

## **pH-Regulated Copper and Indium Catalysts for CO<sub>2</sub> Electroreduction to C<sub>2</sub>**

### **Products**

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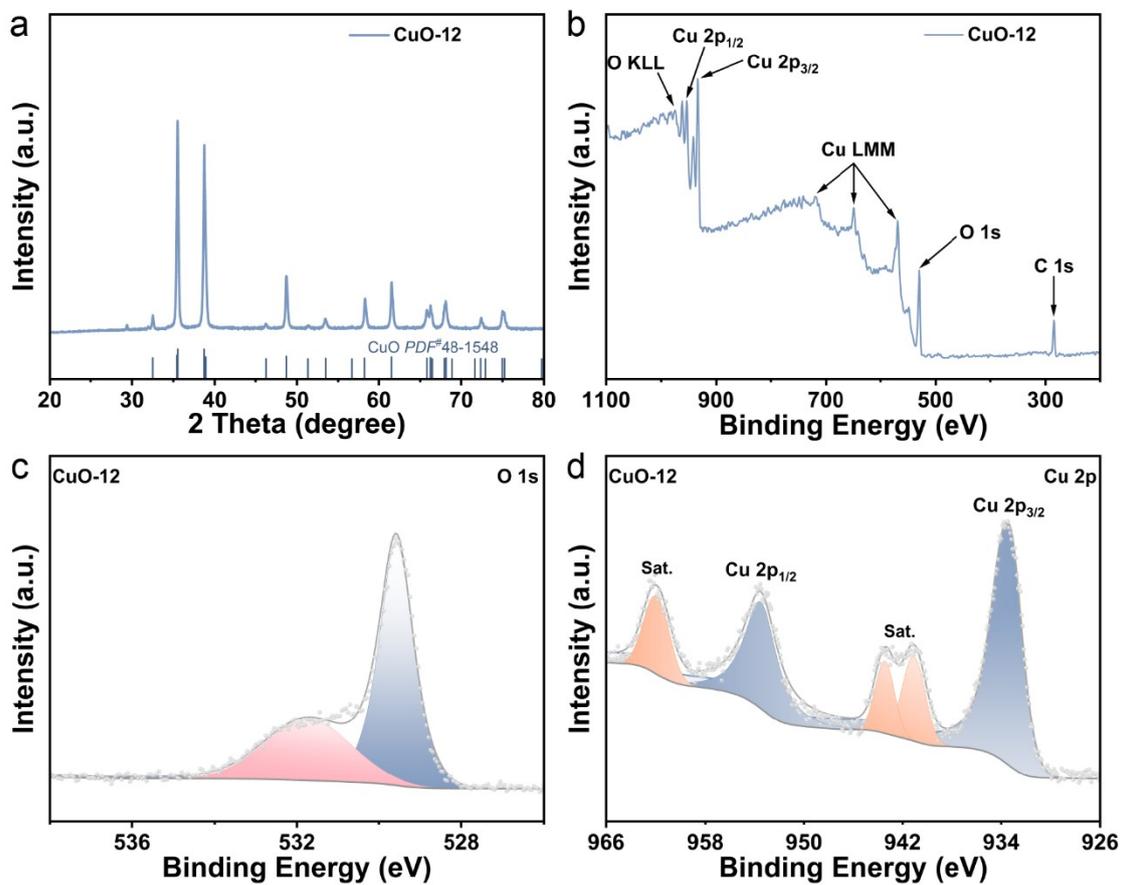
