

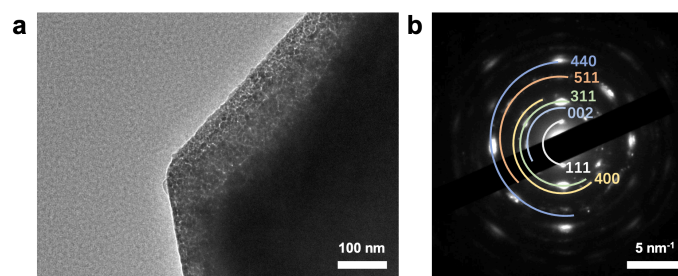
**Supporting Information**  
*for*

# Crystal Facet Regulation and Ru Incorporation of Co<sub>3</sub>O<sub>4</sub> for Acidic Oxygen Evolution Reaction Electrocatalysis

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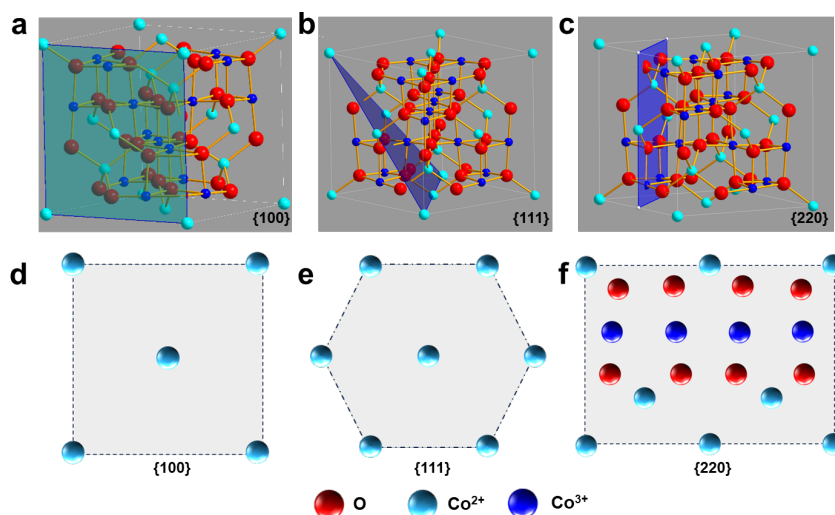
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**Figure S1.** (a) TEM image and (b) SAED pattern of the *h*-Co<sub>3</sub>O<sub>4</sub>.

**Table S1.** Surface Co<sup>3+</sup>/Co<sup>2+</sup> ratio of the *c*-Co<sub>3</sub>O<sub>4</sub>, *o*-Co<sub>3</sub>O<sub>4</sub> and *h*-Co<sub>3</sub>O<sub>4</sub> based on XPS analysis.

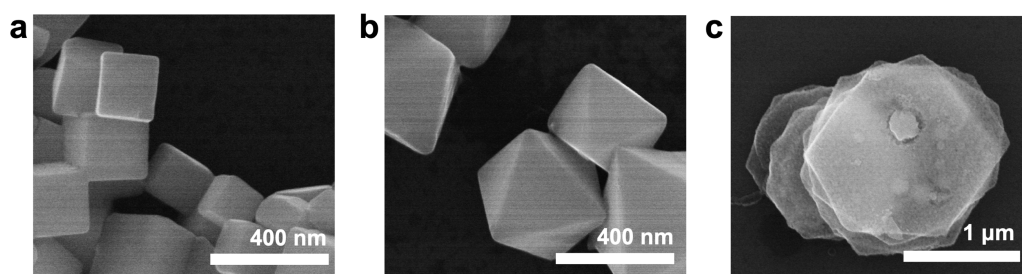
Catalyst	Co <sup>3+</sup> (%)	Co <sup>2+</sup> (%)	Co <sup>3+</sup> /Co <sup>2+</sup>
<i>c</i> -Co <sub>3</sub> O <sub>4</sub>	55.01	44.99	1.22
<i>o</i> -Co <sub>3</sub> O <sub>4</sub>	57.05	42.96	1.33
<i>h</i> -Co <sub>3</sub> O <sub>4</sub>	59.56	40.54	1.47



