Different Nanostructured CoP Microcubes Derivd from Metal Formate Frameworks with Enhanced Oxygen Evolution Reaction

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Materials: Cobalt (II) perchlorate hydrate, Cobalt(II) nitratehexahydrate ($Co(NO_3)_2 \cdot 6H_2O$, 98%) and sodiumhypophosphite ($NaH_2PO_2 \cdot H_2O$, 99%) were provided by Tianjin Yongsheng Fine Chemical Company. Anhydrous ethanol (CH_3CH_2OH, 99.7 wt%), Formic acid (HCOOH, 88wt%) and methylamine water solution (CH_3NH_2, 30wt%) were provided by Tianjin Zhiyuan Chemical Plants. Surfactant polyvinylpyrrolidone K30 (PVP K30) was purchased from Tokyo Chemical Industry Co.,Ltd. All materials were used as purchased without further purification.

Structural characterizations: The surfacial morphology and elemental composition of samples were examined by field-emission scanning electron microscopy (FESEM; Hitachi S-4800 microscope) attached with energy dispersive X-ray spectrometry (EDX). Powder X-ray diffraction (PXRD) texted by Bruker D8 advance diffractometer with Cu Ka radiation was used to analysize crystal phase and porous features of products. The Barrett-Emmett-Teller (BET) specific surface area was characterized on the Micromeritics ASAP 2050. Surfacial element states was measured using X-ray photoelectron spectroscopy (XPS) performed on Escalab 250 Xi systerm.

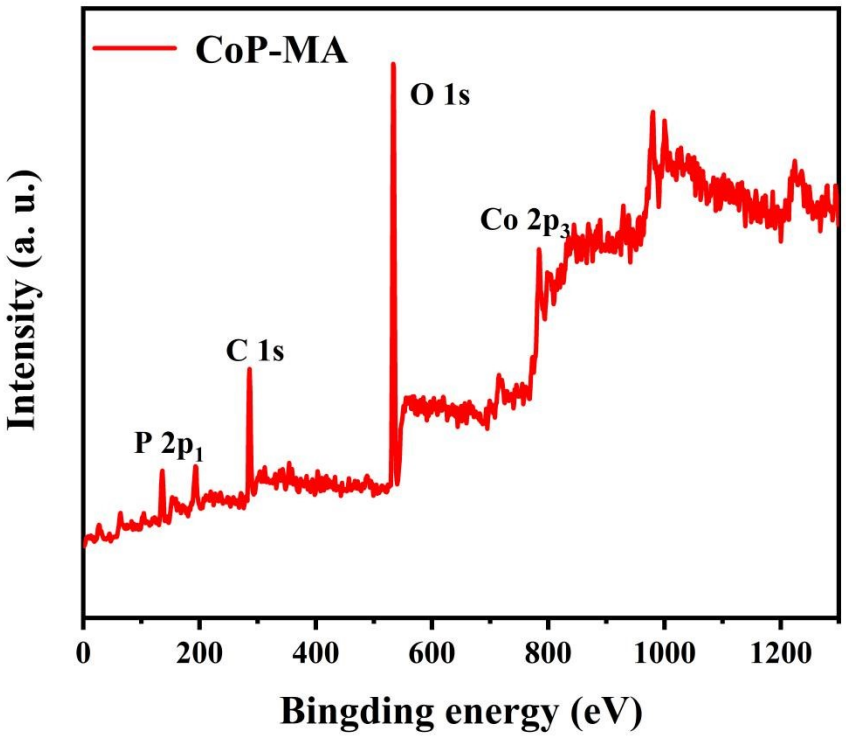

Figure S1. XPS survey spectra of CoP-GC.

