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Supporting information

Constructing oxygen vacancy-enriched Fe_2O_3@NiO heterojunctions for highly efficient electrocatalytic alkaline water splitting

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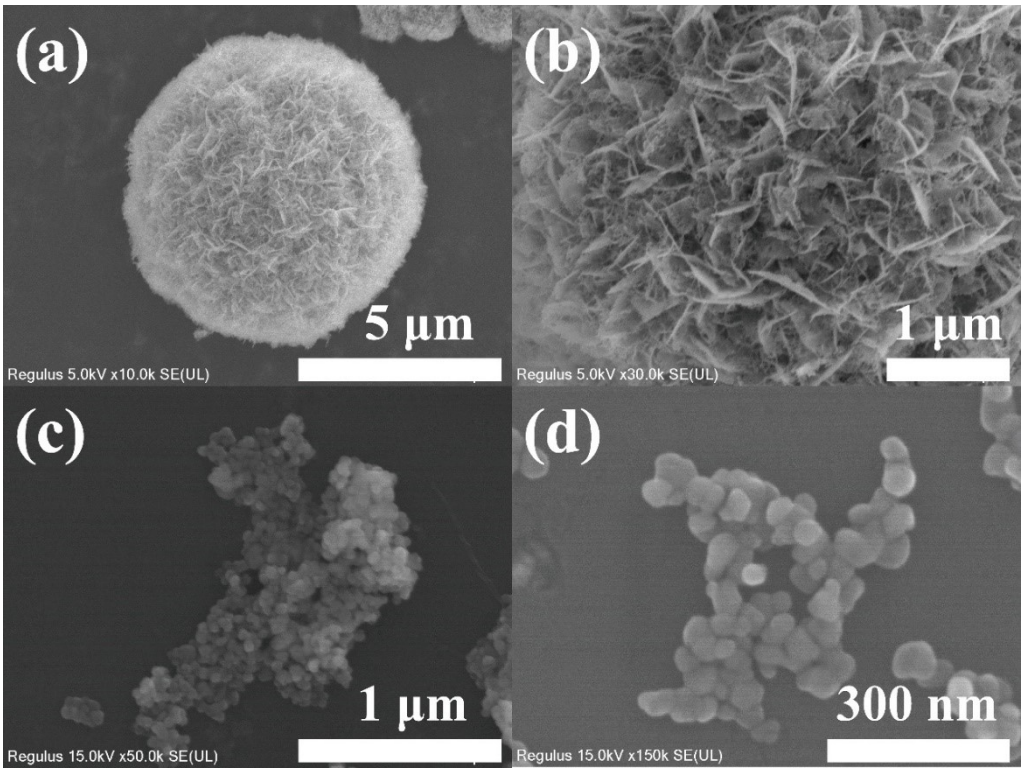

Fig. S1. (a, b) SEM images of pure NiO at low and high magnification. (c, d) SEM images of pure Fe_2O_3 at low and high magnification.

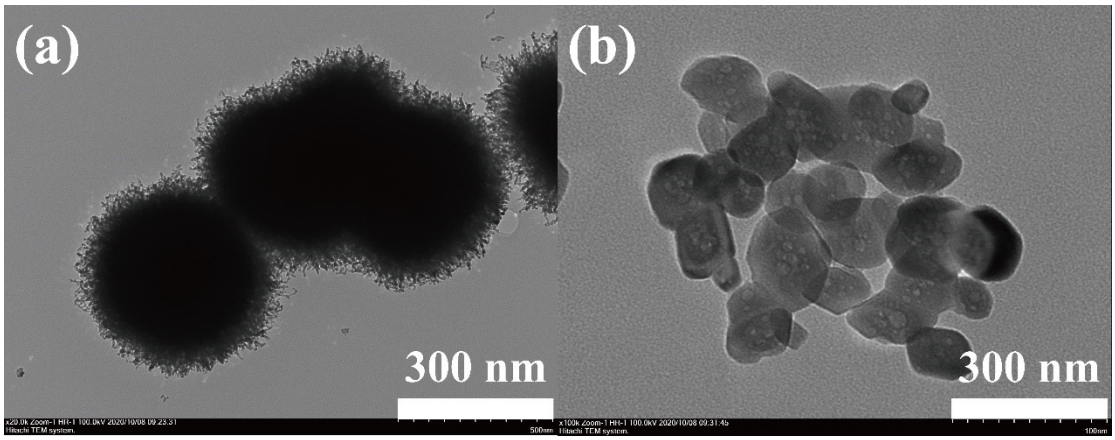

Fig. S2. (a) TEM image of pure NiO. (b) TEM image of pure Fe_2O_3.

