. S3. FESEM image of MoS_2@O-CF.

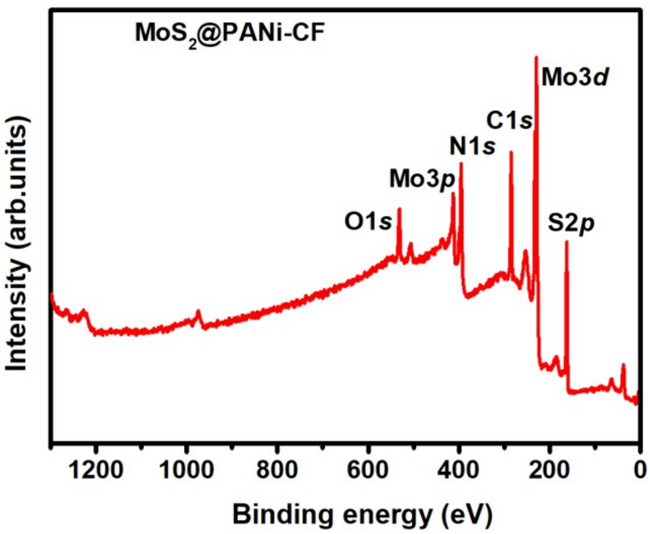

Fig. S4. XPS survey spectrum of MoS_2@PANi-CF.

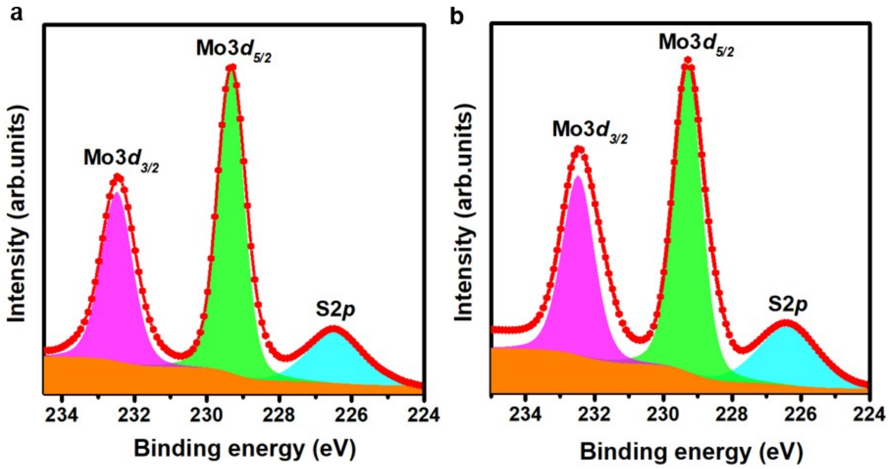

Fig. S5. Mo *3d* XPS deconvoluted spectra of (a) MoS_2@O-CF and (b) MoS_2.

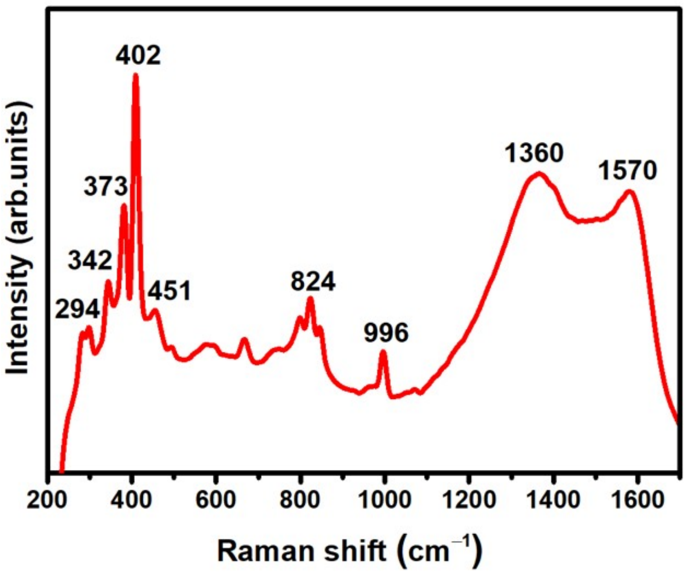

Fig. S6. Raman spectrum of MoS_2@PANi-CF with a larger range.