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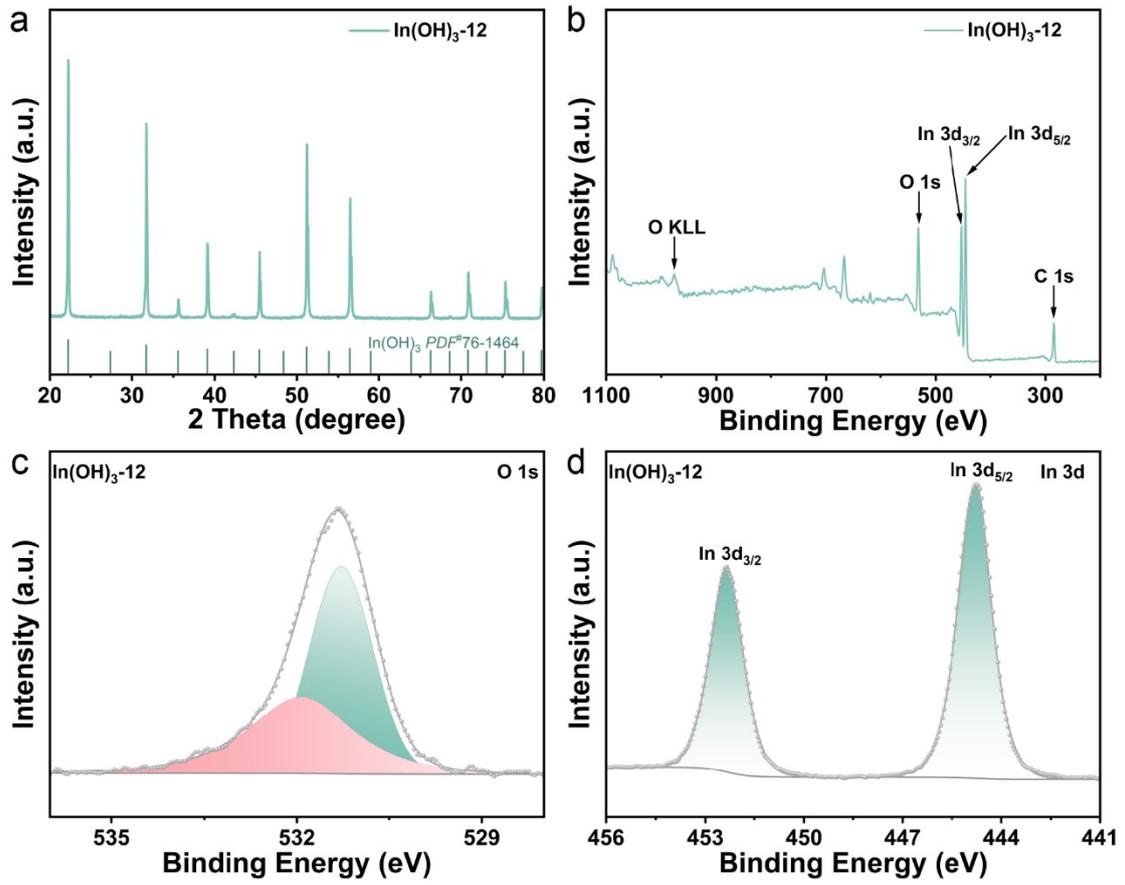
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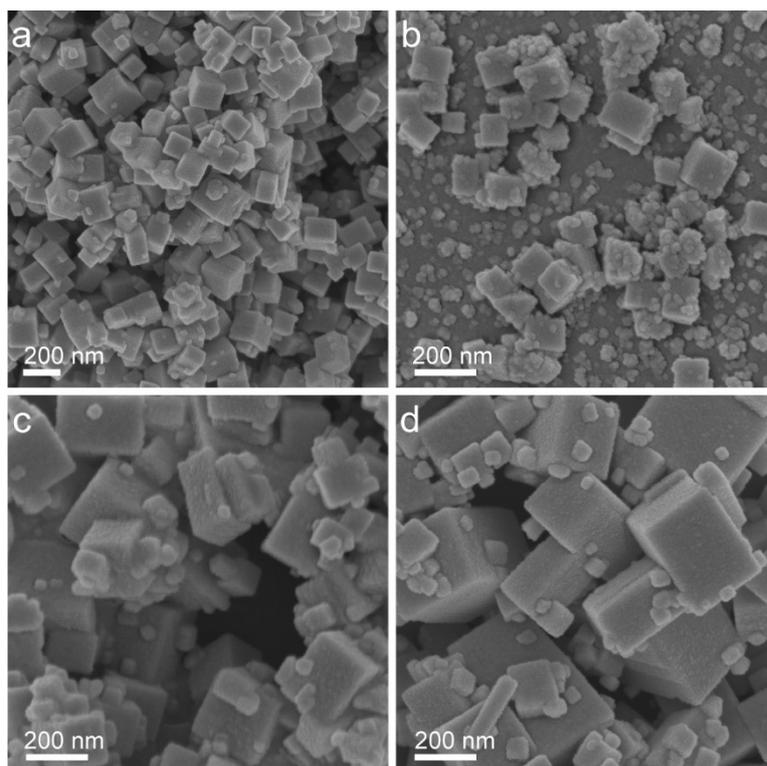
## Supplementary Figures



