

Supporting Information

Low-Temperature Phosphidation Synthesis of Flower-like Ru-CoVO-P Polymetallic Catalyst for Enhanced Overall Water Splitting in Alkaline and Seawater

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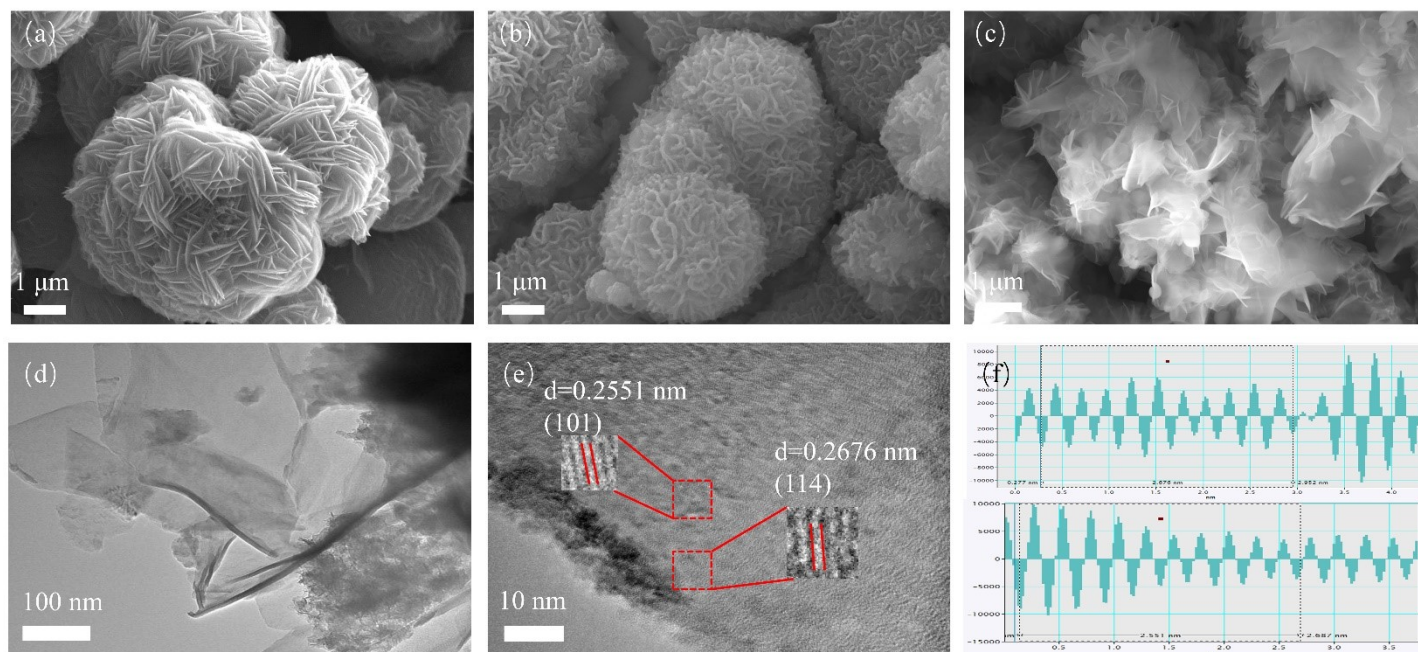


Figure S1 SEM images of the prepared samples (a) SEM images of CoVO (b) SEM images of Ru-CoVO-2 (c) SEM images of Ru-CoVO-1 (d) TEM images of Ru-CoVO-P samples (e) HRTEM image of Ru-CoVO-P (f) Crystal face spacing diagram

