

Supporting Information for

Electric-Field-Treated Ni/Co₃O₄ Film as High-Performance Bifunctional Electrocatalysts for Efficient Overall Water Splitting

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Supplementary Figures and Tables

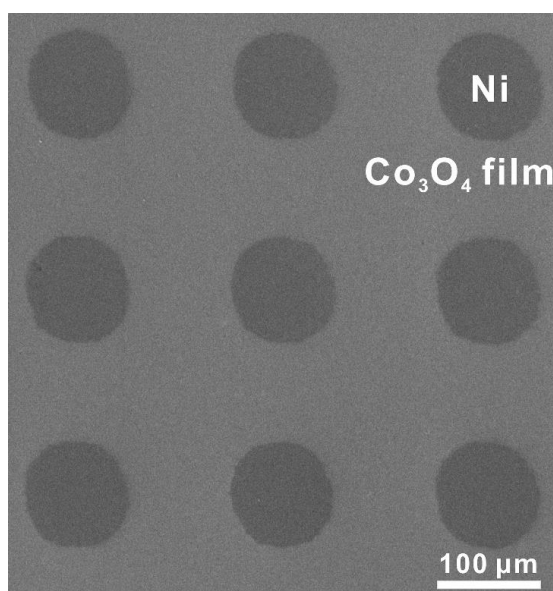


Fig. S1 The surface SEM image of the Ni/Co₃O₄/Pt device

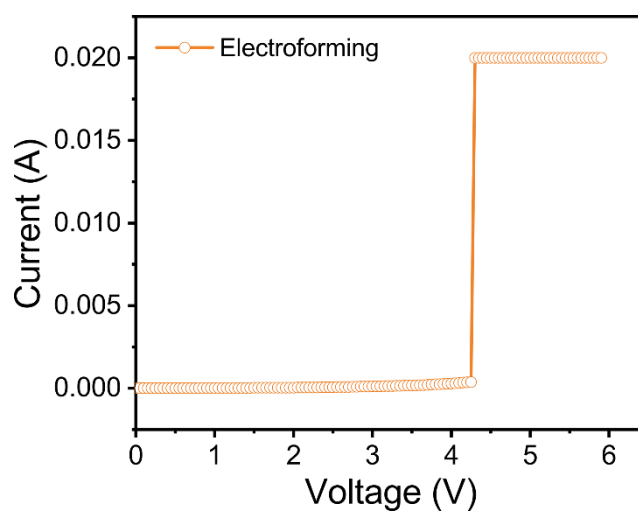


Fig. S2 The electroforming process of the prepared device. The current compliance (I_{cc}) is 0.02 A

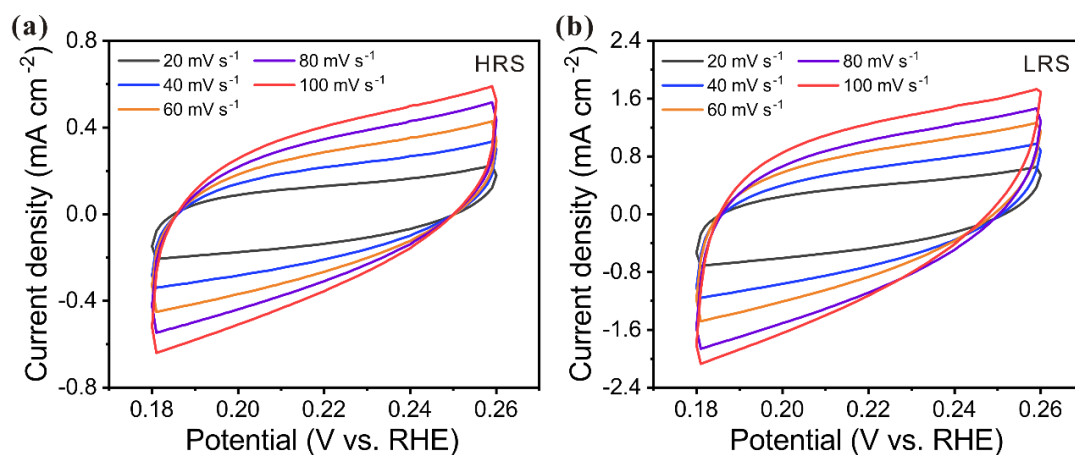


Fig. S3 Electrochemical surface area (ECSA) tests of different samples. Cyclic voltammogram curves of (a) HRS sample and (b) LRS sample measured in the nonfaradaic potential of 0.18-0.26 V vs. RHE at multiple scan rates (20, 40, 60, 80 and 100 mV s^{-1})

