

Supplementary Information for:

Zwitterion Additive promotes (100)-textured Zinc Anodes for deep cycling Zinc Ion Batteries

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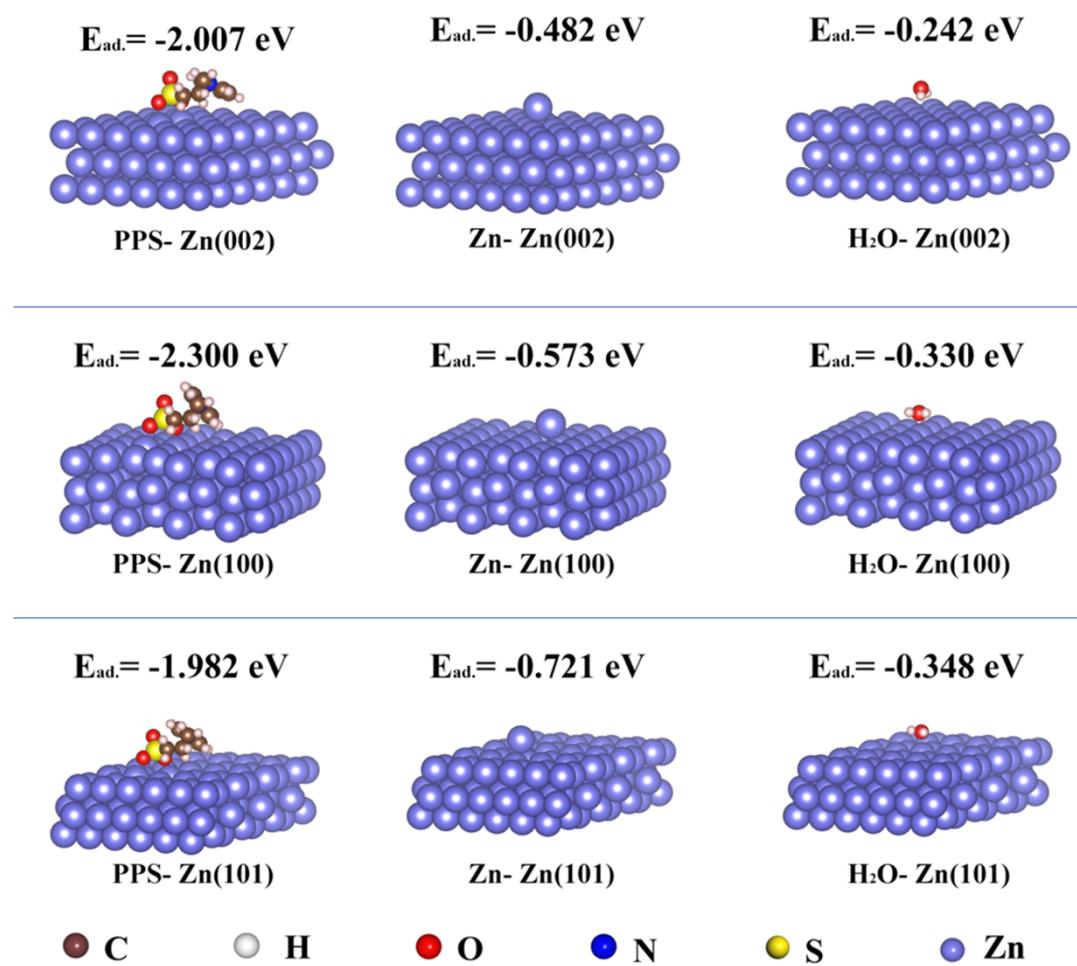


Figure S1. Comparison of adsorption energies of Zn atom, H₂O and PPS molecule on the Zn(002) plane, Zn(100) plane, and Zn(101) plane.