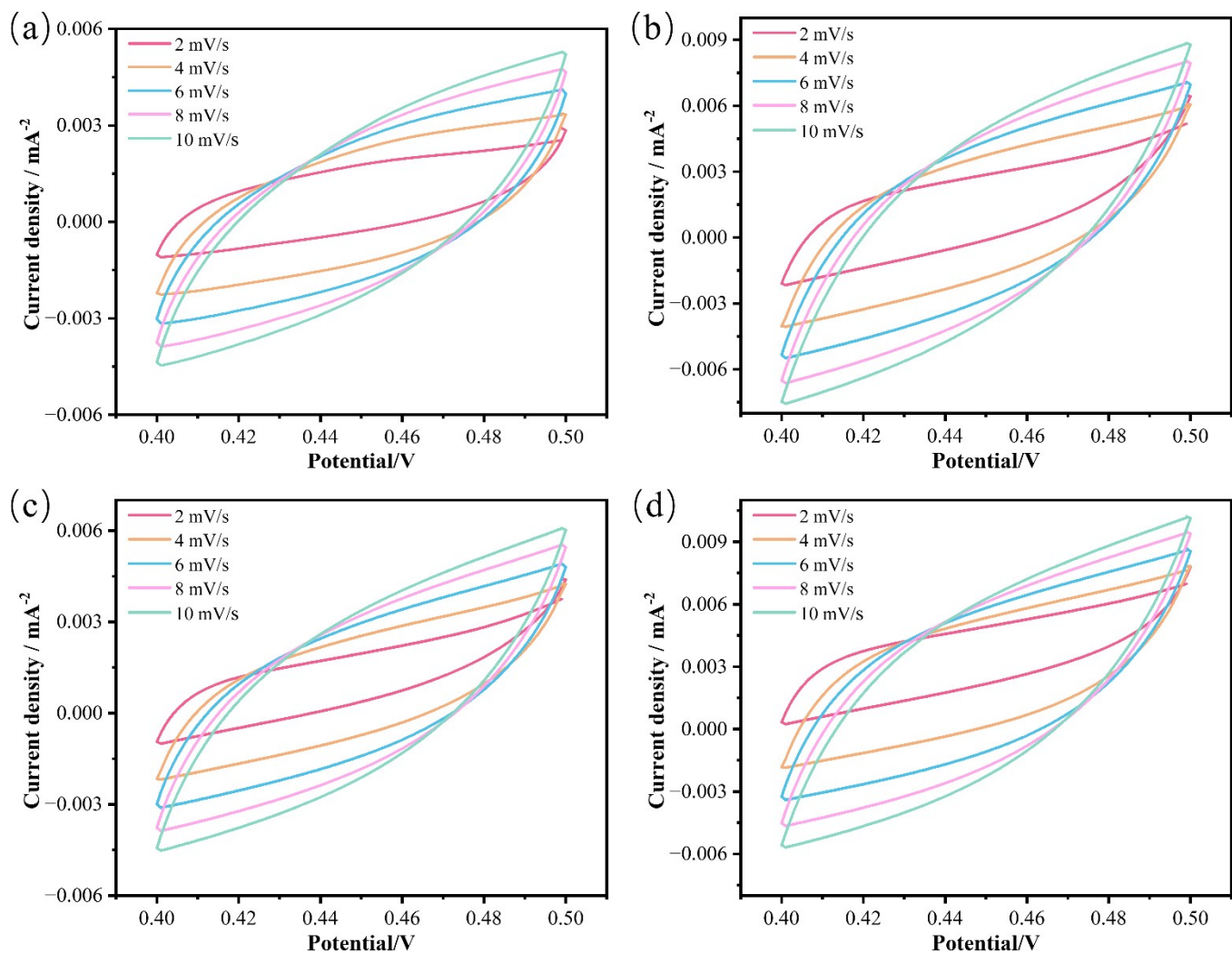


Figure S2 CV curves of OER of the as-obtained samples in KOH solutions;(a) curves of CoVO (b) curves of Ru-CoVO-2 (c) curves of Ru-CoVO-1 (d) curves of Ru-CoVO-P.