**Fig. S1.** (a) XRD patterns of CuO-12. XPS profiles of CuO-12 of (b) Survey scan, (c) O 1s, and (d) Cu 2p.

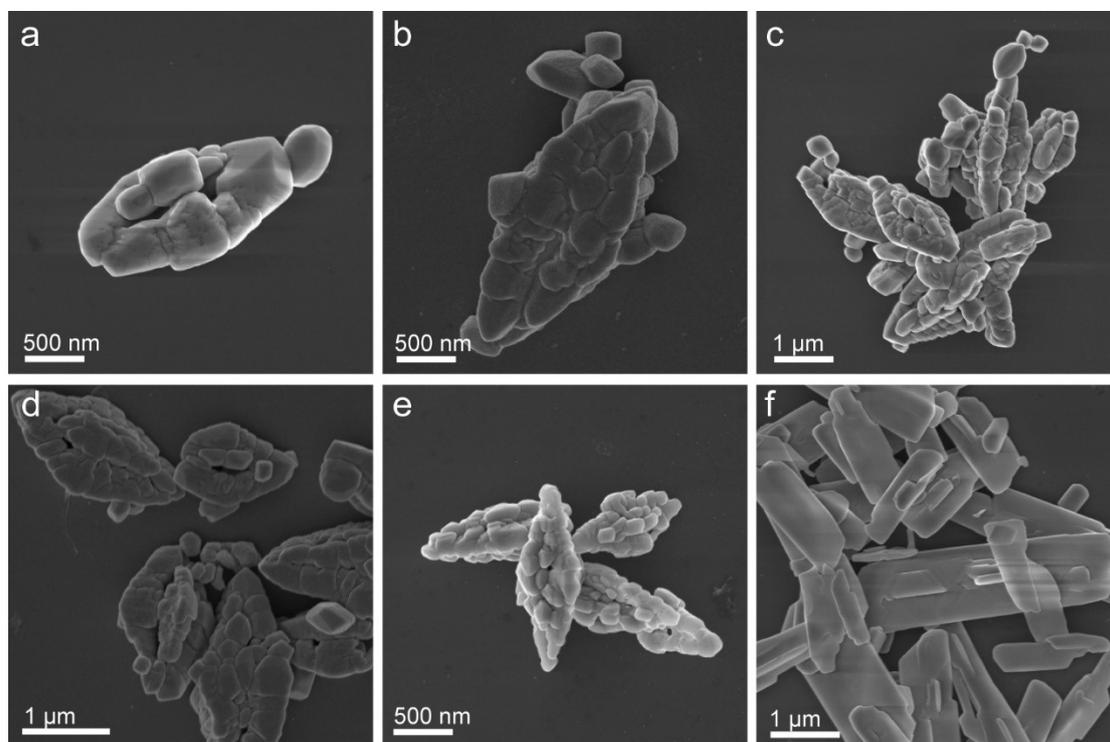


**Fig. S2.** (a) XRD patterns of In(OH)<sub>3</sub>-12. XPS profiles of In(OH)<sub>3</sub>-12 of (b) Survey scan, (c) O 1s, and (d) In 3d.