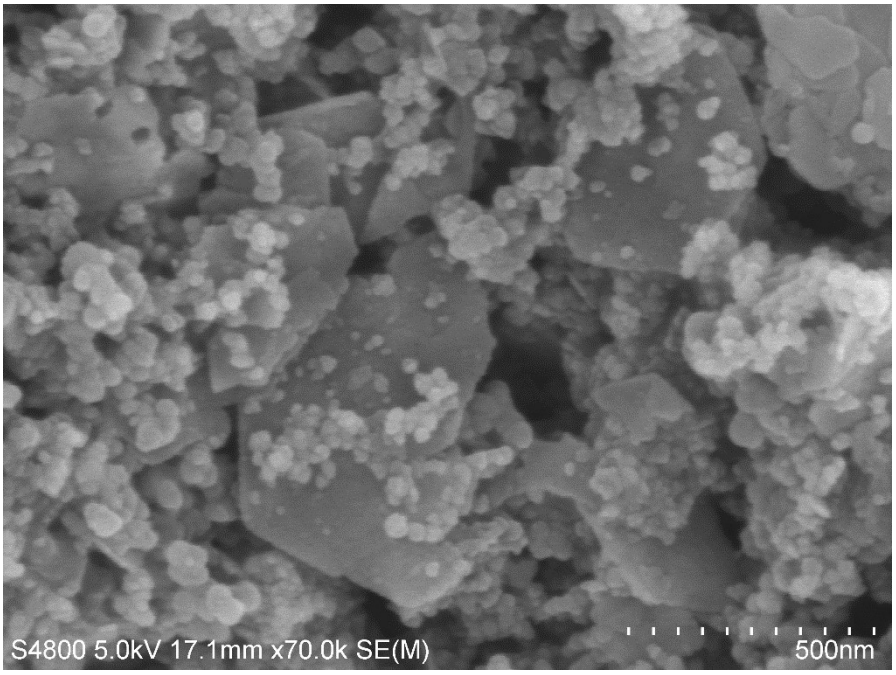

Fig. S3. SEM image after the electrochemical performance testing.

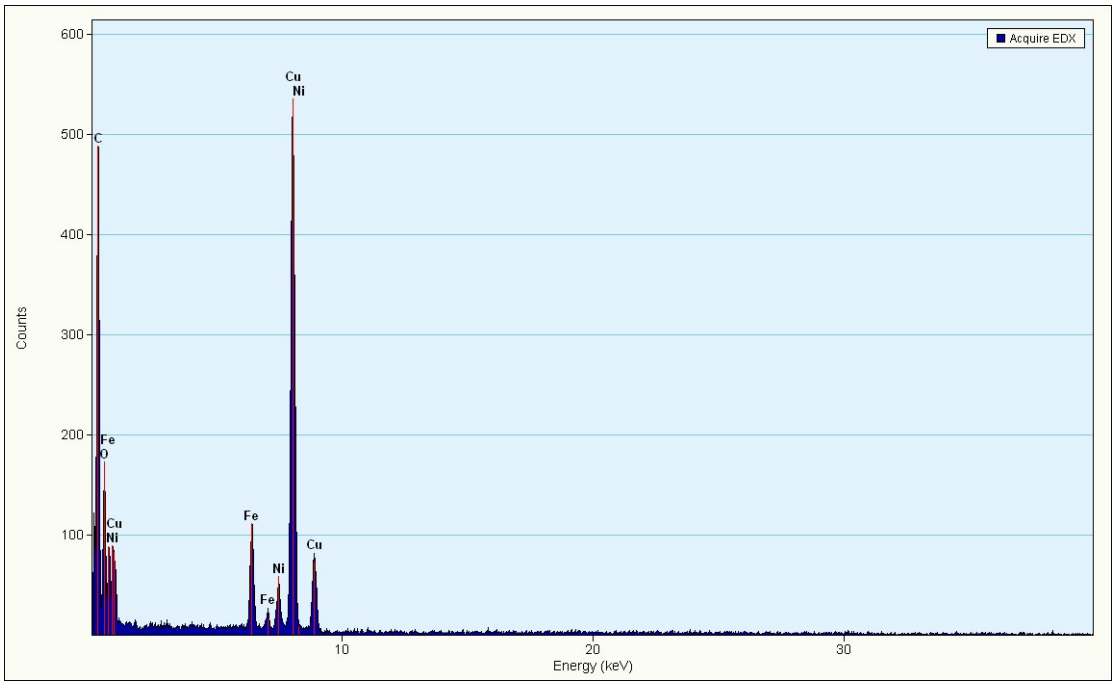

Fig. S4. EDX spectrum of Fe_2O_3@NiO.

