Electronic Supplementary Material (ESI) for Inorganic Chemistry Frontiers.

Supporting information

Interface-engineered urchin-like CoFe-layered double hydroxide for high-efficiency electrocatalytic oxygen evolution

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Results

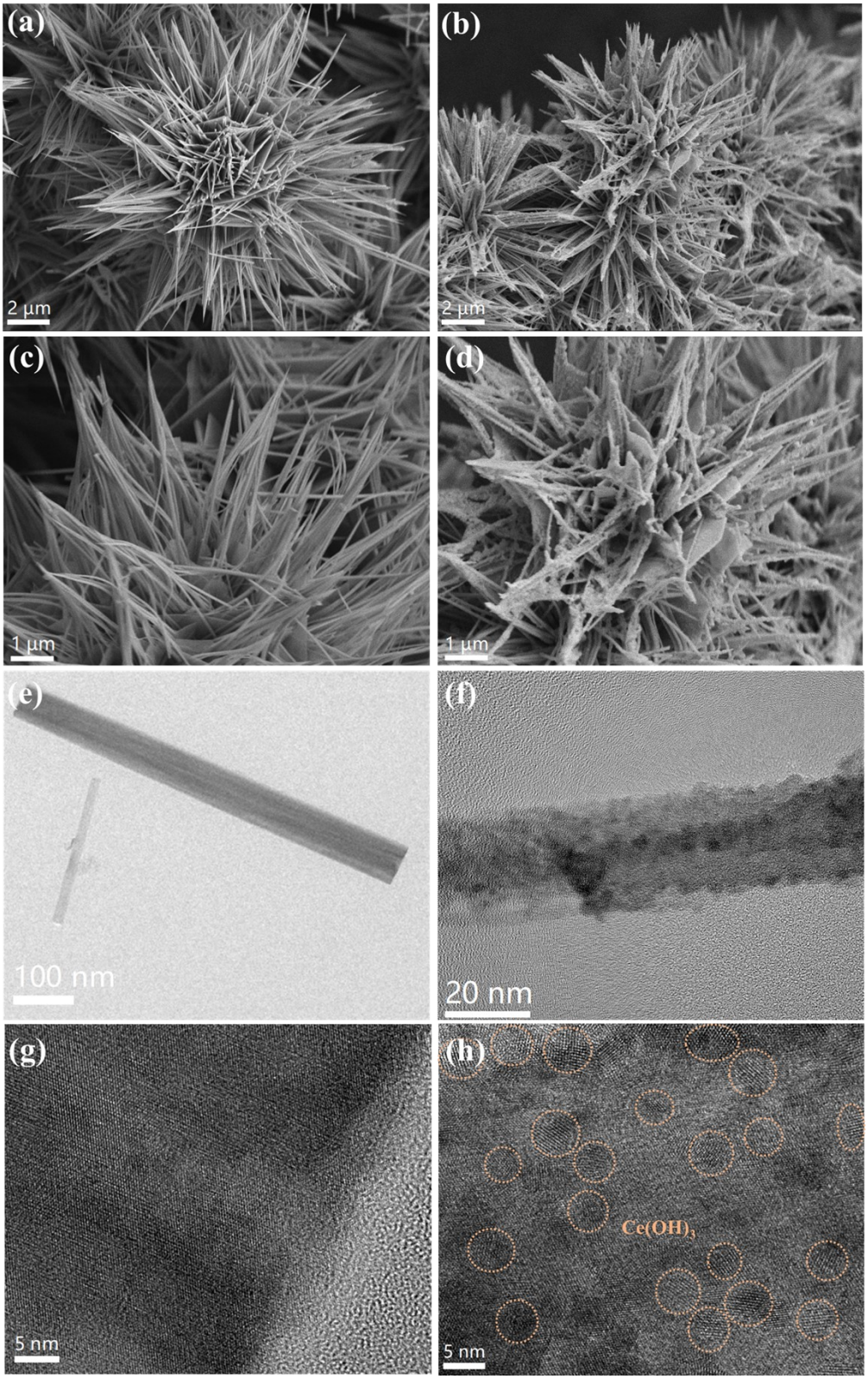

Figure S1. SEM images of (a, c) CoFe-LDH, and (b, d) Ce@CoFe-LDH; TEM images of (e) CoFe-LDH and (f) Ce@CoFe-LDH; HRTEM images of (g) CoFe-LDH and (h) Ce@CoFe-LDH.