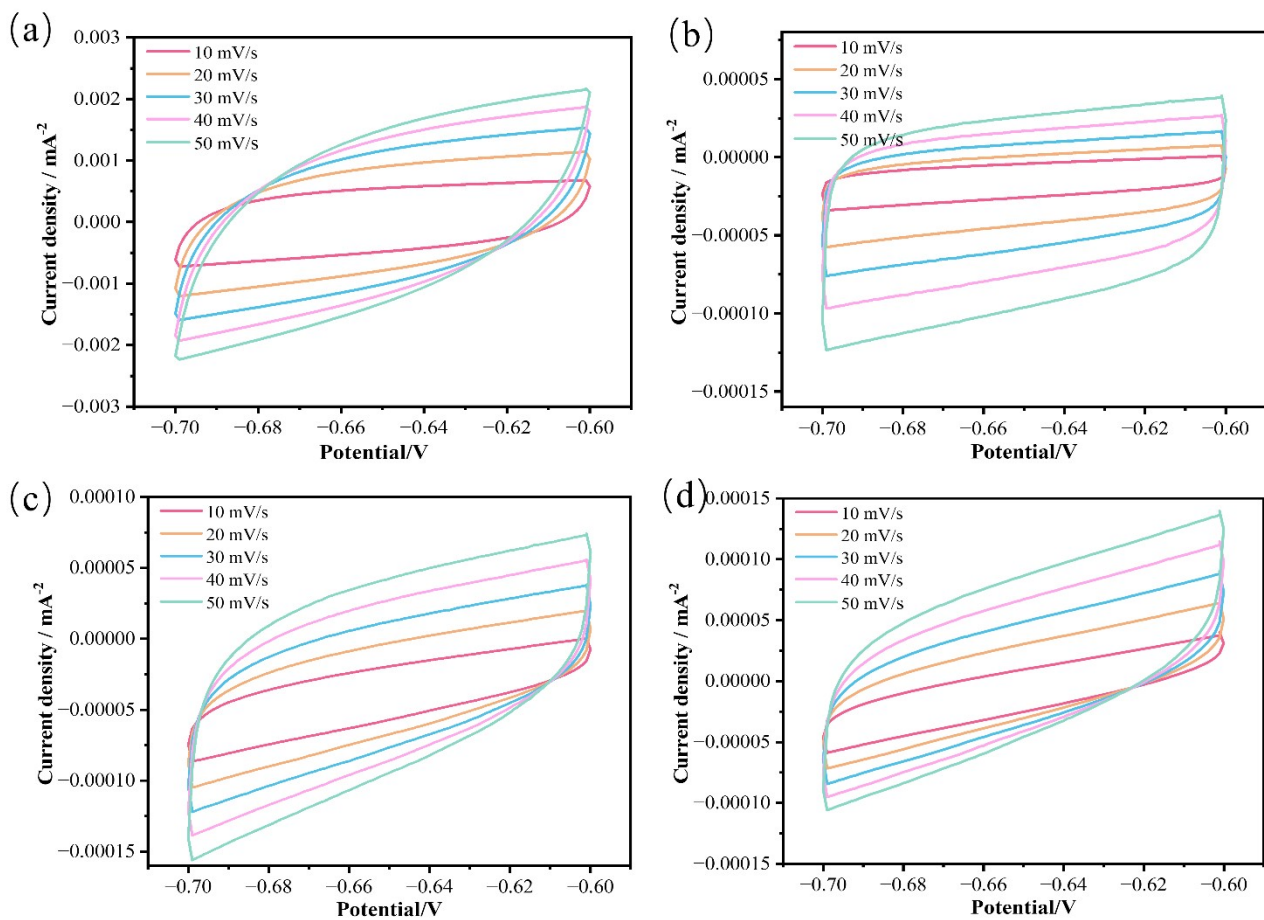


Figure S3 CV curves of HER of the as-obtained samples in KOH solutions; (a) curves of CoVO (b) curves of Ru-CoVO-2 (c) curves of Ru-CoVO-1 (d) curves of Ru-CoVO-P.