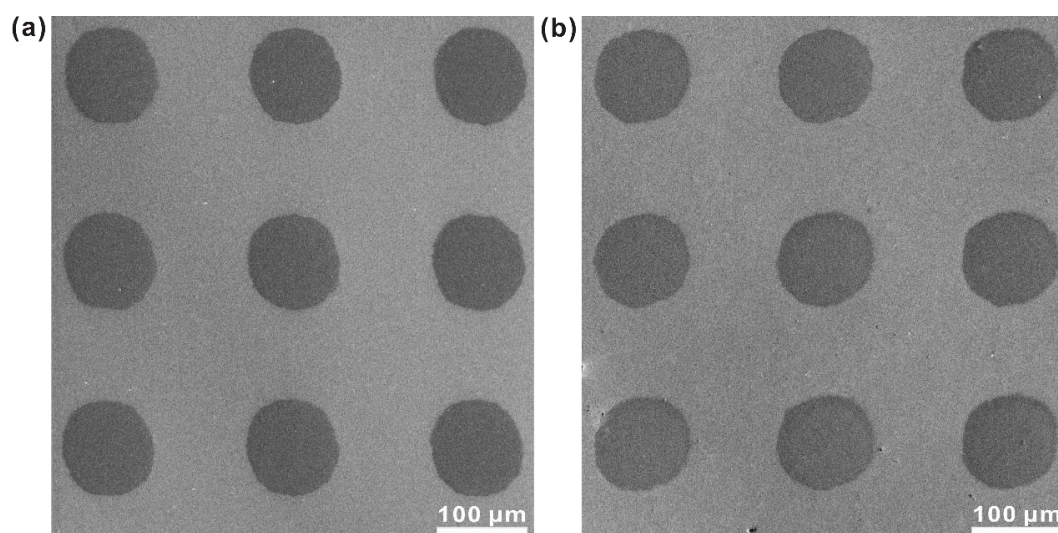


Fig. S4 The surface SEM image of LRS sample before and after OER test

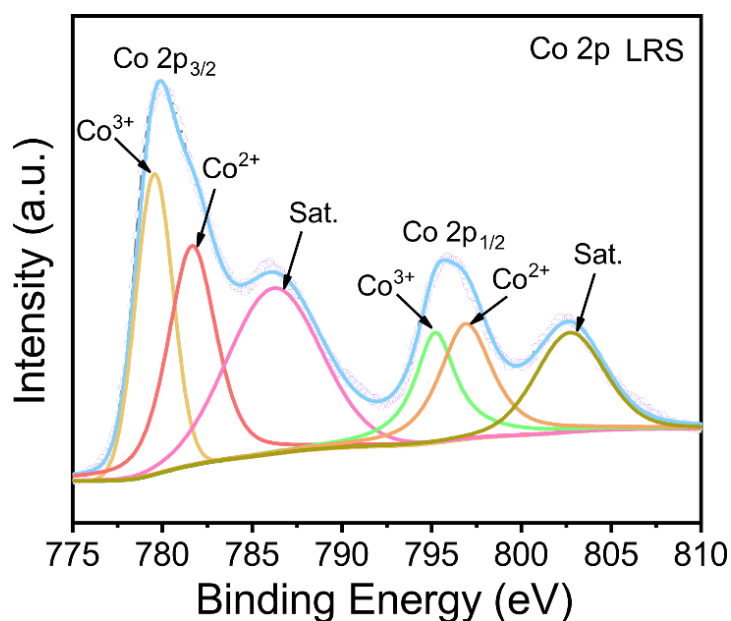


Fig. S5 XPS spectra of Co 2p in bulk for LRS sample after OER operation

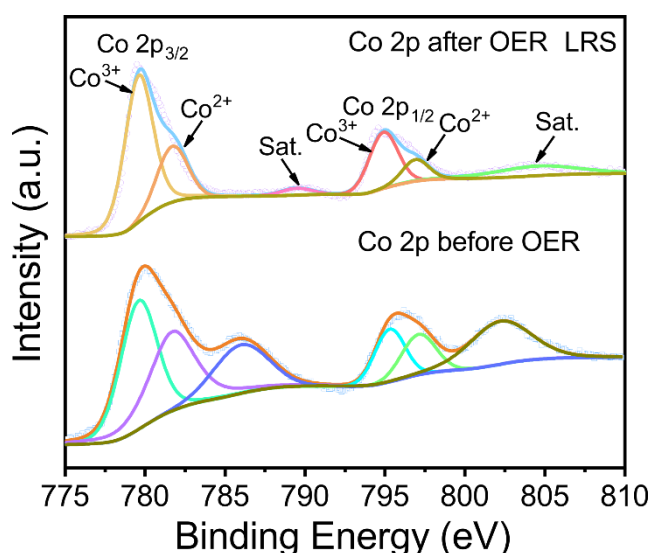


Fig. S6 XPS spectra of Co 2p on the surface of LRS sample before and after OER test

Table S1 Comparison of HER catalytic performance of LRS sample with other reported cobalt-based catalysts in alkaline electrolyte

Catalyst	Electrolyte	Current density (j)	Overpotential (mV)	Tafel (mV dec ⁻¹)	Refs.
LRS sample	1M KOH	10	93	69	This work
Ni/Co ₃ O ₄ cubes	1 M KOH	10	145	109	[S1]
NiO/Co ₃ O ₄ microcubes	1 M KOH	10	169.5	119	[S2]
MOF Co ₃ O ₄ /MoS ₂	1 M KOH	10	205	98	[S3]
Cu-Co ₃ O ₄ nanoarrays	1 M KOH	10	125	66	[S4]
P _{8.6} -Co ₃ O ₄ /NF	1 M KOH	10	97	86	[S5]
Co ₃ O ₄ -N-C	1 M KOH	10	139	45	[S6]
P-Co ₃ O ₄	1 M KOH	10	120	51.6	[S7]
Co ₃ O ₄ @Ni	1 M KOH	10	225	53	[S8]
Co ₃ O ₄ with {111} crystal planes	1 M KOH	10	195	50	[S9]
Co ₃ O ₄ NCs/C	1 M KOH	10	380	116	[S10]

Table S2 Comparison of OER catalytic performance of LRS sample with other reported cobalt-based catalysts in alkaline electrolyte