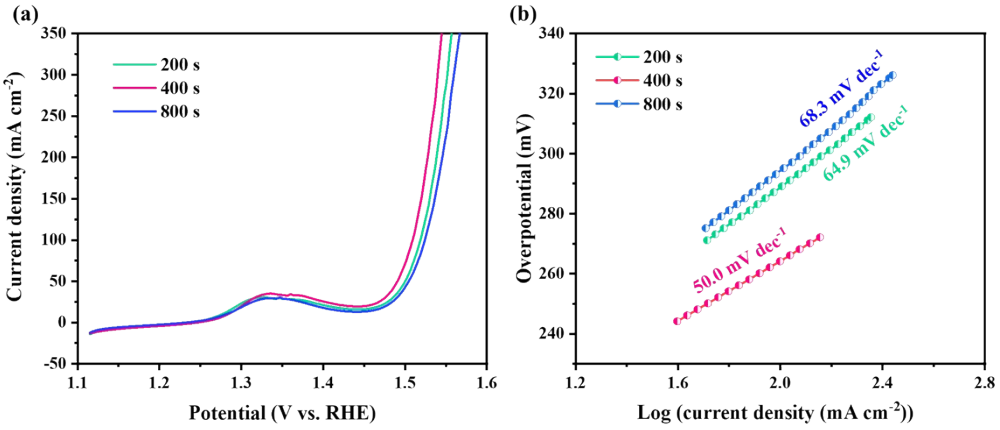

Figure S2. (a) LSV curves and (b) Tafel plots corresponding to different electrodeposition time for Ce@CoFe-LDH samples.

Table S1. Comparative OER performance of our Ce@CoFe-LDH with state-of-the-art OER electrocatalysts

Samples	Electrolyte	Overpotential (mV)	Tafel slop（mV/dec）	Ref.
Ce@CoFe-LDH	1 M KOH	207	50	This work
NiFe-LDH@NiCoP/NF	1 M KOH	220	48.6	[1]
Co_9S_8@NiFe-LDH	1 M KOH	220	52	[2]
PA-ZnCoFe-LDH	1 M KOH	221	58.7	[3]
NiFe-LDHs-V_{Ni}	1 M KOH	229	62.9	[4]
FeCo-LDH@$Co(OH)_2$-0.5	1 M KOH	230	75.8	[5]
Mn-NiFe-LDH/rGO	1 M KOH	240	40	[6]
CoFeV-LDH/NF	1 M KOH	242	57	[7]
S-FeOOH/IF	1 M KOH	244	59	[8]
NiFeCo-LDH/CF	1 M KOH	249	42	[9]

CoFe@NC/CC	1 M KOH	254	54.9	[10]
Ni_3S_4@CoFe-LDH	1 M KOH	262	70.2	[11]
Fe-Co_9S_8@SNC	1 M KOH	273	55.8	[12]
(Co,Ni)Se_2@NiFe-LDH	1 M KOH	277	75	[13]

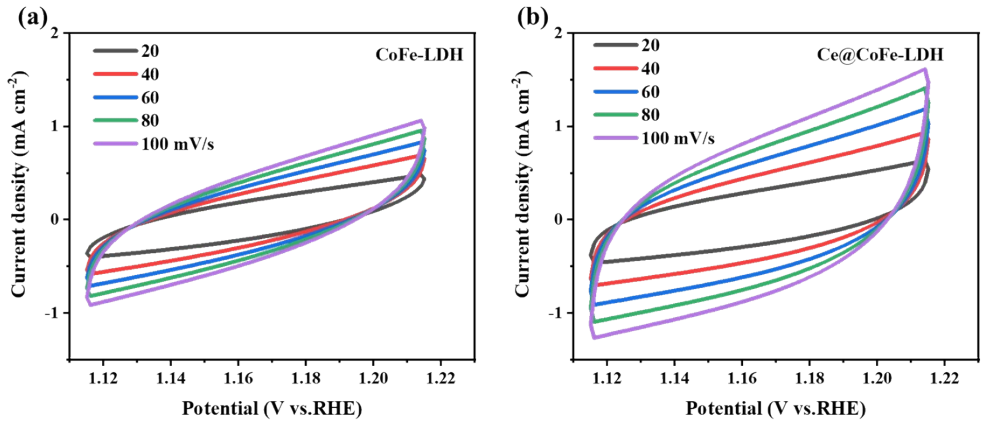

Figure S3. CV curves of (a) CoFe-LDH and (b) Ce@CoFe-LDH samples at different scan rates from 20 to 100 mV s^{-1} for the calculation of C_{dl}.

Table S2. Performance comparison of Ce@CoFe-LDH and CoFe-LDH catalysts.