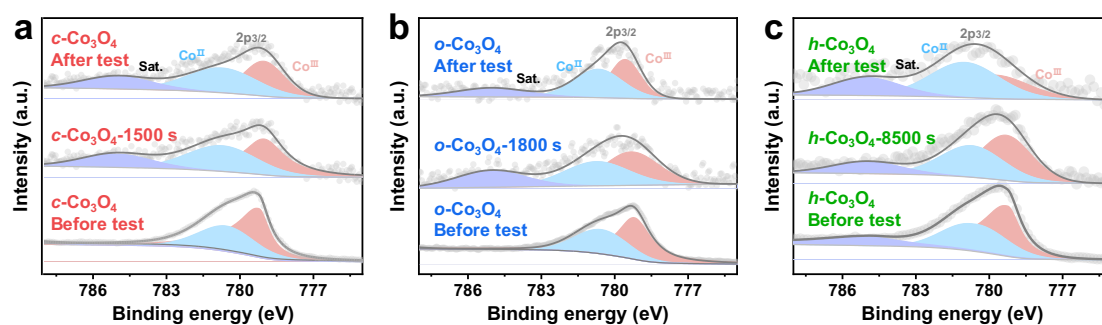
**Figure S2.** Atomic configuration of Co<sub>3</sub>O<sub>4</sub> (a) {100}, (b) {111} and (c) {220} crystal faces and (d-e) the corresponding crystal plane projections. The white spheres in S2c represent false atoms that pass through the crystal surface and do not actually exist.

**Table S2.**  $\text{Co}^{3+}/\text{Co}^{2+}$  ratio of the *c*- $\text{Co}_3\text{O}_4$ , *o*- $\text{Co}_3\text{O}_4$  and *h*- $\text{Co}_3\text{O}_4$  based on Raman analysis.

Catalyst	$\text{Co}^{3+}/\text{Co}^{2+}$
<i>c</i> - $\text{Co}_3\text{O}_4$	2.72
<i>o</i> - $\text{Co}_3\text{O}_4$	3.11
<i>h</i> - $\text{Co}_3\text{O}_4$	3.65



**Figure S3.** SEM images of the *c*- $\text{Co}_3\text{O}_4$ , *o*- $\text{Co}_3\text{O}_4$  and *h*- $\text{Co}_3\text{O}_4$  after the OER catalysis.



**Figure S4.** Co  $2p_{3/2}$  XPS spectra of (a) *c*- $\text{Co}_3\text{O}_4$  (b) *o*- $\text{Co}_3\text{O}_4$  and (c) *h*- $\text{Co}_3\text{O}_4$ .

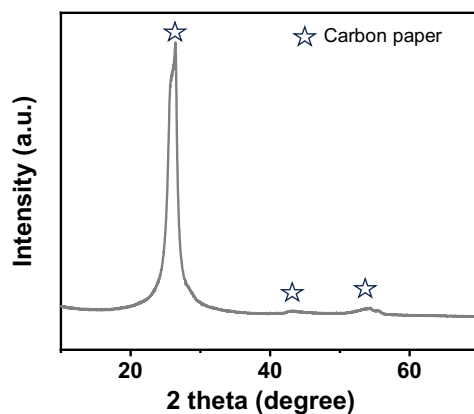


Figure S5. XRD pattern of carbon paper.

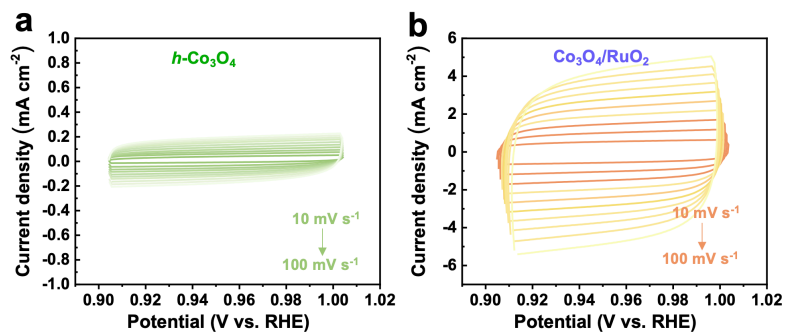


Figure S6. CV curves of (a)  $h\text{-Co}_3\text{O}_4$  and (b)  $\text{Co}_3\text{O}_4/\text{RuO}_2$  at different scanning rates.

