Supporting Information

Interface-Engineered ZnS QDs@HKUST-1 Composite for Electrochemical Overall Water Splitting

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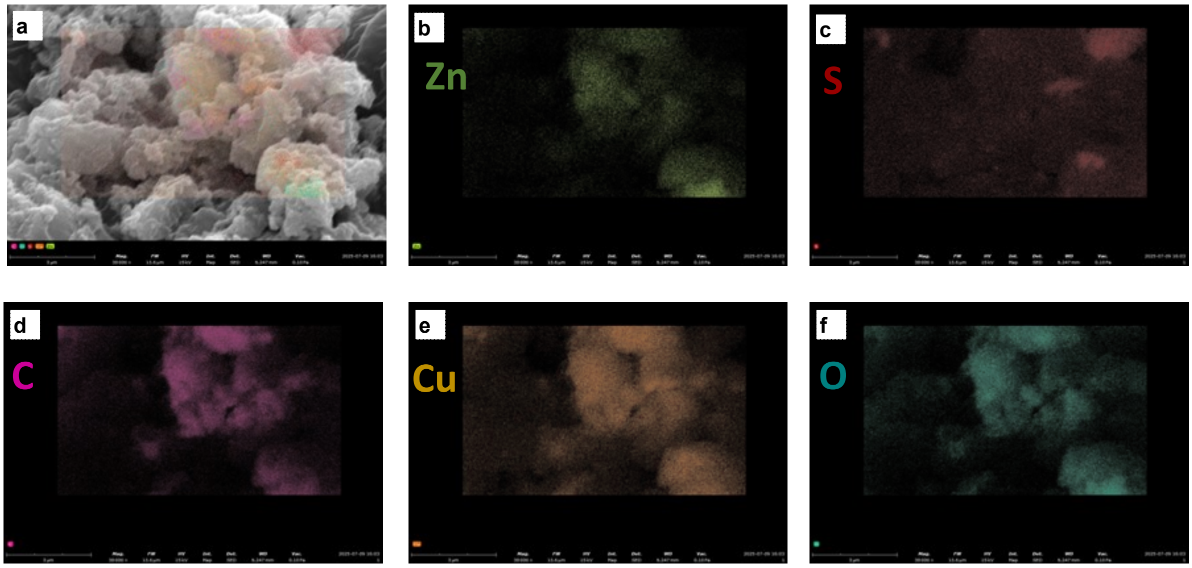

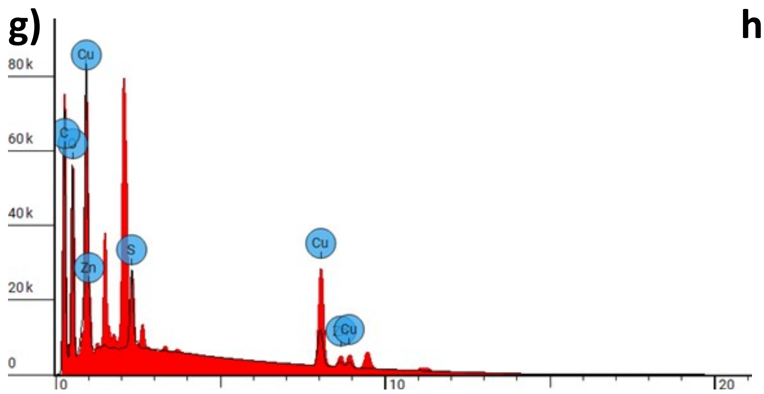

h)

	Element Symbol	Atomic Conc. [%]
	C	55.33
	O	28.17
	S	3.28
	Cu	8.79
	Zn	4.43

Fig. 1 (a) FESEM-EDS image of ZQH-1 (b-f) displays the elemental mapping images of distribution of Zn, S, C, Cu, O respectively, (g) Energy dispersive spectrum of ZQH-1, (h) the EDS spectrum showing the percentage of chemical elements present.

Table S1: ICP-OES elemental analysis of ZQH-1 showing the concentration of key elements (in ppm).