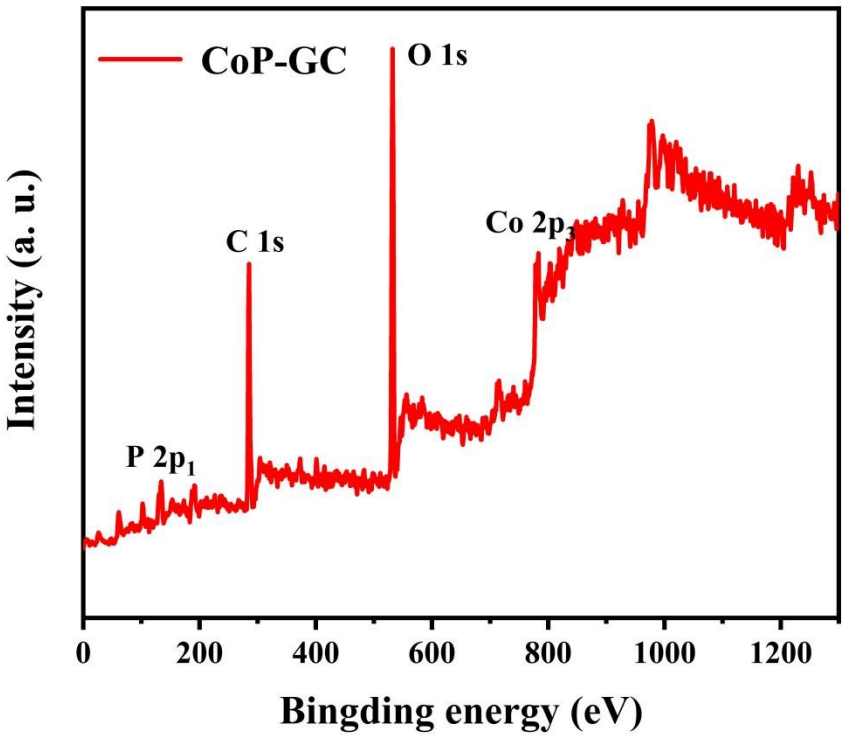

Figure S2. XPS survey spectra of CoP-MA

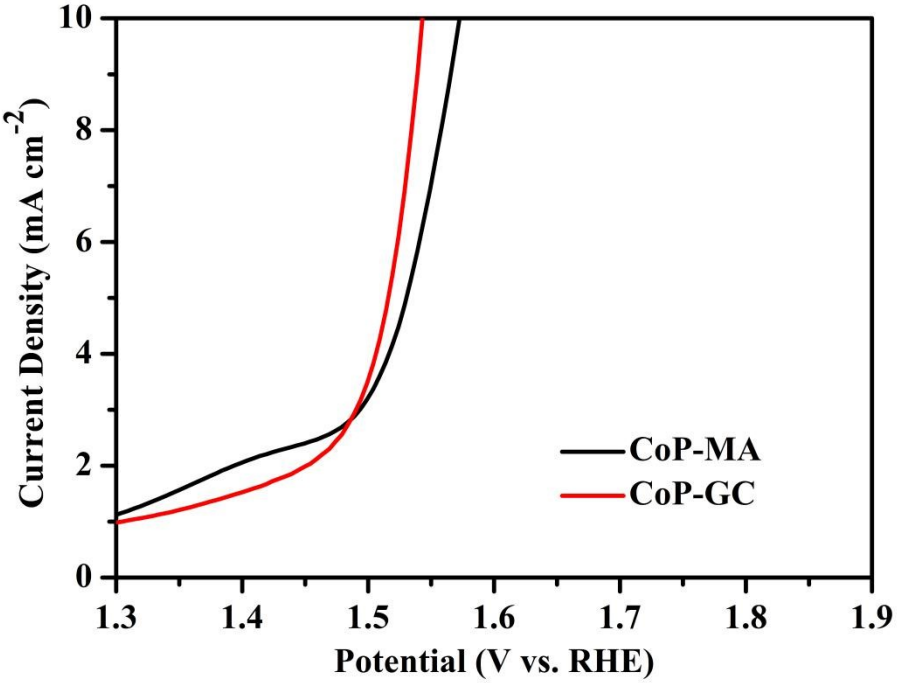

Figure S3. Polarization curves of CoP-MA and CoP-GC

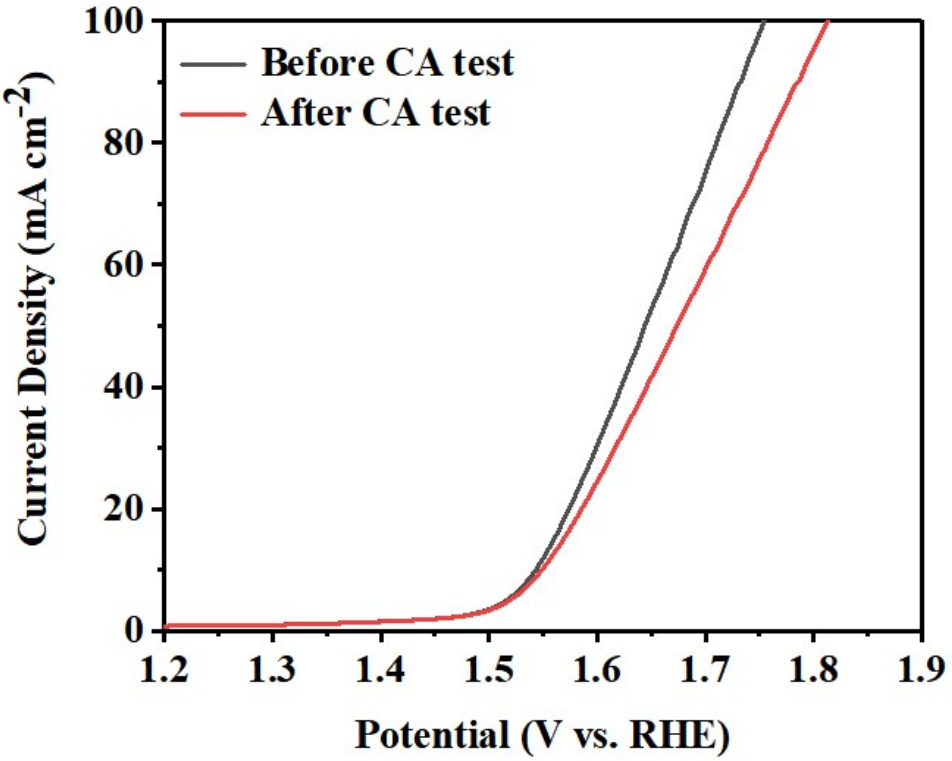

Figure S4. The LSV curve after CA test