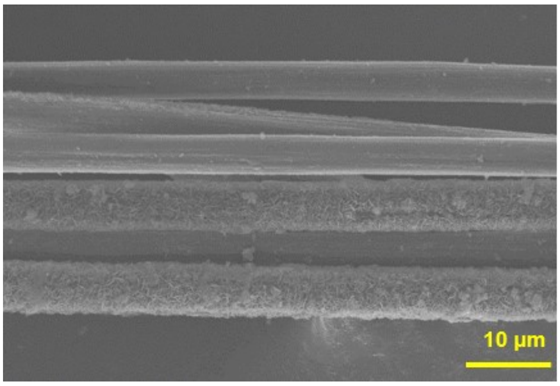

Fig. S7. FESEM image of NiFeLDH@O-CF.

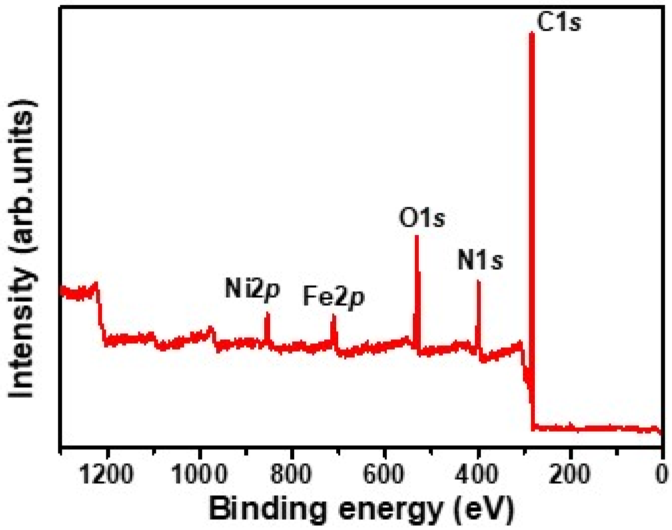

Fig. S8. XPS survey spectrum of NiFeLDH@PANi-CF.

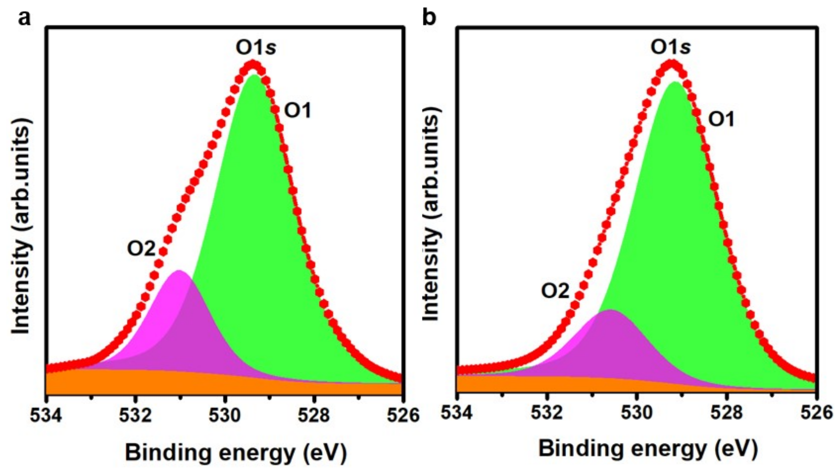

Fig. S9. O1s deconvolution XPS spectra of (a) NiFeLDH@O-CF and (b) NiFeLDH.