Element	ZQH-1
Mn	0.001 ppm
Ba	0.009 ppm
B	0.011 ppm
Co	0.001 ppm
Cu	39.743 ppm

Pb	0.041 ppm
Mn	0.001 ppm
Ni	0.006 ppm
Zn	20.663 ppm

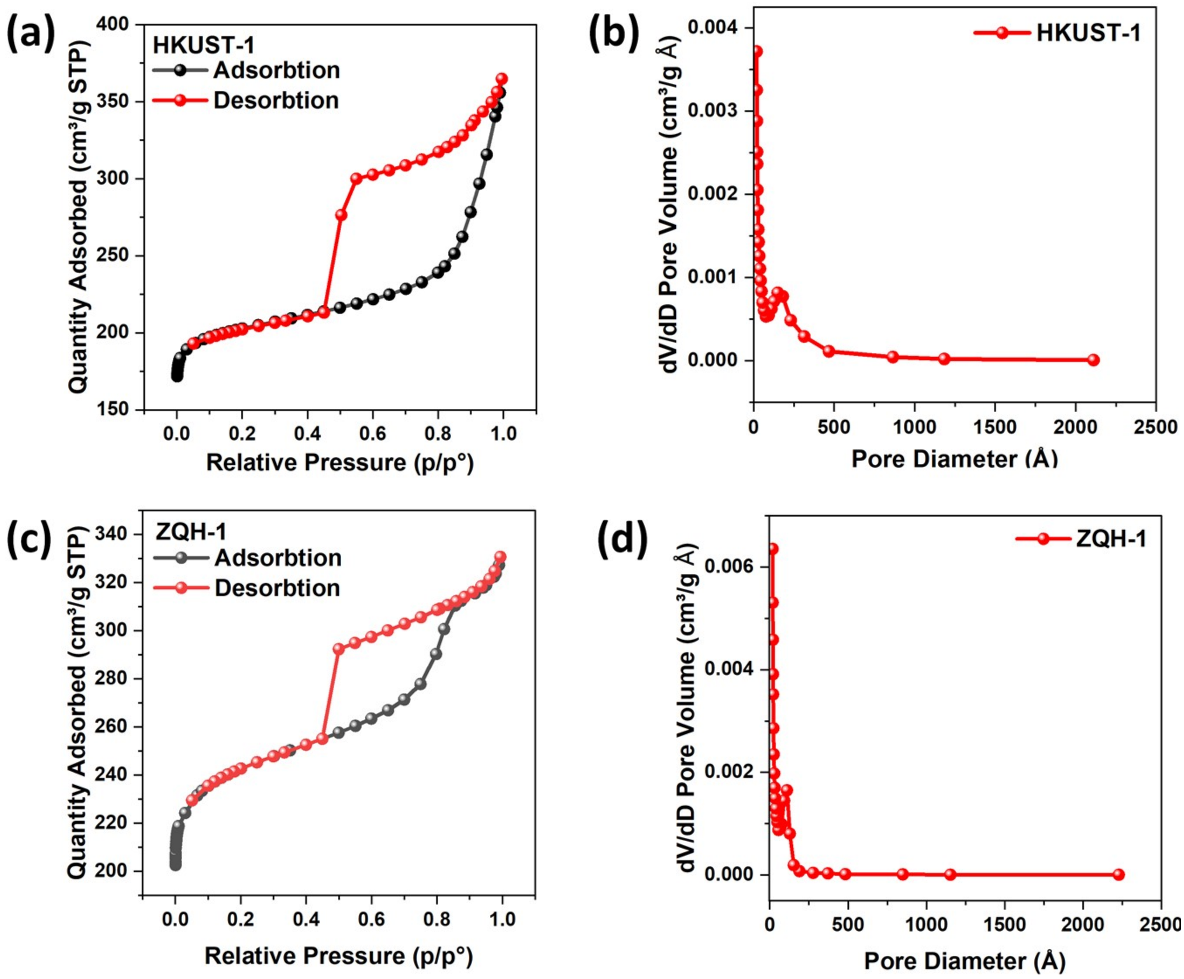

Fig. 2 N_2 adsorption-desorption isotherms with the corresponding BJH pore size distributions for (a-b) HKUST-1 and (c-d) ZQH-1.

