## **Electronic Supplementary Information**

## **Experimental section**

**Materials:** Ni foam (NF) was provided by Hangxu Filters Flag Store, Hengshui, Hebei. The  $CoCl_2 \cdot 6H_2O$ , terephthalic acid, and N,N-Dimethyl formamide (DMF) was purchased from Aladdin Ltd. in Shanghai. RuCl<sub>3</sub>·3H<sub>2</sub>O ( $\geq$  43%)were bought from Sigma-Aldrich Chemical Reagent Co., Ltd. The water used throughout all experiments was purified through a Millipore system. All the reagents and chemicals were used as received without further purification.

**Preparation of Co-MOF/NF:** Co-MOF/NF was prepared as follows. 1 mmol  $CoCl_2 \cdot 6H_2O$  (0.238 g) and 1 mmol terephthalic acid (0.166 g) were dissolved in 35 mL DMF under magnetic stirring to form a uniform solution. 2.5 mL ethanol and 2.5 mL distilled water were added slowly to the solution under constant stirring for 30 min. Ni foam was cleaned by sonication in water and ethanol for 10 min, was immersed into the solution. Then, the pre-treated Ni foam (2 × 3 cm) and the above solution were transferred into a 50 mL Teflon-lined stainless-steel autoclave and maintained at 125 °C for 12 h. After cooled to room temperature, the product was washed with distilled water for three times and dried at 60 °C in air. Then the Co-MOF/NF was obtained. The loading for Co-MOF/NF was about 5.84 mg cm<sup>-2</sup>.

Synthesis of RuO<sub>2</sub>: RuO<sub>2</sub> was prepared according to previous publication. Briefly, 2.61 g of RuCl<sub>3</sub>·3H<sub>2</sub>O and 30.0 mL KOH (1.0 M) were added into 100 mL distilled water and stirred for 45 min at 100 °C. Then the above solution was centrifuged for 10 minutes and filtered. The precipitates were collected and washed with water several times. Finally, the product was dried at 80 °C overnight and then annealed at 300 °C in air atmosphere for 3 h. For a typical synthesis of RuO<sub>2</sub>/NF electrode, 50 mg RuO<sub>2</sub> was dispersed in 1 mL ethane/water (v:v = 1:1) solution with sonication for 30 min. Then 29.2  $\mu$ L catalytic inks were dropped on Ni foam (0.5 × 0.5 cm), and dried at 80 °C for 4 h. The loading for RuO<sub>2</sub>/NF was about 5.84 mg cm<sup>-2</sup>.

**Characterizations:** The XRD patterns were obtained from a LabX XRD-6100 X-ray diffractometer with Cu K $\alpha$  radiation (40 kV, 30 mA) of wavelength 0.154 nm

(SHIMADZU, Japan). Scanning electron microscope (SEM) measurements were recorded on a XL30 ESEM FEG scanning electron microscope at an accelerating voltage of 20 kV. The structures of the samples were determined by Transmission electron microscopy (TEM) images on a HITACHI H-8100 electron microscopy (Hitachi, Tokyo, Japan) operated at 200 kV. X-ray photoelectron spectroscopy (XPS) data of the samples was collected on an ESCALABMK II x- ray photoelectron spectrometer using Mg as the exciting source. Fourier transform infrared (FTIR) transmission spectra were taken on a BRUKER-EQUINOX-55 IR spectrophotometer.

**Electrochemical measurements:** Electrochemical measurements were performed with a CHI 660E electrochemical analyzer (CH Instruments, Inc., Shanghai) in a standard three-electrode system. Co-MOF/NF was used as the working electrode. Graphite plate, and an Hg/HgO were used as the counter electrode and the reference electrode, respectively. The temperature of solution was kept at 25 °C for all the measurements via the adjustment of air condition and heating support, which ensured the variation of diffusion coefficient below 1%. The potentials reported in this work were calibrated to RHE other than especially explained, using the following equation: E (RHE) = E (Hg/HgO) + (0.098 + 0.059 pH) V.

**FE determination:** The FE was calculated by comparing the amount of measured  $O_2$  generated by anodal electrolysis with calculated  $O_2$  (assuming 100% FE). GC analysis was carried out on GC–2014C (Shimadzu Co.) with thermal conductivity detector and nitrogen carrier gas. Pressure data during electrolysis were recorded using a CEM DT-8890 Differential Air Pressure Gauge Manometer Data Logger Meter Tester with a sampling interval of 1 point per second.



Fig. S1. SEM image of Co-MOF/NF.



Fig. S2. EDX spectrum of Co-MOF/NF.



Fig. S3. XRD patterns of Co-MOF/NF after 500 cycles and after long-term stability test.



Fig. S4. SEM image of Co-MOF/NF after 105 h.



Fig. S5. TEM image of Co-MOF after 105 h.



Fig. S6. LSV curves for Co-MOF/NF before and after 500 cycles.



Fig. S7. The amount of  $O_2$  theoretically calculated and experimentally measured versus time for oxygen evolution of Co-MOF/NF.



Fig. S8. Plot of TOF vs. potential for Co-MOF/NF.

Catalyst	j (mA cm <sup>-2</sup> )	η (mV)	Electrolyte	Ref.
Co-MOF/NF	50	311	1.0 M KOH	This work
N-doped graphene-CoO	50	~440	1.0 M KOH	1
Zn <sub>x</sub> Co <sub>3-x</sub> O <sub>4</sub> nanowire array	50	390	1.0 M KOH	2
Co <sub>3</sub> O <sub>4</sub> /N -rmGO	10	310	1.0 M KOH	3
Co <sub>3</sub> O <sub>4</sub> @C-MWCNTs	10	320	1.0 M KOH	4
Ni <sub>x</sub> Co <sub>3-x</sub> O <sub>4</sub> nanowire	10	370	1.0 M KOH	5
NiCo LDH nanosheets	10	367	1.0 M KOH	6
Ni <sub>0.5</sub> Co <sub>0.5</sub> O <sub>x</sub>	10	360	1.0 M KOH	7
CoCo LDH	10	390	1.0 M KOH	8
Co-UTSA-16	10	408	1.0 M KOH	9
Co <sub>0.5</sub> Fe <sub>0.5</sub> S@N-MC	10	410	1.0 M KOH	10
Au@Co <sub>3</sub> O <sub>4</sub> /C	10	380	0.1 M KOH	11
Co <sub>3</sub> O <sub>4</sub> /mMWCNT	10	390	0.1 M KOH	12
Mn <sub>3</sub> O <sub>4</sub> /CoSe <sub>2</sub>	10	450	0.1 M KOH	13

 Table S1. Comparison of OER performance for Co-MOF/NF with other

## non-noble-metal electrocatalysts in alkaline media.

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