Supporting Information

Study of the effect of the interaction between the active center and the ligand environment of ionomer-based catalyst on the oxygen evolution reaction

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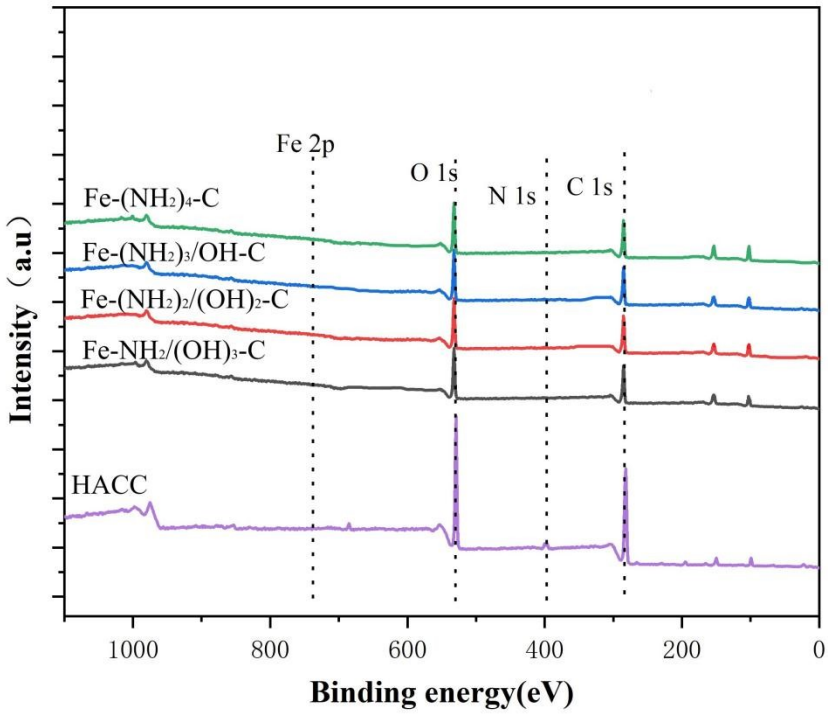

Figure S1. Total XPS spectrogram of the composition and chemical of HACC and quaternary ferric chitosan (Fe-$(NH_2)_4$-C, Fe-$(NH_2)_3$/OH-C, Fe-$(NH_2)_2$/$(OH)_2$-C vs. Fe-NH_2/$(OH)_3$-C) complexes.

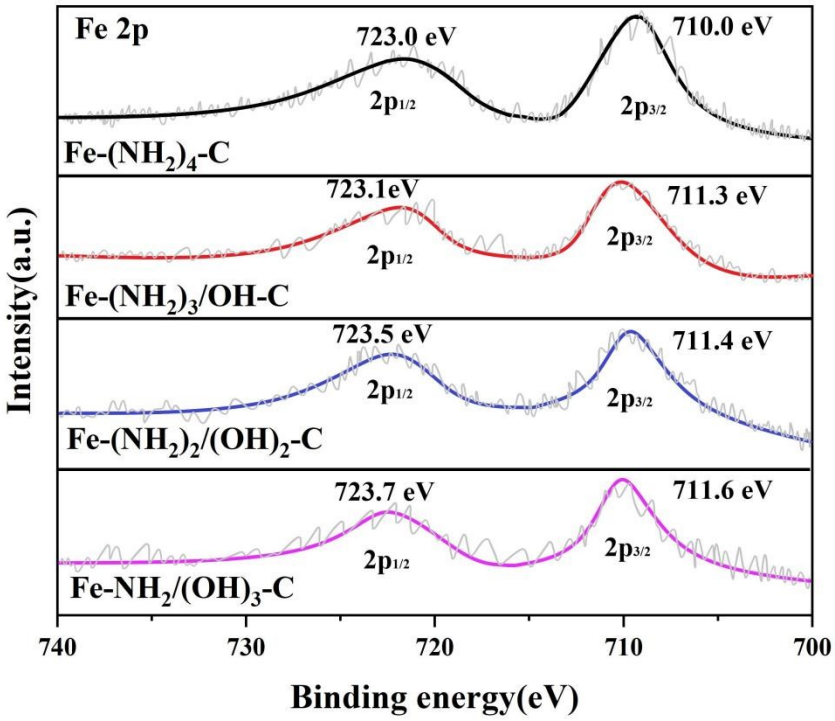

Figure S2. Fe 2p XPS spectra of the composition and chemical of quaternary ferric chitosan (Fe-$(NH_2)_4$-C, Fe-$(NH_2)_3$/OH-C, Fe-$(NH_2)_2$/$(OH)_2$-C vs. Fe-NH_2/$(OH)_3$-C) complexes.