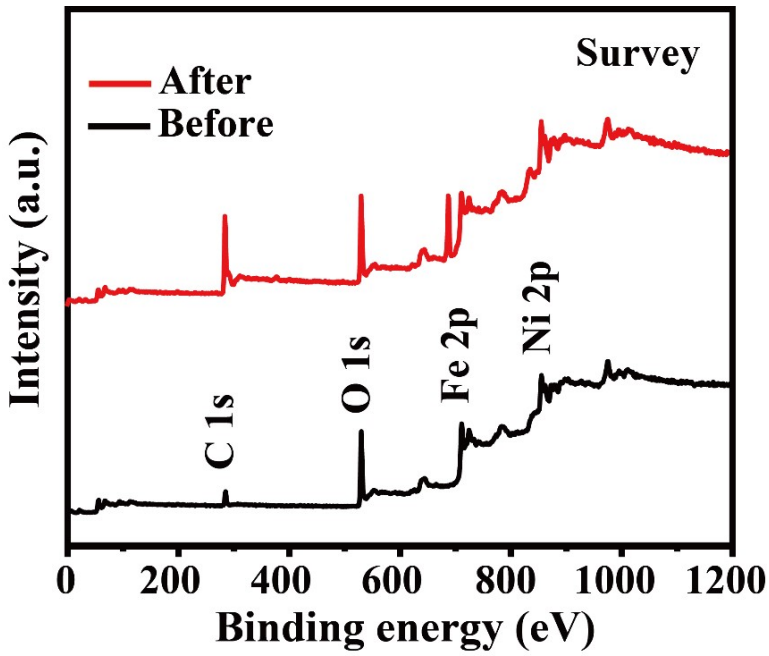

Fig. S5. Elements XPS survey.

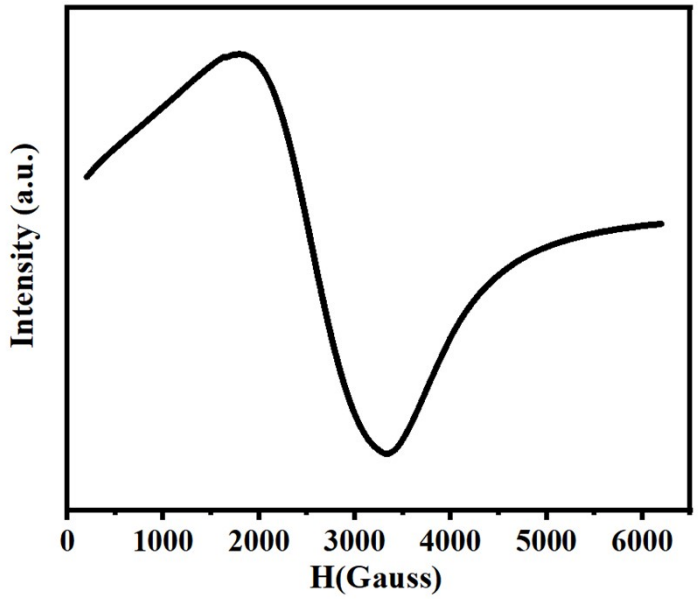

Fig. S6. The collected EPR spectra of Fe_2O_3@NiO heterojunction.