Samples	**Catalytic activity**				
	Overpotential (mV)	Tafel slop (mV dec^{-1})	Specific activity (mA cm^{-2})	TOF (s^{-1})	Rct (ohm)
			@ 300 mV overpotential		
Ce@CoFe-LDH	207	50.0	2.23	0.0512	3.15
CoFe-LDH	232	74.2	1.20	0.0121	4.5

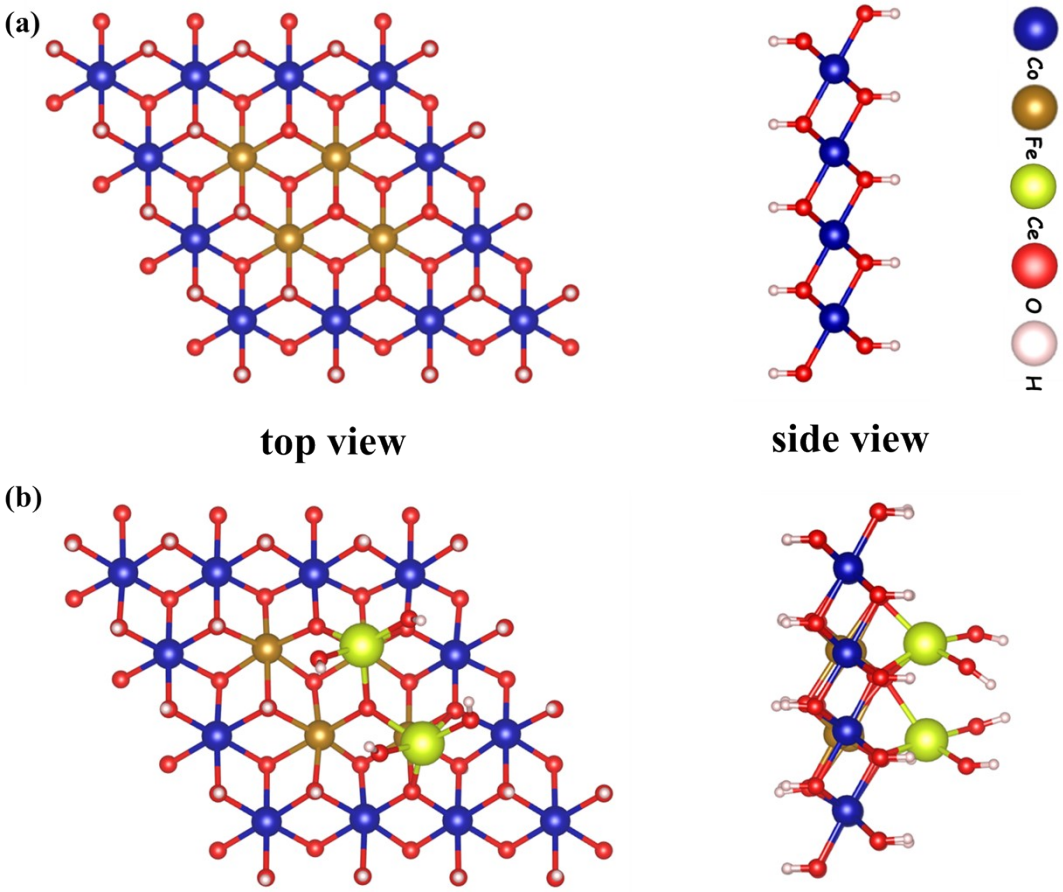

Figure S4. Structural models of (a) CoFe-LDH and (b) Ce@CoFe-LDH catalysts.

Table S3. Calculated Gibbs free energy values of Ce@CoFe-LDH and CoFe-LDH catalysts.

Samples	Gibbs free energy values (eV)			
	$H_2O \rightarrow *OH$	$*OH \rightarrow *O$	$*O \rightarrow *OOH$	$*OOH \rightarrow O_2$
Ce@CoFe-LDH	-0.14	0.25	-0.04	-0.07
CoFe-LDH	0.29	0.56	-0.47	-0.38

Table S4. Comparative performance of our Ce@CoFe-LDH with state-of-the-art electrocatalysts for overall water splitting.

Samples	Electrolyte	Cell voltage (V) @10 mA cm^{-2}	Ref.
Ce@CoFe-LDH	1 M KOH	1.47	This work

CoFe-250	1 M KOH	1.47	[14]
Ni_3S_2-FeS-CoS/PNFCF	1 M KOH	1.48	[15]
NiTe-NeSe/NFF	1 M KOH	1.49	[16]
S-FeOOH/IF	1 M KOH	1.50	[8]
MoS_2-AB (75)	1 M KOH	1.51	[17]
Cr-Fe_3O_4-N/NF	1 M KOH	1.53	[18]
Ti_3C_2@mNiCoP	1 M KOH	1.57	[19]
NiFe-LDH@NiCoP	1 M KOH	1.57	[1]
S-NiFeOOH	1 M KOH	1.57	[20]
CoFe@NiFe-200/NF	1 M KOH	1.59	[21]
CoP@NCFs	1 M KOH	1.59	[22]
$NiCo_2S_4$@NiFe-LDH	1 M KOH	1.60	[23]
Ni-SA@NCA	1 M KOH	1.66	[24]

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