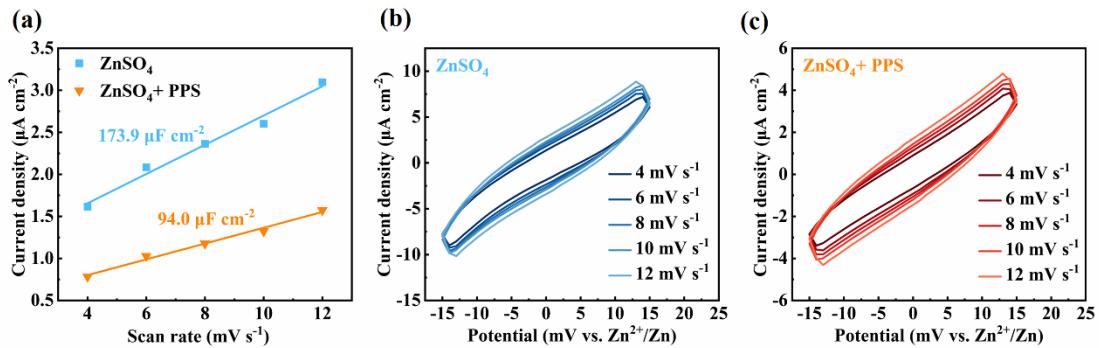


Figure S2. (a) Plots of capacitive currents versus scan rate for calculating the EDL capacitances of the Zn electrodes in different electrolytes and CV curves of Zn//Zn symmetric cells with (b) ZnSO_4 electrolytes and (c) $\text{ZnSO}_4 + \text{PPS}$ electrolytes.

The calculation of electric double layer capacitance was based on the equation $C = i/v$, where i was defined half of the difference between positive and negative scanning current at 0 V vs. Zn^{2+}/Zn of each scanning rate, C was the EDL capacitance and v was the scanning rate¹.

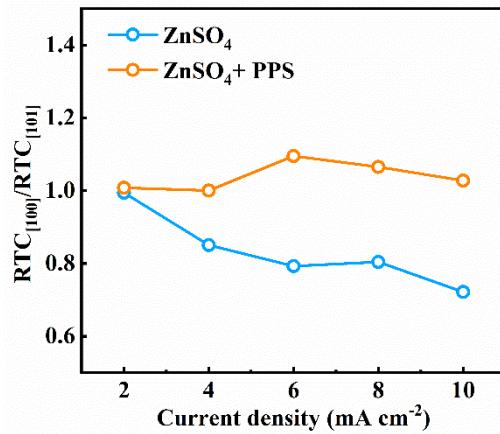


Figure S3. Corresponding $\text{RTC}_{(100)}/\text{RTC}_{(101)}$ ratios of cycled zinc anode in electrolytes with and without 5 mM PPS at various current density.

Table S1. Corrosion potential and corrosion current density of Zn anode in electrolyte with and without PPS.

Electrode	$E_{\text{corr.}} (\text{V})$	$J_{\text{corr.}} (\text{mA cm}^{-2})$
In ZnSO ₄ electrolyte	-0.978	2.012×10^{-3}
In ZnSO ₄ + PPS electrolyte	-0.975	8.644×10^{-4}

Table S2. The fitted R_{ct} and R_s of Zn//Zn symmetric cells.

Electrolyte	$R_{\text{ct}} (\Omega)$	$R_s (\Omega)$
Initial in ZnSO ₄	935.8	2.23
Initial in ZnSO ₄ + PPS	1034	1.93
50 cycles in ZnSO ₄	47.31	2.06
50 cycles in ZnSO ₄ + PPS	133	1.34

Table S3. Comparison of electrochemical performances of this work with previously reported symmetric Zn-based cells.

Strategies ^[Ref.]	Current density (mA cm^{-2})	Areal capacity (mAh cm^{-2})	Time (h)
This work	1	1	4100
	2	2	4500
	5	5	2300
	10	10	390
Sorbitol in 1 M ZnSO ₄ ²	1	1	1000
	5	5	480
α -Cyclodextrins in 3 M ZnSO ₄ ³	5	5	200
	10	1	160
2-Methylimidazole in 2 M ZnSO ₄ ⁴	1	1	1500
	10	5	300
Amphiphilic dibenzenesulfonimide in 1 M ZnSO ₄ ⁵	1	1	2700
	2	2	1700
	5	5	1180
ammonium dihydrogen phosphate in 1 M ZnSO ₄ ⁶	1	1	2100
	5	5	300
Glycine in 2 M ZnSO ₄ ⁷	1	1	3100
	10	10	300
Cysteine in 2 M ZnSO ₄ ⁸	5	5	620
L-Cysteine in 2 M ZnSO ₄ ⁹	2	2	1600
	10	10	200
propylene glycol in 1 M ZnSO ₄ ¹⁰	2	2	1000
Betaine in 1 M ZnSO ₄ ¹¹	1	1	1800
	2	2	830

Supplementary References

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