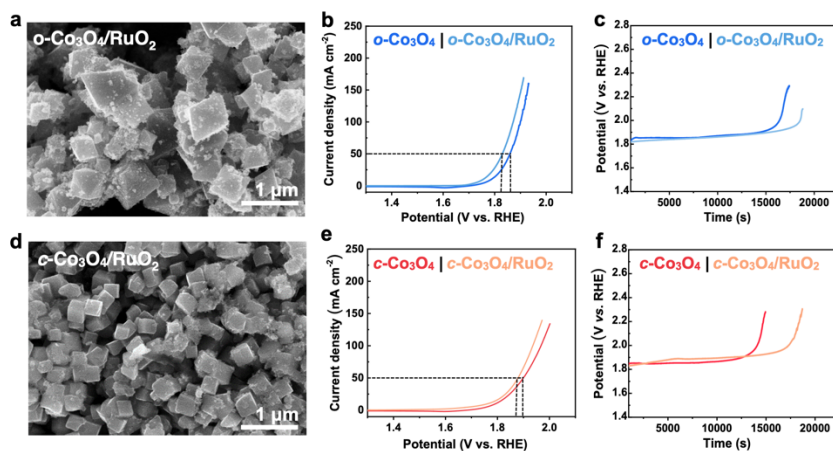
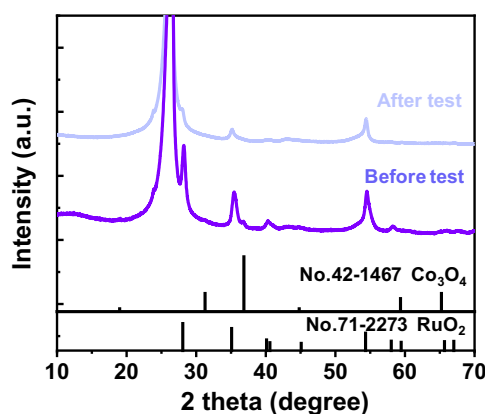
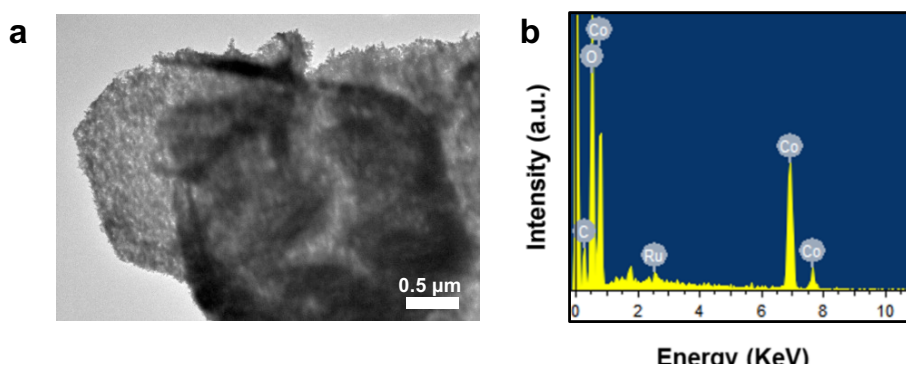


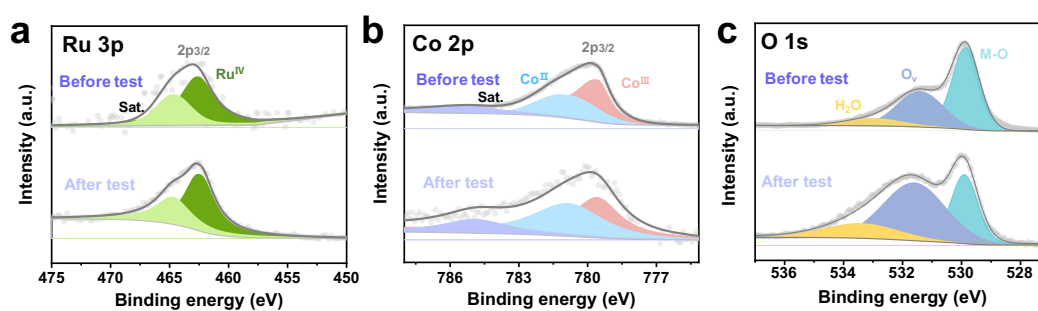
Figure S7. Structural and electrochemical characterization of (a-c)  $o\text{-Co}_3\text{O}_4$  and (b-d)  $c\text{-Co}_3\text{O}_4$ : (a, d) SEM images, (b, e) LSV curves, and (c, f) chronopotentiometry curves collected at  $10\text{ mA cm}^{-2}$ .



**Figure S8.** XRD patterns of  $\text{Co}_3\text{O}_4/\text{RuO}_2$  before and after test.



**Figure S9.** (a) TEM image and (b) EDS spectrum of the  $\text{Co}_3\text{O}_4/\text{RuO}_2$  after chronopotentiometry test.



**Figure S10.** (a) Co 2p, (b) Ru 3p, and (c) O 1s XPS spectra of the  $\text{Co}_3\text{O}_4/\text{RuO}_2$  before and after the chronopotentiometry test.