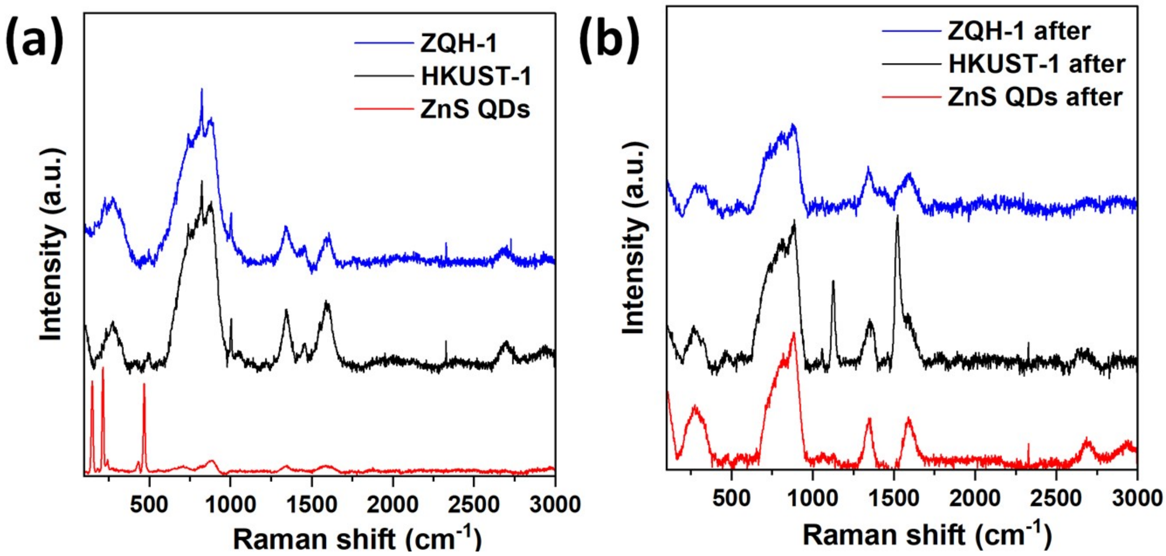

Fig. 3 Raman spectra of HKUST-1, ZnS QDs and ZQH-1 (a) Before (b) After stability.