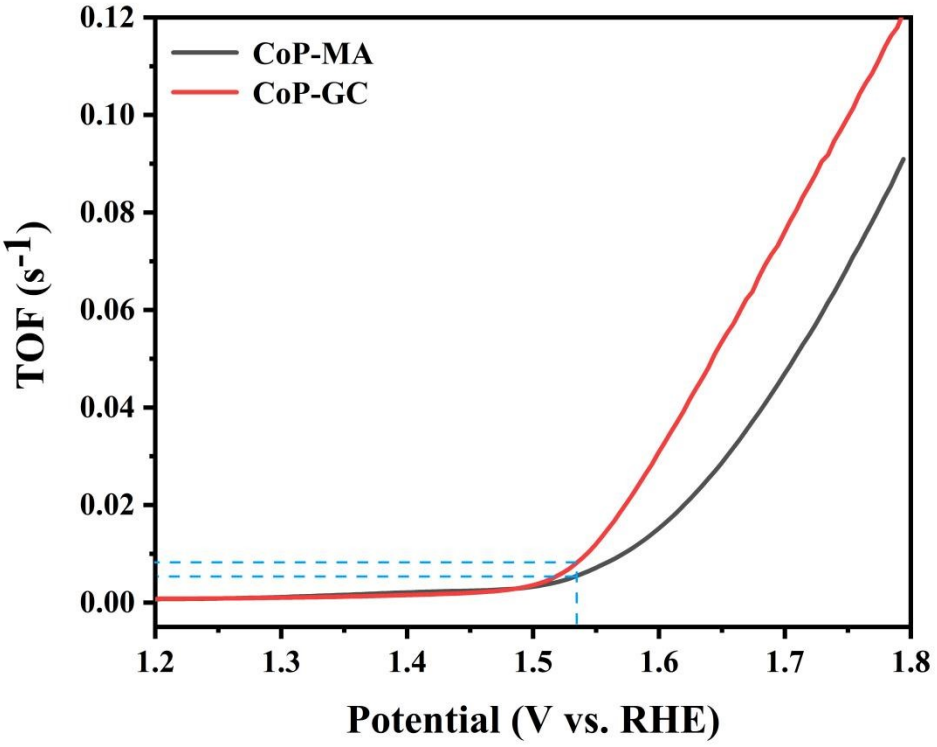

Figure S5. The turnover frequence of CoP-MA and CoP-GC

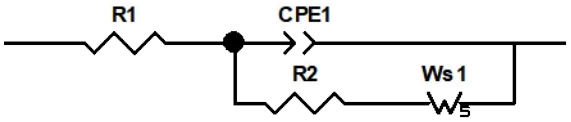

Figure S6. The equivalent-circuit diagram of CoP-GC electrodes for EIS measurement