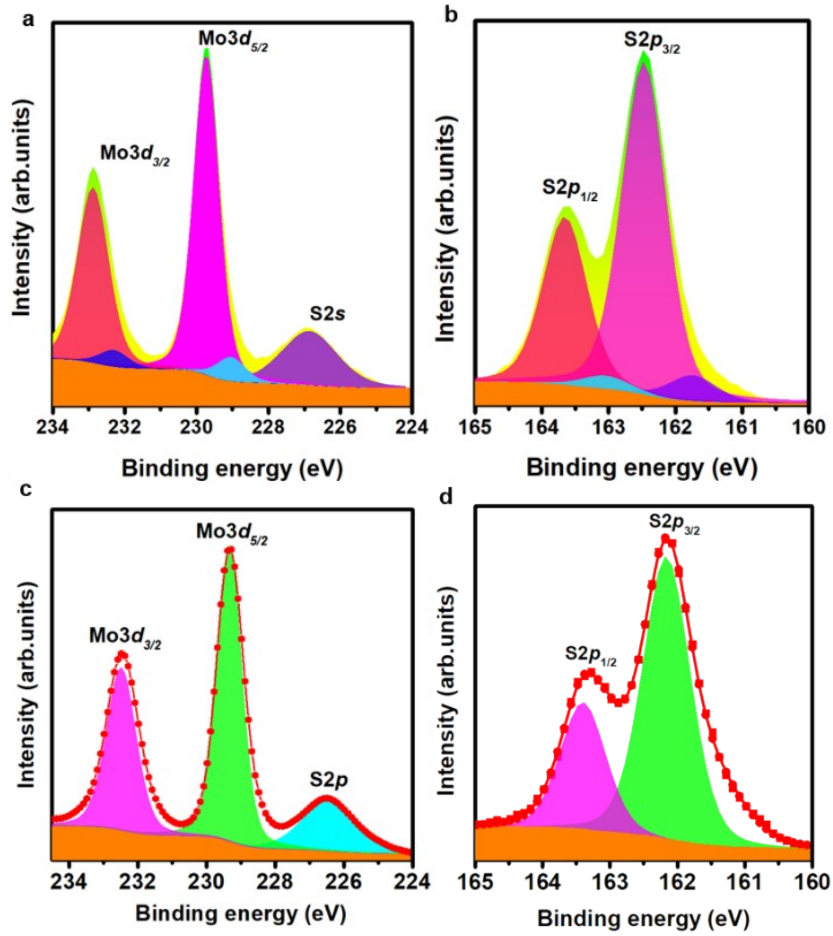

Fig. S10. Deconvoluted (a) Mo 3*d* and (b) S 2*p* XPS spectra of MoS_2@PANi-CF and (c) Mo 3*d* and (d) S 2*p* XPS spectra of MoS_2@O-CF prolonged cycling in acidic medium.

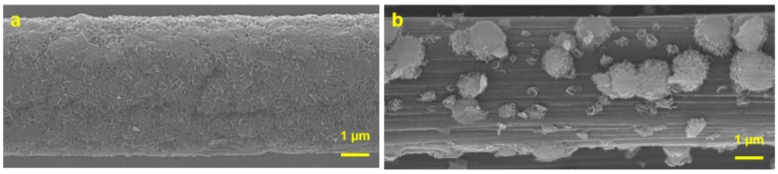

Fig. S11. FESEM image of (a) MoS_2@PANi-CF and (b) MoS_2@O-CF after durability test.