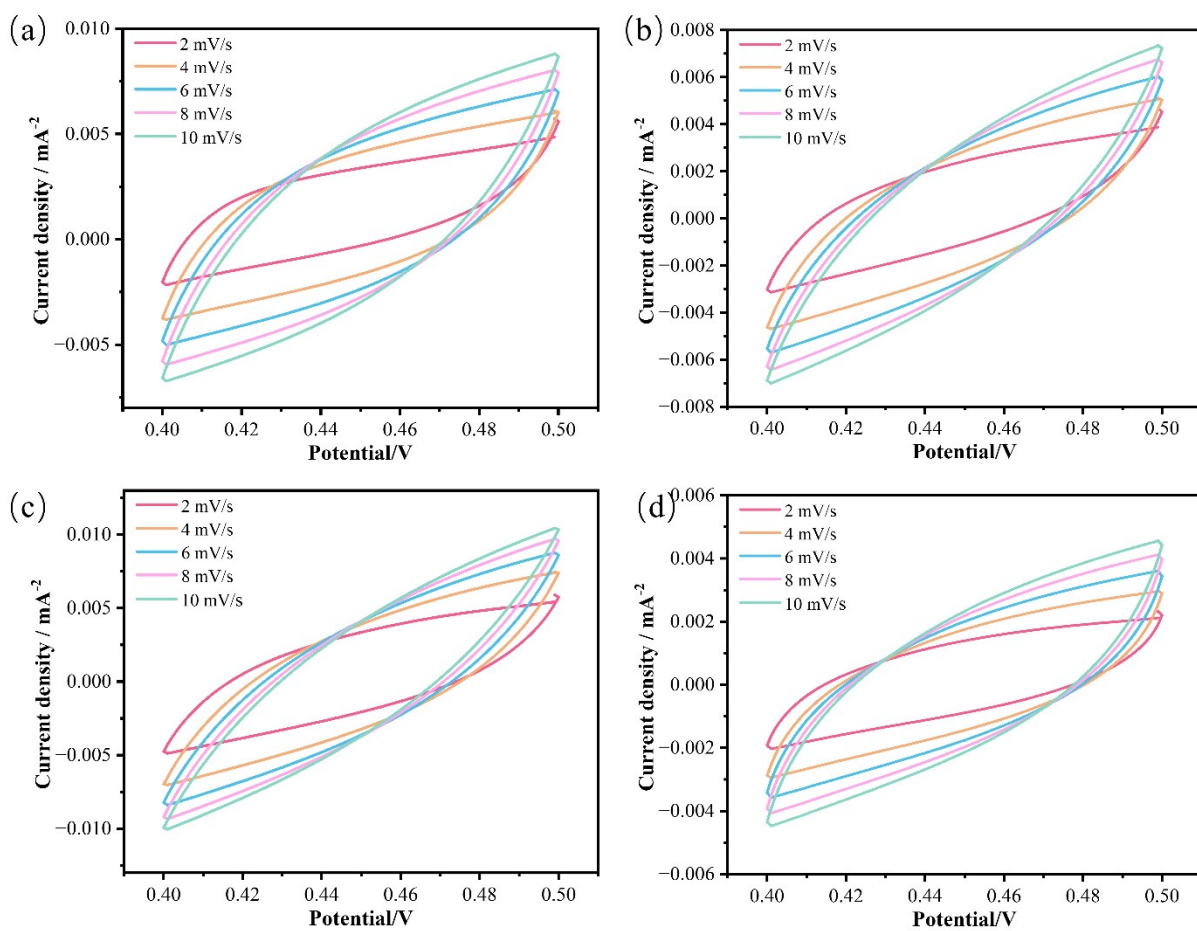


Figure S4 CV curves of OER of the as-obtained samples in seawater; (a) curves of CoVO (b) curves of Ru-CoVO-2 (c) curves of Ru-CoVO-1 (d) curves of Ru-CoVO-P.