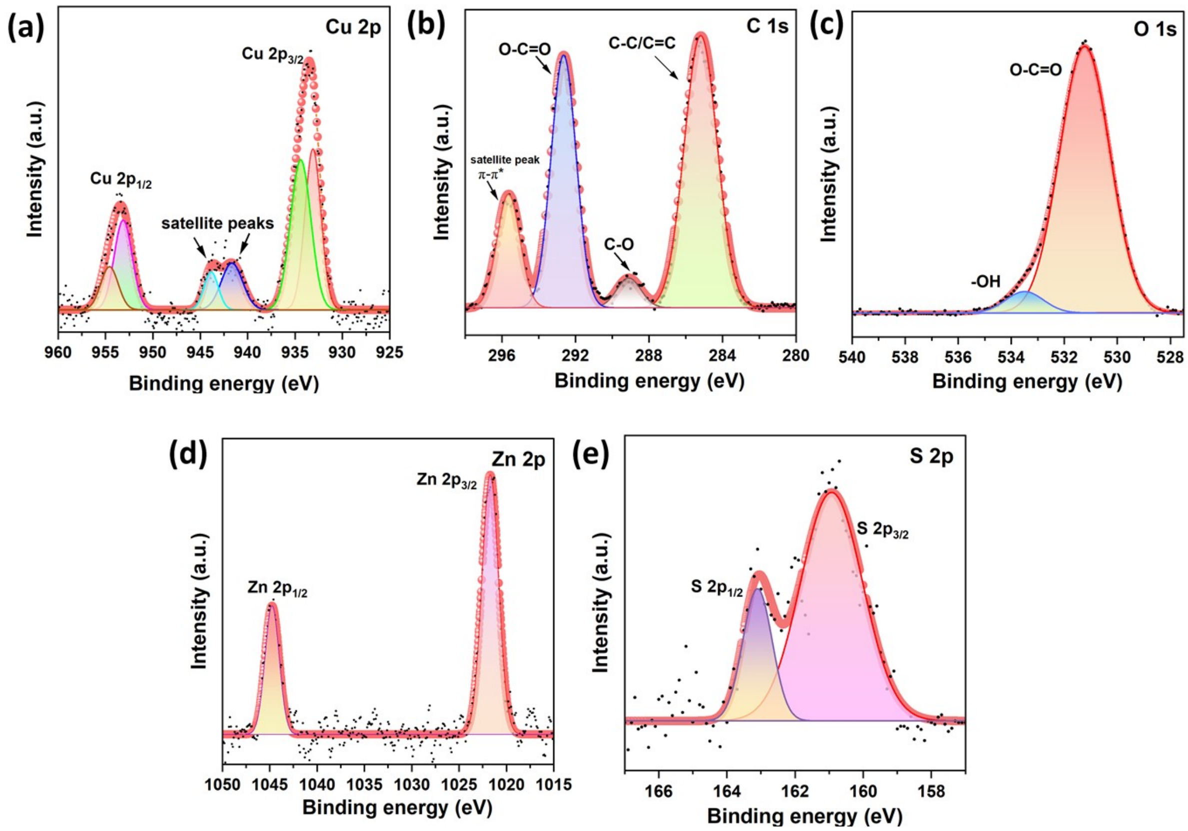

Fig. 4 High resolution XPS spectra of (b) Zn 2p, (c) S 2p, (d) C 1s (e) Cu 2p and (f) O 1s of ZQH-1 composite post stability.

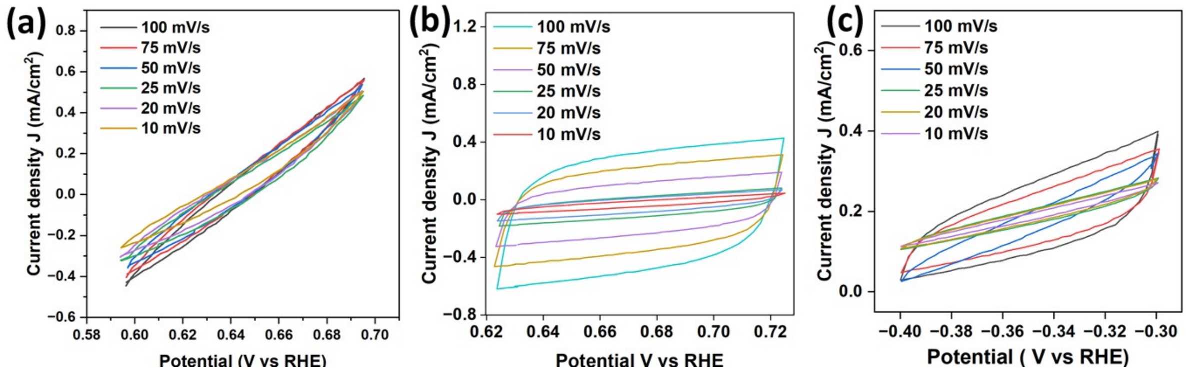

Fig. 5 CV at different scan rates in 1M KOH of (a) HKUST-1 (b) ZnS QDs (c) ZQH-1.

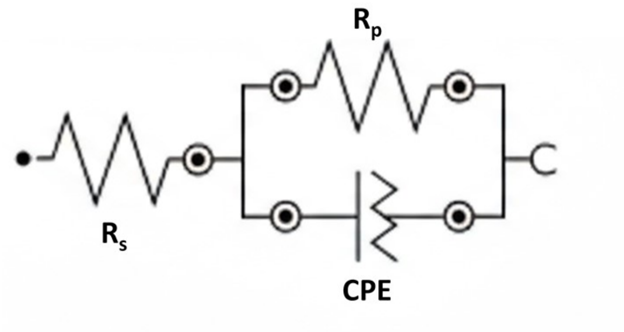

Fig. 6 Equivalent circuit of ZQH-1 calculated from the Nyquist plot.

An electrical equivalent circuit is drawn with electrical elements in Figure S3. We found from the Nyquist plot that the equivalent circuit is the R_s R_{ct} CPE circuit, where R_s = resistance of the solution, R_{ct} = charge-transfer resistance, and CPE = constant phase element were obtained from the fittings.