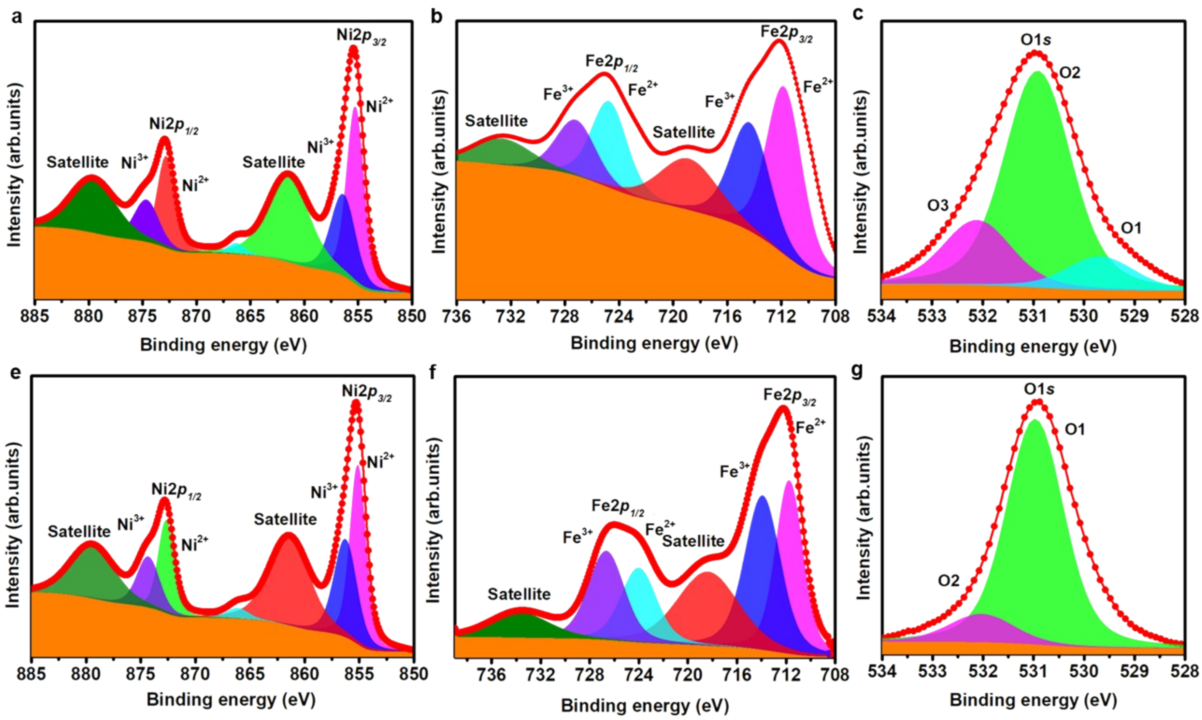

Fig. S12. Deconvoluted (a) Ni 2*p* and (b) Fe 2*p* and (c) O 1*s* XPS spectra of NiFeLDH@PANi-CF and (d) Ni 2*p* and (e) Fe 2*p* and (f) O 1*s* XPS spectra of NiFeLDH@O-CF after cycling in alkaline medium.

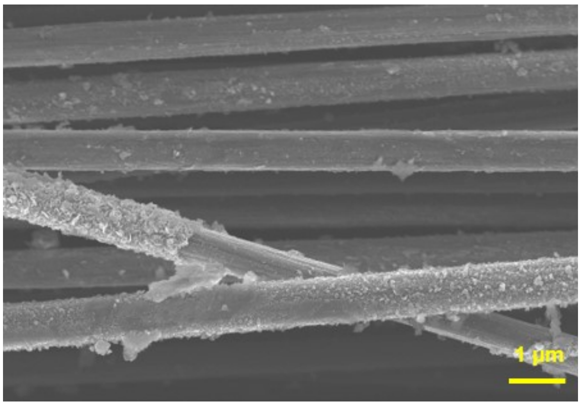

Fig. S13. FESEM image of NiFeLDH@O-CF after durability test.