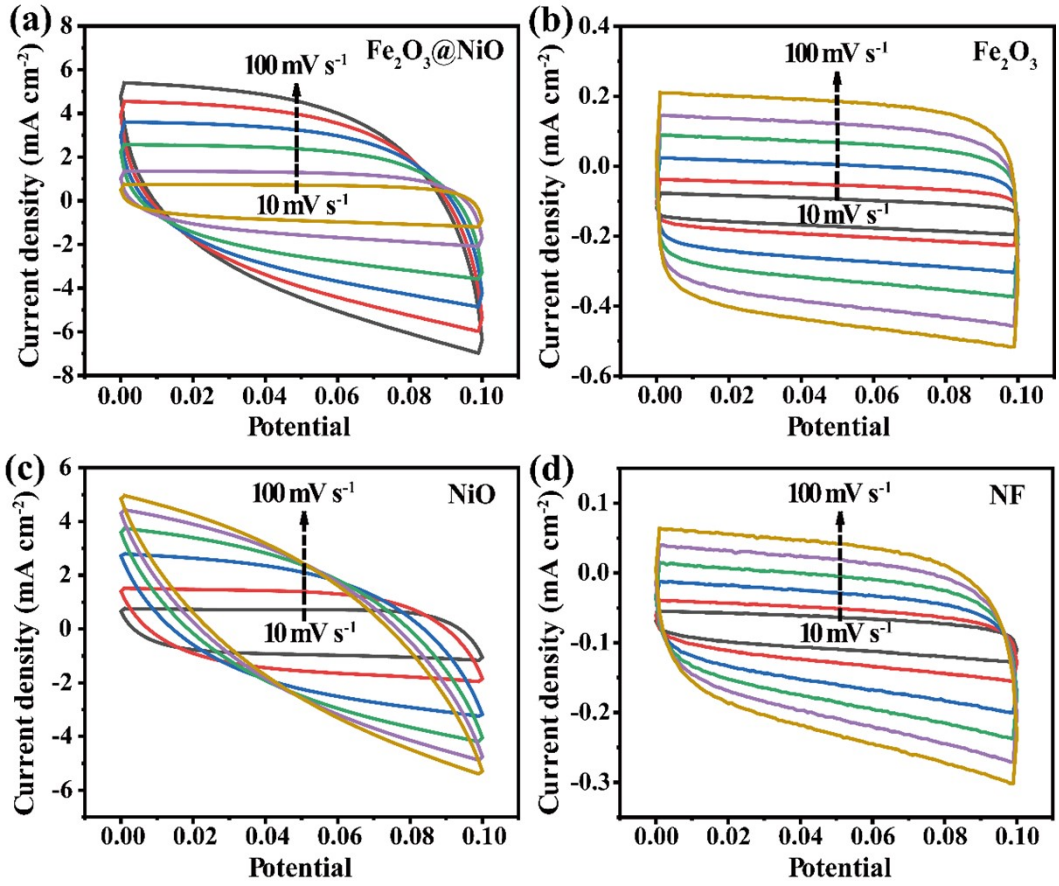

Fig. S7. CV curves for OER in 1 M KOH at the scan rate of 10, 20, 40, 60, 80 and 100 mV/s: (a) Fe_2O_3@NiO, (b) Fe_2O_3, (c) NiO, and (d) NF.

Table S1 Quantitative analysis of EDX elements.

Element	Weight %	Atomic %	Uncert. %	Detector Correction	k-Factor
O(K)	44.96	74.34	1.46	0.49	1.990
Fe(K)	37.08	17.56	0.96	0.99	1.382
Ni(K)	17.94	8.08	0.74	0.99	1.484

Table S2 Comparison of the overpotential of Fe_2O_3@NiO in 1.0 M KOH with other iron- and nickel-based bifunctional catalysts.

Catalysts	**Electrolyte**	**j=10mA cm^{-2}(mV)**		**Tafel (mV dec^{-1})**		**Overall Water Splitting (V)**	**Ref.**
		OER	**HER**	**OER**	**HER**		
Fe_2O_3@NiO	1.0 M KOH	224	187	20.0	53.8	1.63	This Work
$Ni_{0.9}Fe_{0.1}$/NC	1.0 M KOH	330	231	45	111	1.58	1
CoFe LDH-F	1.0 M KOH	300	255	40	95	1.63	2
NiFe/$NiCo_2O_4$/NF	1.0 M KOH	260	110	38.8	88	1.67	3
$NiCo_2S_4$ NW	1.0 M KOH	260	210	40.1	58.9	1.63	4
Co-Fe oxyphosphide	1.0 M KOH	280	180	53	62	1.69	5
NiFe HNSs	1.0 M KOH	220	189	40.7	87.2	1.67	6
NiCoFe ALDHs/CFC	1.0 M KOH	239	200	32	70	1.55	7

CoFe LDH nanosheets	1.0 M KOH	260	166	40	95	1.63	8
Fe/Co–N–C	1.0 M KOH	340	270	61	83	\	9

Table S3 The ratio of Fe and O before and after test in XPS.

Before and after test	Fe 2p			O 1s	
	Fe^{2+} (%)	Fe^{3+} (%)	Fe^{2+}(%)/Fe^{3+}(%)	O1 (%)	O2 (%)
Before test	37.2	62.8	59.3	41.9	58.1
After test	30.8	69.2	44.5	64.1	35.9

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