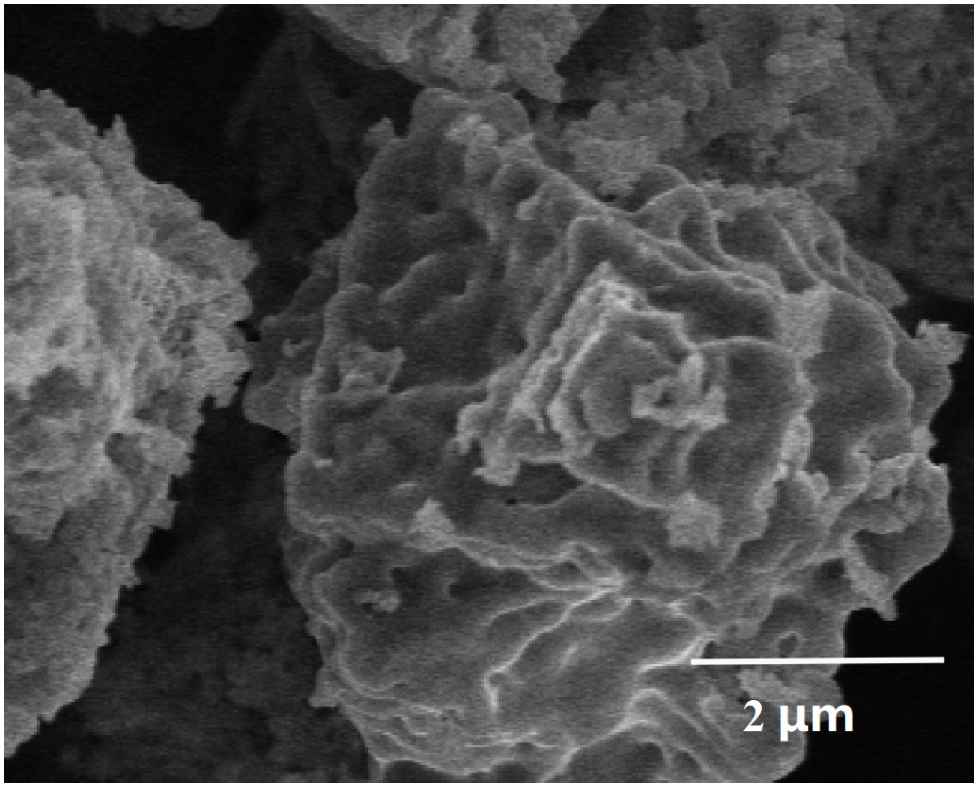

Figure S7. SEM image of CoP-GC after the CA test for OER

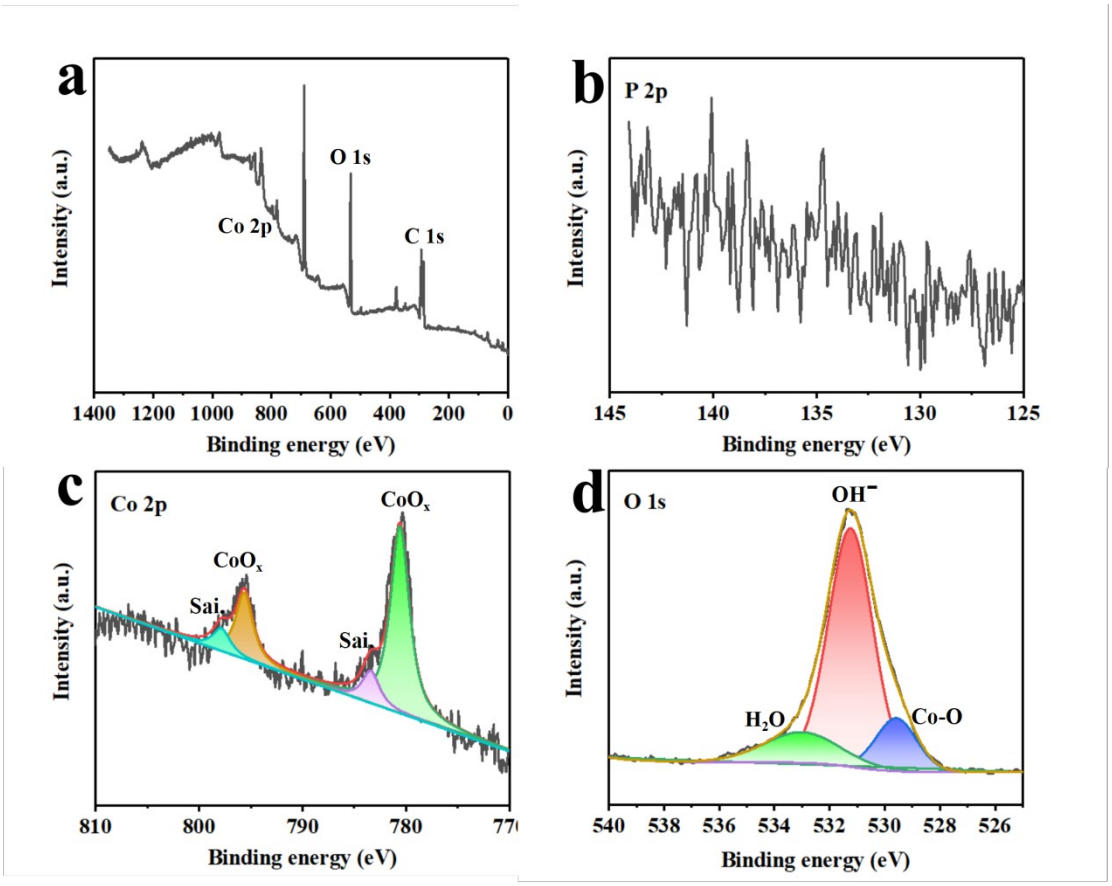

Figure S8. XPS spectra of survey spectra (a), P 2p (b), Co 2p (c) and O 1s (d) of the CoP-GC after the OER stability tests

Table S1. OER performances comparison of reported cobalt-based electrocatalysts in alkaline electrolyte.

Electrocatalyst	Electrolyte	Loading (mg cm^{-2})	Overpotential (mV)	Reference
CoP-MA CoP-GC	1 M KOH	0.25	340 310	This work
CoO_x-4h	1 M KOH	0.5	306	[1]
CoO-MoO_2 Nanocages	1 M KOH	0.5	312	[2]
CoP hollow polyhedron	1 M KOH	0.102	400	[3]
Needle-shaped Co_2P	1 M KOH	Not mention	310	[4]
Co_3FeP_xO	1 M KOH	Not mention	291	[5]
CoP-MNA	1 M KOH	6.2	290	[6]
CoP/NC	1 M KOH	0.57	343	[7]
hollow Fe-CoP prisms	1 M KOH	1	236	[8]
Fe-CoP nanocages	1 M KOH	Not mention	300	[9]
Fe-NiCoP	1 M KOH	Not mention	235	[10]
CoP_x@CNS/NF	1 M KOH	Not mention	289	[11]

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