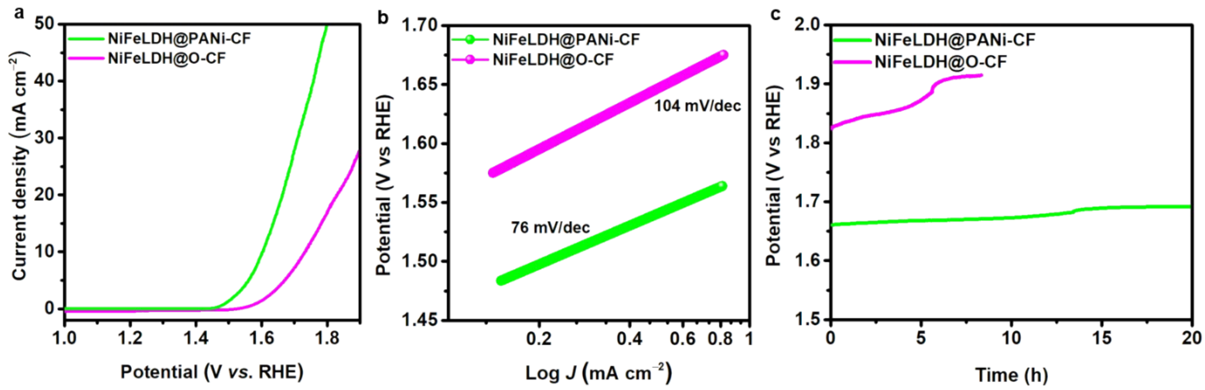

Fig. S14. The OER performance of NiFeLDH based catalysts in 0.5 M H_2SO_4 electrolyte. (a) Polarization curves of NiFeLDH-based catalysts. (b) Tafel slopes of the NiFeLDH-based catalysts derived from the polarization curves of the catalysts. (c) Chronopotentiometric measurement of NiFeLDH catalysts at the current density of 20 mA cm^{-2} in 0.5 M H_2SO_4 electrolyte for 20 h.

Table S1. The HER performance of the MoS_2 based catalysts.

Samples		Onset potential [V vs. RHE]	Tafel slope [mV dec^{-1}]	Reference
1T/2H MoS_2		~0.12	110	[S1]
1T MoS_2		0.2	42	[S2]
Ferromagnetic MoS_2		0.1	59	[S3]
Defect rich MoS_2		0.1	95	[S4]
Defect rich MoS_2		~0.15	50	[S5]
Three-dimensional MoS_2		0.2	98	[S6]
MoS_2 nanoflowers		0.2	52	[S7]
MoS_2 nanosheets		~0.25	38	[S8]
Monolayer MoS_2		~0.2	53	[S9]
Annealed MoS_2		~0.25	71	[S10]
MoS_2 Nanomesh		~0.15	46	[S11]
MoS_2 Nanodots		0.1	61	[S12]
Edge oriented MoS_2		~0.25	50	[S13]
Micro/Nano MoS_2		~0.17	74	[S14]
MoS_2/graphene		~0.12	71	[S15]
MoS_2/carbon cloth		~0.1	42	[S16]
MoS_2/carbon foam		~0.25	44	[S17]
MoS_2/vertical graphene/ carbon cloth		~0.15	53	[S18]
MoS_2/Au/SiO_2/Si		~0.15	45	[S19]
Vacancy-induced MoS_2@PANi-CF	**acidic**	**0.03**	**35**	**This work**
	alkaline	**0.04**	**40**	
	neutral	**0.05**	**31**	

Table S2. The OER performance of the NiFeLDH based catalysts.

Samples		Onset potential [V vs. RHE]	Tafel slope [mV dec^{-1}]	Reference
NiFeLDH/CNT		1.45	31	[S20]
Three-dimensional NiFeLDH		1.46	40	[S21]
NiFeLDH/Graphene		1.43	39	[S22]
NiFeLDH/Carbon quantum dot		1.43	35	[S23]
NiFeLDH hollow spheres		1.45	53	[S24]
NiFeLDH/Mesoporous graphene oxide nanospheres		1.50	63	[S25]
NiFeLDH/Reduced graphene oxide		1.50	91	[S26]
Plasma assisted oxygen enriched NiFeLDH		1.48	74	[S27]
NiFeLDH edge active		1.47	35	[S28]
NiFeLDH with oxygen vacancies		1.45	48	[S29]
Edge-enriched NiFeLDH		1.45	41	[S30]
NiFeLDH/carbon cloth		1.50	56	[S31]
NiFeLDH/sulfonated carbon dots		1.42	55	[S32]
NiFeLDH edge rich		1.52	49	[S33]
Vacancy-induced NiFeLDH@PANi-CF	**alkaline**	**1.44**	**47**	**This work**
	acidic	**1.48**	**76**	

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