Electronic Supplementary Material (ESI) for Inorganic Chemistry Frontiers.

Supplementary Information

Co-FeP hollow cube as advanced electrocatalyst for water oxidation

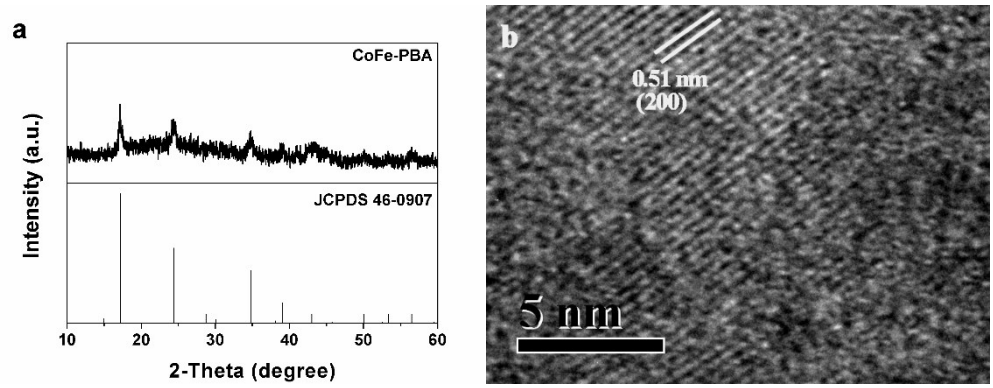

Fig. S1 (a) XRD pattern and (b) HRTEM of CoFe-PBA.

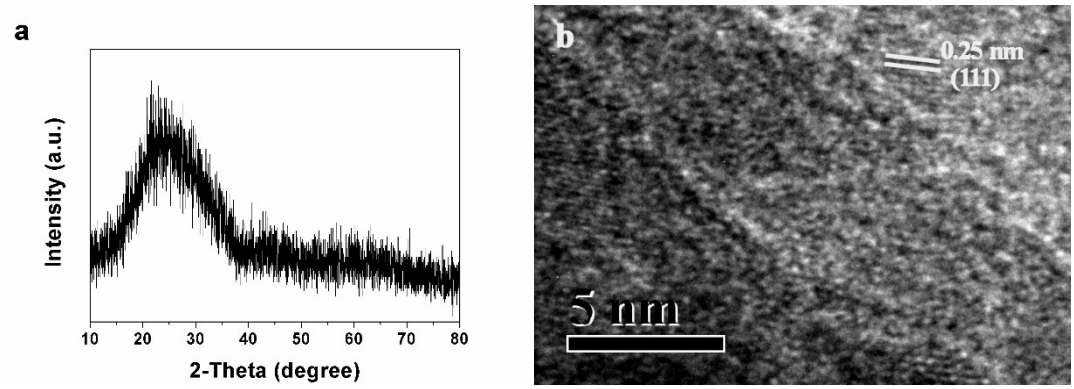

Fig. S2 (a) XRD pattern and (b) HRTEM of CoFeP multivoid nanocages.

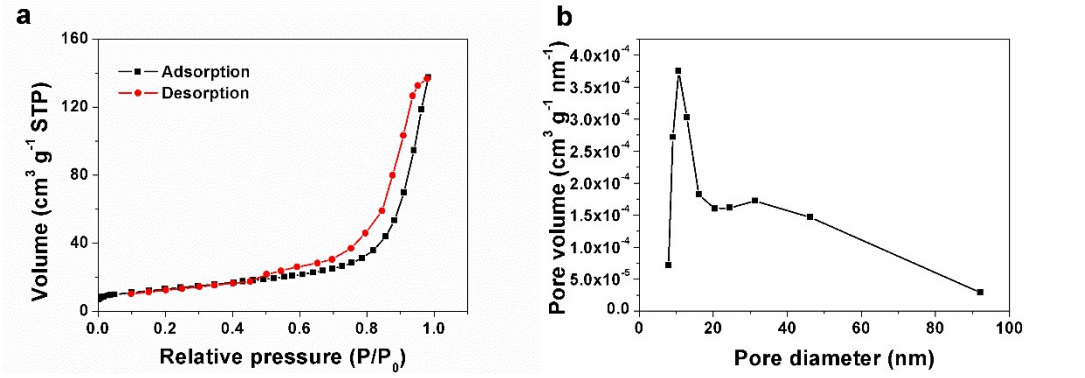

Fig. S3 (a) N_2 adsorption/desorption isotherms recorded for porous CoFeP multivoid nanocages and (b) the corresponding pore size distribution. N_2 adsorption/desorption isotherms of CoFeP nanocages