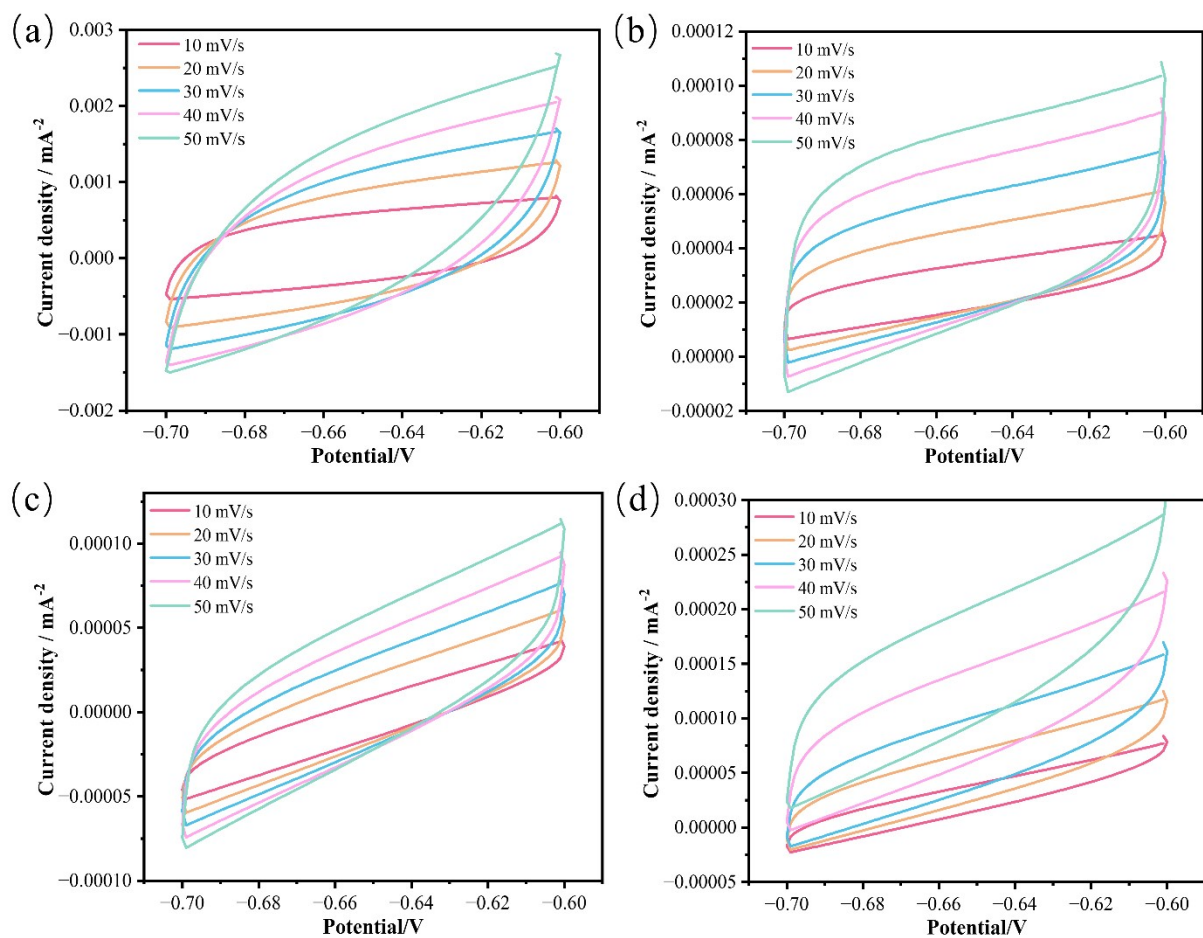


Figure S5 CV curves of HER of the as-obtained samples in seawater; (a) curves of CoVO (b) curves of Ru-CoVO-2 (c) curves of Ru-CoVO-1 (d) curves of Ru-CoVO-P.