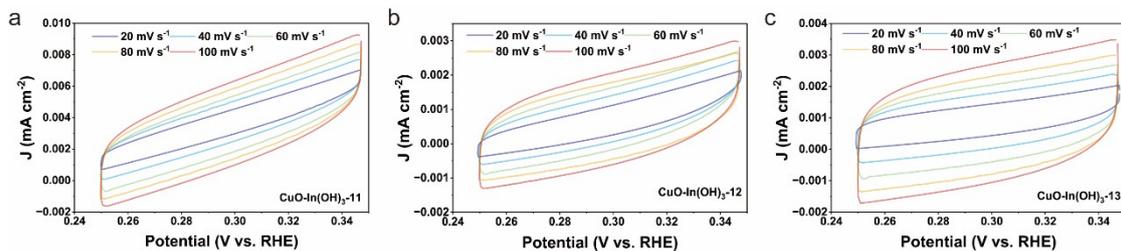
**Fig. S3.** SEM images of (a) In(OH)<sub>3</sub>-7, (b) In(OH)<sub>3</sub>-9, (c) In(OH)<sub>3</sub>-11, and (d) In(OH)<sub>3</sub>-

13.

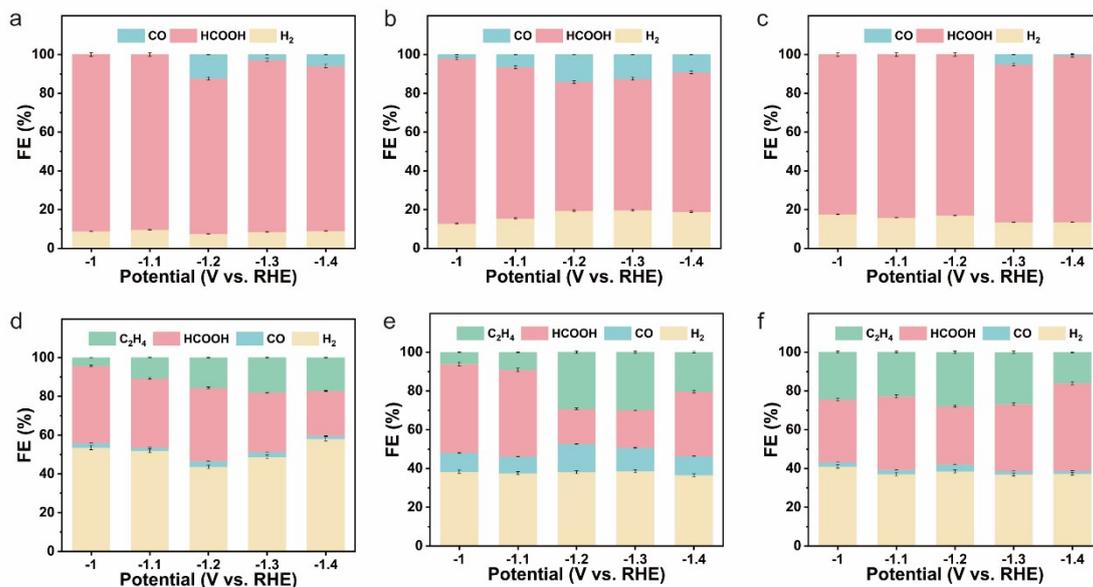


**Fig. S4.** SEM images of (a) CuO-8, (b, c) CuO-9, (d) CuO-10, (e) CuO-11, and (f) CuO-

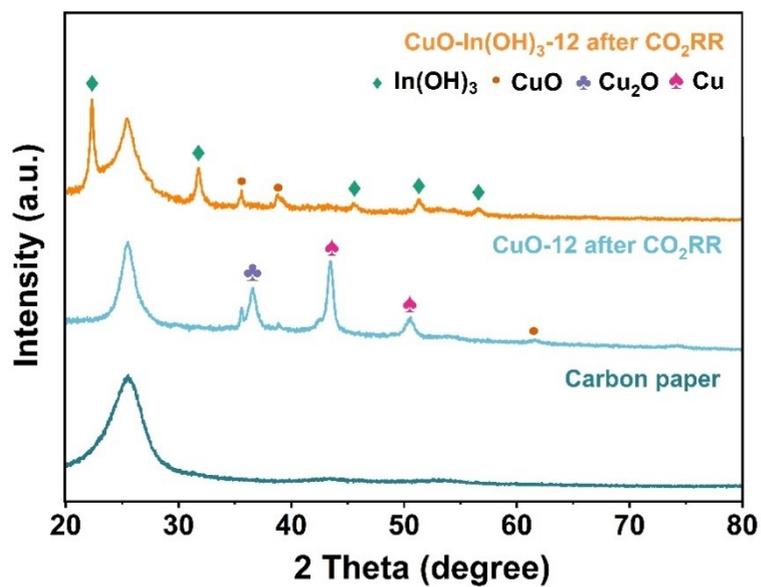
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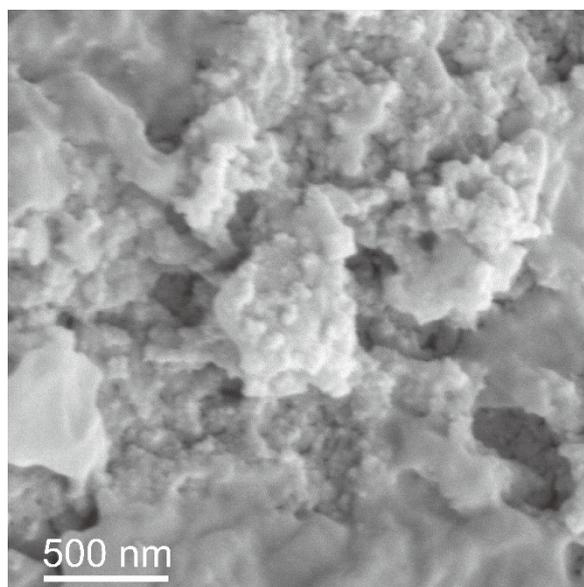
**Fig. S5.** Cyclic voltammograms measured in a non-Faradaic region of the voltammogram with the scan rates of 20, 40, 60, 80, and 100  $\text{mV s}^{-1}$  of (a)  $\text{CuO-In(OH)}_3\text{-11}$ , (b)  $\text{CuO-In(OH)}_3\text{-12}$  and (c)  $\text{CuO-In(OH)}_3\text{-13}$ .



**Fig. S6.** FEs from -1 to -1.4 V (vs. RHE) of (a)  $\text{In(OH)}_3\text{-11}$ , (b)  $\text{In(OH)}_3\text{-12}$ , (c)  $\text{In(OH)}_3\text{-13}$ , (e)  $\text{CuO-11}$ , (f)  $\text{CuO-12}$  and (c)  $\text{CuO-13}$ .



**Fig. S7.** XRD Characterization on CuO-In(OH)<sub>3</sub>-12 and CuO-12 after the stability test.