are obtained from Micromeritics Co. Ltd., Tristar. The total surface area is measured with the multipoint Brunauer-Emmett-Teller (BET) method. Firstly, V_m is determined based on the following equation: (1) $P/V(P_0-P) = 1/CV_m + (C-1)/CV_m \times (P/P_o)$, where V_m corresponds to the saturated adsorption capacity of monolayer N_2, P corresponds to the measured vapor pressure of N_2, P_0 corresponds to the saturated vapor pressure of N_2, V corresponds to the measured adsorption capacity of N_2, and C is a constant. The BET surface area is calculated with the following equation: (2) $S_g = A_m \times N_A \times (V_m/22414) \times 10^{-18}$ (m^2 g), where S_g corresponds to the BET surface area, A_m corresponds to the surface area of single N_2 molecular, and N_A is the Avogadro constant.

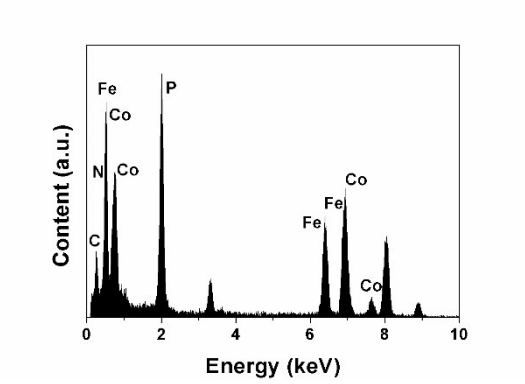

Fig. S4 EDX spectrum of CoFeP multivoid nanocages. The atomic ratio between Co and Fe is 1.5, which agrees with the theoretical value of CoFe-PBA precursor.

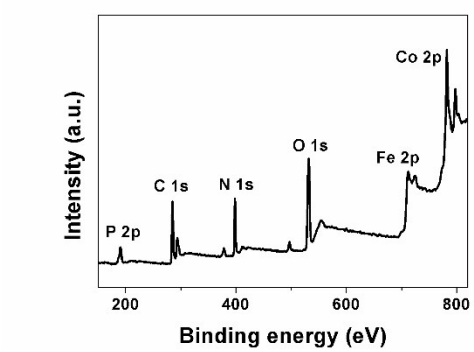

Fig. S5 Survey XPS spectrum of CoFeP multivoid nanocages. The atomic ratio of Co and Fe is determined to be about 3:2, which is calculated based on the total peak area ratio between Co 2p and Fe 2p.

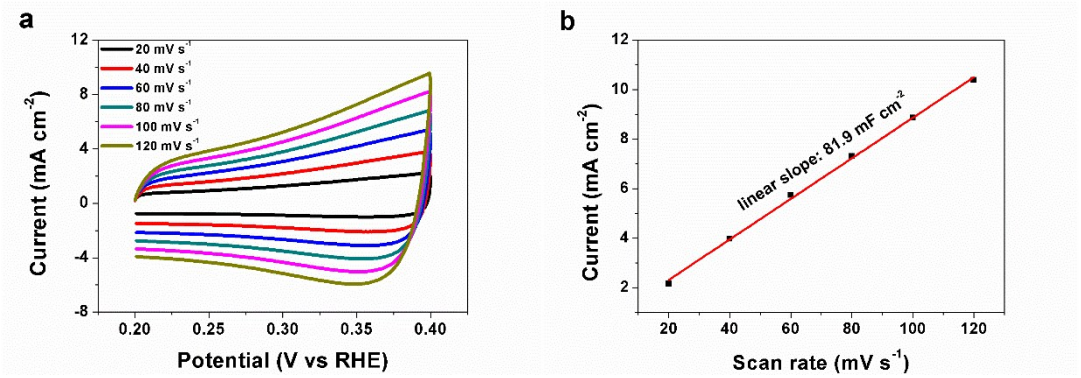

Fig. S6 (a) Cyclic voltammogram (CV) curves of CoFeP multivoid nanocages at different scan rates. (b) The capacitive currents as a function of scan rate for CoFeP multivoid nanocages.