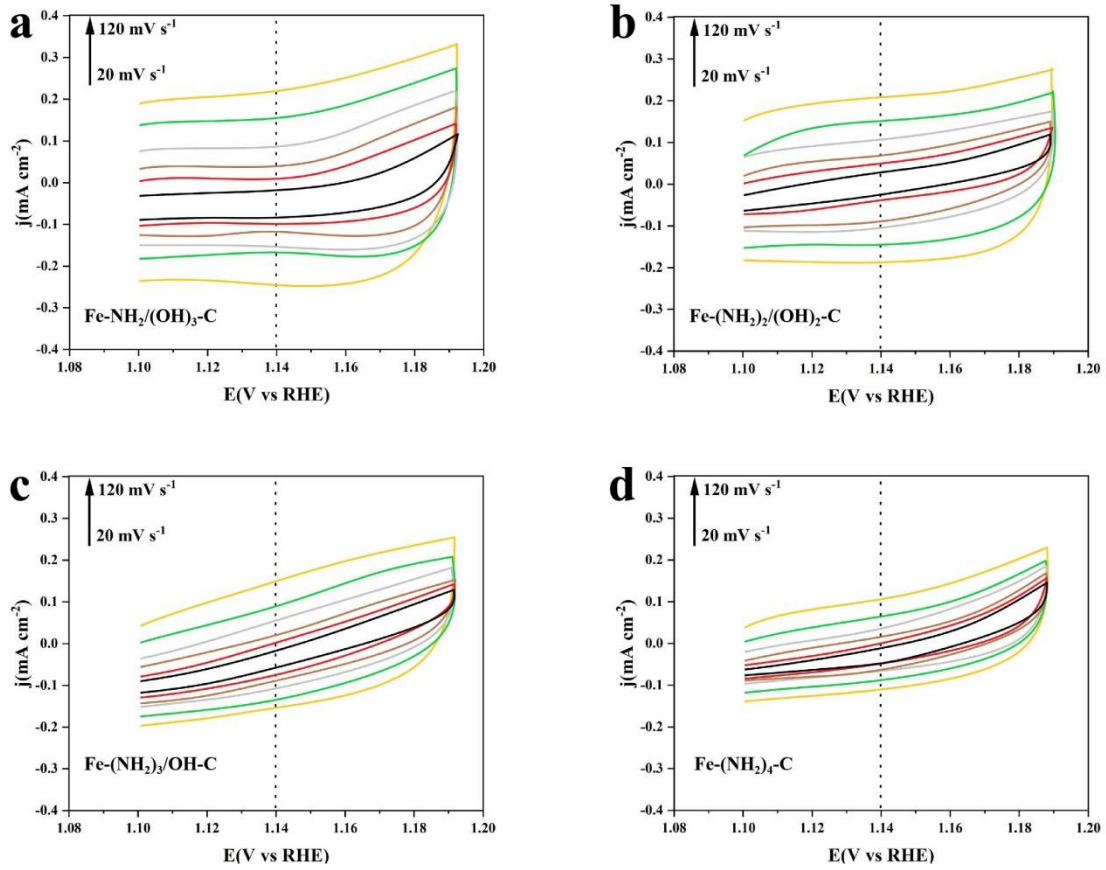

Figure S3. CV curves for Fe-$(NH_2)_4$-C, Fe-$(NH_2)_3$/OH-C, Fe-$(NH_2)_2$/$(OH)_2$-C Fe-NH_2/$(OH)_3$-C complexes at different rates (0.02, 0.04,0.06, 0.08, 0. 10, 0.12 and 0.14 V/s).

Table S1 Main infrared spectrum HACCta of HACC and quaternary ammonium chitosan iron ($Fe\text{-}(NH_2)_4$-C, $Fe\text{-}(NH_2)_3$/OH-C, $Fe\text{-}(NH_2)_2$/（OH）$_2$-C and $Fe\text{-}NH_2$/（OH）$_3$-C) complex (cm^{-1}).

Sample	$\nu_{N\text{-}H}+\nu_{O\text{-}H}$	$\delta_{N\text{-}H}$	$\nu_{C\text{-}OH}$	$\nu_{C\text{-}OH}$
HACC	3431.13	1550.66	1076.21	1026.06
A	3321.58	1480.73	1072.35	1023.56
B	3315.61	1485.21	1026.78	989.73
C	3305.79	1490.82	959.56	915.13
D	3248.01	1496.25	933.71	909.22

Table S2.The overpotential at 10 mA cm^{-2} of Fe-NH_2/$(OH)_3$-C and other reported Fe-based catalysts for OER in 1 M KOH solution.

Sample	Overpotential (mV) at 10 mA cm^{-2}	Tafel slope (mV dec^{-1})	References
Fe-NH_2/$(OH)_3$-C	255	67.3	This work
CN-FeO_x-OH	322	124.3	[1]
RuO_2	283	104.7	[2]
Co-Fe-N-C	~310	40	[3]
Fe/SNCFs-NH_3	~520	_	[4]
Fe-N-C/FeP_x/NPSC	370	103	[5]
Fe-SAs/Fe_3C-Fe@NC	330	56	[6]
CoFe-LDHs	310	59	[7]
A-Ir_1/$Co_{0.8}Fe_{0.2}Se_2$	230	_	[8]
$Co_{0.8}Fe_{0.2}Se_2$@Ni foam	370	_	[9]
$Ni_{1/2}Fe_{1/2}(OH)_2$/CNT-24	244	41	[10]

Table S3.Current density attenuation of samples Fe-$(NH_2)_4$-C, Fe-$(NH_2)_3$/OH-C, Fe-$(NH_2)_2$/$(OH)_2$-C and Fe-NH_2/$(OH)_3$-C after 12 h stability test.

Sample	Current density attenuation (vs 10 mA cm^{-2})
Fe-$(NH_2)_4$-C	39.6%
Fe-$(NH_2)_3$/OH-C	20.8%
Fe-$(NH_2)_2$/$(OH)_2$-C	12.7%
Fe-NH_2/$(OH)_3$-C	1.3%

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