**Fig. S8.** SEM images of CuO-In(OH)<sub>3</sub>-12 after the stability test.

## Supplementary Table

**Table S1.** Reported ethylene Faradaic efficiencies of representative Cu-based catalysts for CO<sub>2</sub>RR.

Electrocatalyst	Potential (vs. RHE)	Electrolyte	Cell type	Current Density (mA cm <sup>-2</sup> )	C <sub>2</sub> Faradaic Efficiency (%)	Refs
Cu <sub>2</sub> /NC Dual-Atom Catalyst	-1.23 V	0.5M KHCO <sub>3</sub>	H cell	33.6	34.9	1
PtNi@Cu Ternary Alloy	-1.20 V	0.2 M KHCO <sub>3</sub> + 0.1 M NaOH	H cell	20	30.9	2
Cu-In-10s	-1.20V	0.5 M KHCO <sub>3</sub>	Gastight cell	10	30.0	3
Cu-Au NCAs	-1.00V	0.1 M KHCO <sub>3</sub>	H cell	8.5	43.2	4
Cu-Cu <sub>2</sub> O/rGO	-1.3 V	0.1 M KHCO <sub>3</sub>	Flow cell	-16	55.4	5
Cu-1TA catalyst	-0.85V	1 M KHCO <sub>3</sub>	Flow cell	340	43.54	6
Pd-Cu <sub>2</sub> O catalyst	-1.1V	0.5 M KHCO <sub>3</sub>	H cell	12	63.8	7
Cu <sub>90</sub> Ag <sub>10</sub>	2.2V	1 M KOH	single cell	42.7	33.26	8

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