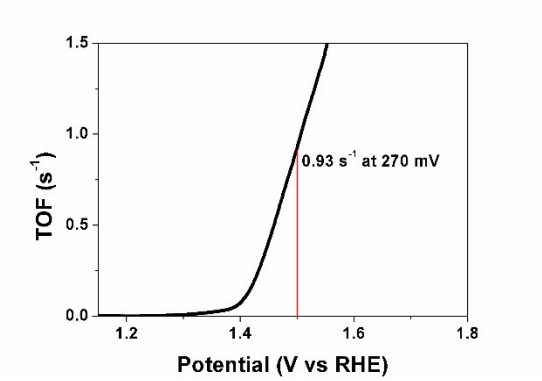

Fig. S7 The TOF values of CoFeP multivoid nanocages as a function of potential.

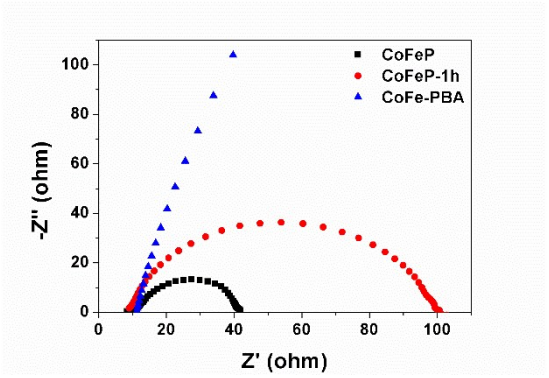

Fig. S8 Nyquist plots of CoFeP multivoid nanocages, CoFeP obtained via phosphorization process of 1h, and CoFe-PBA.

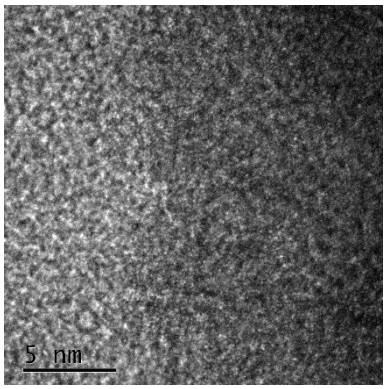

Fig. S9 TEM images of CoFeP after OER test.

Table S1 Comparison of the OER electrocatalytic parameters between the present CoFeP multivoid nanocages with reported metal phosphides electrocatalysts and the PBA derived OER catalysts in alkaline media. (η_{10}: Overpotentials at a current density of 10 mA cm^{-2}.)

Smaples	Overpotential/η_{10} (mV)	Tafel (mV dec^{-1})	Ref./Year
CoFeP nanocages	180	55	This work
NiP nanoplate/C	300	64	[1]/2016
CoP nanorod/C	320	71	[2]/2015
Co-Pi/CoP/Ti	310	58	[3]/2017
Ni_2P/Ni/Ni foam	200	72	[4]2016
CoP@GC	345	56	[5]/2016
Ni_8P_3/Ni foam	270/η_{30}	73.2	[6]/2016
R-Co_xP/rGO	268	103	[7]/2018
MoP/NiP/Ni foam	309/η_{20}	80.3	[8]/2017
$Co_{0.7}Fe_{0.3}P$/CNT	243	57	[9]/2017
Ni_2P-CoP/N-rGO	310/η_{40}	53	[10]/2018
$Ni_{2-x}Co_xP$	270	45.2	[11]/2016
NiCoP/Ni foam	280	87	[12]/2016
$Co_{2-x}Rh_xP$	290	31	[13]/2018
$Co_{1-x}Ni_xP_3$/CC	221/η_{20}	83.7	[14]/2018
FeNiP nanoplates/NF	180	76	[15]/2017
$CoSe_2$	330	79	[16]/2017
Hollow FeCoP	252	33	[17]/2018
$Ni_{0.6}Co_{1.4}P$ nanocages	300	80	[18]/2018
NiCoP/C nanobox	330	96	[19]/2017
Ni_2P-CoP	320	64	[20]/2017
CoFeO frames	290	62	[21]/2018
FeNi@NC-NG	270	72	[22]/2018
NiCoFe-PBA	320	49	[23]/2018
NiFeSe nanocages	240	24	[24]/2017
NiFeP nanocubes	271	53	[25]/2017
$(Ni_xFe_{1-x})_2P$ nanocubes	290	44	[26]/2017
NiCoO cages	380	50	[27]/2016

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