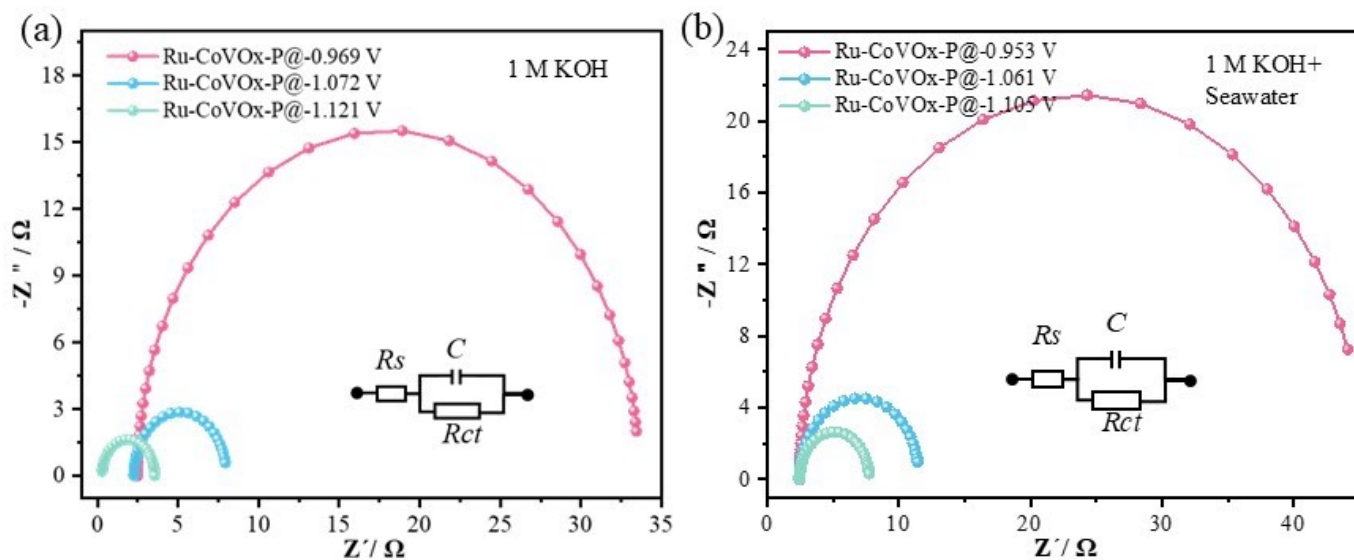


Figure S6 Nyquist plots: (a) Ru-CoVO-P in 1 M KOH, and (b) Ru-CoVO-P in 1 M KOH + seawater, measured at different overpotentials.

Table S1 EIS fitting results of the as-prepared samples.

1 M KOH-OER (Figure 3e)		
Catalysts	R_s/Ω	R_{ct}/Ω
Ru-CoVO-P	3.674	21.72
Ru-CoVO-1	3.523	29.86
Ru-CoVO-2	3.339	31.13
CoVO	3.715	29.42

Table S2 EIS fitting results of the as-prepared samples.

Seawater-OER (Figure 6e)		
Catalysts	R_s/Ω	R_{ct}/Ω
Ru-CoVO-P	2.92	11.66
Ru-CoVO-1	3	12.86
Ru-CoVO-2	2.751	13.44
CoVO	2.914	17.6

Table S3 EIS fitting results of the as-prepared samples.

1 M KOH-HER (Figure S6a)		
Catalysts	R_s/Ω	R_{ct}/Ω
Ru-CoVO-P@-0.969 V	2.483	31.09
Ru-CoVO-P@-1.072 V	2.27	5.718
Ru-CoVO-P@-1.121 V	0.281	3.271

Table S4 EIS fitting results of the as-prepared samples.

Seawater-HER (Figure S6b)		
Catalysts	R_s/Ω	R_{ct}/Ω
Ru-CoVO-P@-0.953 V	2.473	42.9
Ru-CoVO-P@-1.061 V	2.457	9.093
Ru-CoVO-P@-1.105 V	2.447	5.305

Supplementary Video S1. Dynamic process of bubble evolution and detachment on the Ru-CoVO-P catalyst surface during electrochemical water splitting.