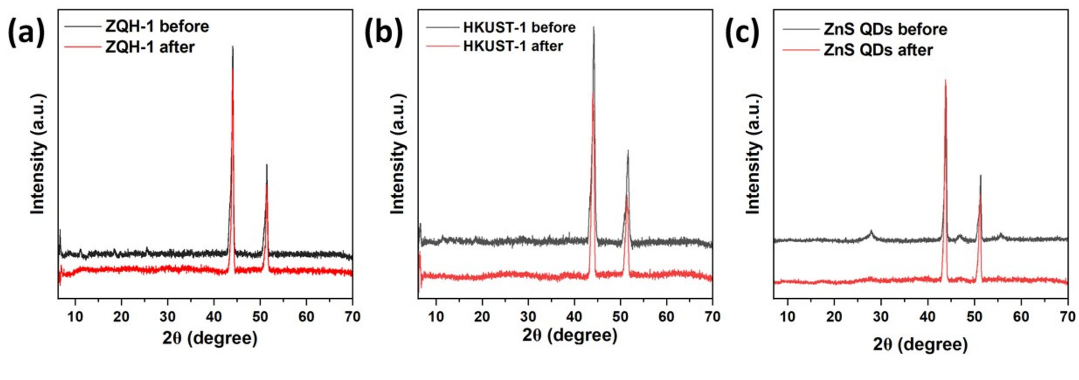

Fig. 7 PXRD patterns of (a) ZQH-1, (b) HKUST-1, and (c) ZnS QDs before and after post-stability.

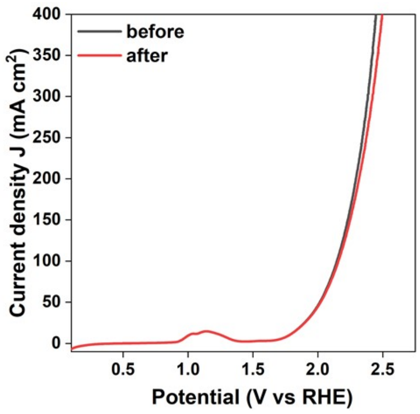

Fig. 8 LSV curve of ZQH-1 composite before and after 36h of stability.

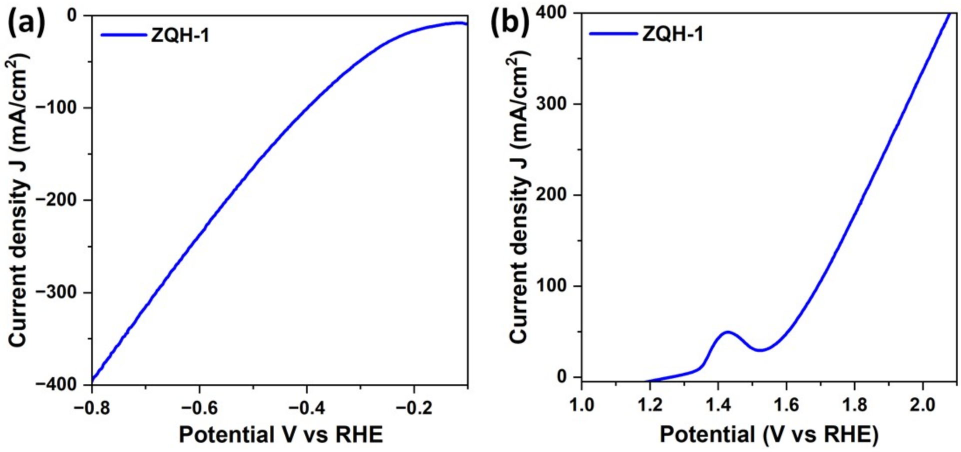

Fig. 9 LSV curve (non-iR-corrected) of ZQH-1 composite (a) HER and (b) OER.