Catalyst	Electrolyte	Current density (j)	Overpotential (mV)	Tafel (mV dec ⁻¹)	Refs.
LRS sample	1 M KOH	10	311	43	This work
Ni/Co ₃ O ₄ cubes	1 M KOH	10	324	35	[S1]
Co ₃ O ₄ /CoMoO ₄	1 M KOH	10	318	63	[S11]
Co ₃ O ₄ NS	1 M KOH	10	330	57.8	[S12]
Co ₃ O ₄ nanowires	1 M KOH	10	339	82	[S13]
Co ₃ O ₄ / NiCo ₂ O ₄ nanocages	1 M KOH	10	340	88	[S14]
Co ₃ O ₄ films	1 M NaOH	10	377	58.1	[S15]
Mesoporous Co ₃ O ₄	1 M KOH	10	380	59	[S16]
Co ₃ O ₄ NCs/C	1 M KOH	10	320	101	[S10]
Meso-Co ₃ O ₄ NWs	1 M KOH	10	370	72	[S17]
Co ₃ O ₄ /N-rmGO	1 M KOH	10	310	67	[S18]

Table S3 Comparison of overall water splitting performance of LRS sample with other reported cobalt-based bifunctional electrocatalysts in alkaline solution

Catalyst	Electrolyte	Current density (j)	Potential (V)	Refs.
LRS sample	1 M KOH	10	1.63	This work
Ni/Co ₃ O ₄ /Ti-mesh	1 M KOH	10	1.66	[S1]
P _{8,6} -Co ₃ O ₄ /NF	1 M KOH	10	1.63	[S5]
Co ₃ O ₄ -MTA	1 M KOH	10	1.63	[S19]
Co ₃ O ₄ @Ni	1 M KOH	10	1.64	[S8]
RuO ₂ /Co ₃ O ₄	1 M KOH	10	1.645	[S20]
Co ₃ O ₄ NCS/C	1 M KOH	10	1.91	[S10]
NiCo ₂ O ₄ microcuboids	1 M KOH	10	1.65	[S21]
CoO-CNF	1 M KOH	10	1.63	[S22]
Co ₅ Mo _{1.0} O NSs@NF	1 M KOH	10	1.68	[S23]
NiCo ₂ S ₄ NA/CC	1 M KOH	10	1.68	[S24]

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