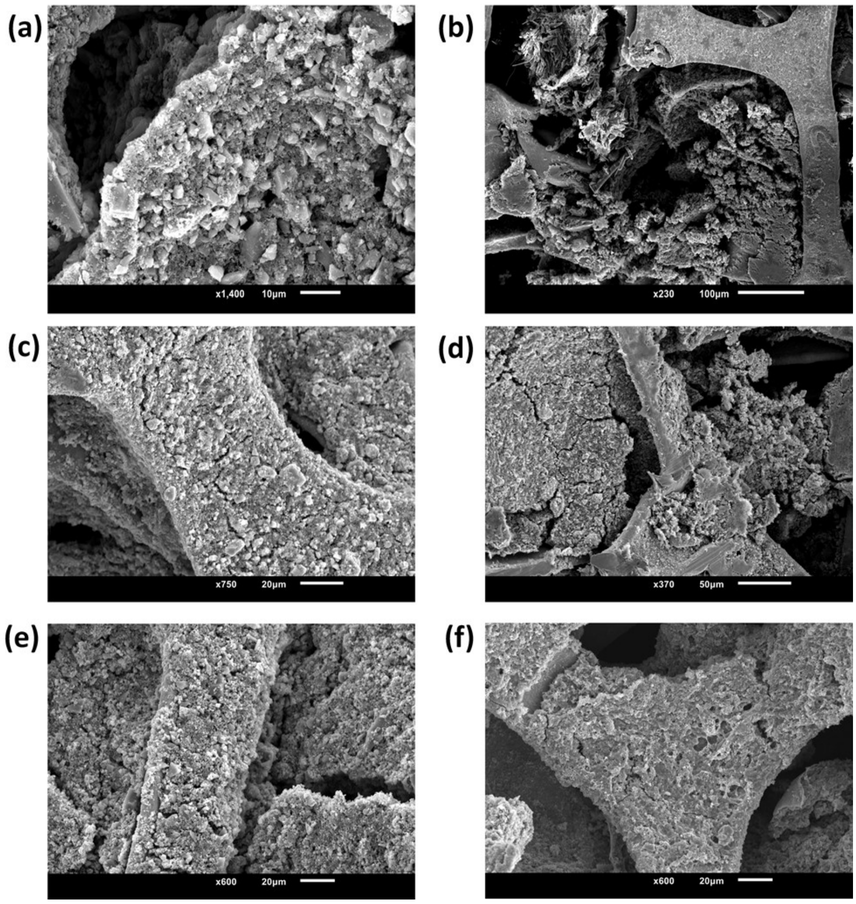

Fig. 10 SEM images of (a) MOF before (b) MOF after (c) ZnS QDs Before (d) Zns QDs after (e) ZQH-1 before (f) ZQH-1 after stability.

Table S2: Comparison with similar MOF/QDs composites, high-performance non-precious metal catalysts, and commercial precious metal catalysts.

Sr.no	Material	Electrolyte	Overpotential @ 10 mA/cm^2	Ref.
1.	Carbon dots @ Ni-BTC-bpy MOF	1M KOH	320 mV (OER)	[1]
2.	ZnS QDs@Dy-MOF	1M KOH	228 mV (HER) and 138 mV (OER)	[2]
3.	Carbon QD@ Ni-Fe-TDC MOF	1M KOH	222 mV (OER)	[3]
4.	NiFe-LDH	1M KOH	223 mV (OER)	[4]
5.	CuFe composite	1M KOH	218 mV (HER) and 158 mV (OER)	[5]

6.	Fe-doped Co_3O_4 nanoflake	1M KOH	196 mV (HER) and 290 mV (OER)	6
7.	Comm. Pt/C	0.5M H_2SO_4	22 mV (HER)	7
8.	Ru/Co-N-C catalyst	1M KOH	247 mV (OER)	8
9.	IrO_2-N-rGO	0.5M H_2SO_4	430 mV (OER)	9
10.	IrO_2-RuO_2/C	1M KOH	270 mV (OER)	10
11.	**ZQH-1**	**1M KOH**	**106 mV (OER) and 140 mV (HER)**	**This work**

Table S3: Comparison of HER OER overpotential of reported Cu-MOF and ZnS QDs based electrocatalyst.

Sr.no	Material	Electrolyte	Overpotential @ 10 mA/cm^2	Ref.
1.	Nanowires CuO	1M KOH	430 mV (OER)	11
2.	CF/Cu_3P	0.5 M H_2SO_4	170 mV(HER)	12
3.	{$Cu_2SiW_{12}O_{40}$}@HKUST-1	1M KOH	340 mV (OER)	13
4.	Cu_3P/C-300	1M KOH	233 mV (OER)	14
5.	CuZn-BTC-250	1M KOH	253 mV (OER)	15
6.	POM@ZnCoS/NF	1M KOH	170 mV (OER) and 200 mV (HER)	16
7.	CuO@UiO-66	1M KOH	220 mV (HER)	17
8.	CoZn-S/Cu-F	1M KOH	170 mV (OER)	18
9.	Co-MOF/ZnS	1M KOH	434 mV (HER)	19
10.	**ZQH-1**	**1M KOH**	**106 mV (OER) and 140 mV (HER)**	**This work**

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