Supporting Information for

Synergistic "Anchor-Capture" Enabled by Amino and Carboxyl for Constructing Robust Interface of Zn Anode

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Supplementary Figures and Tables

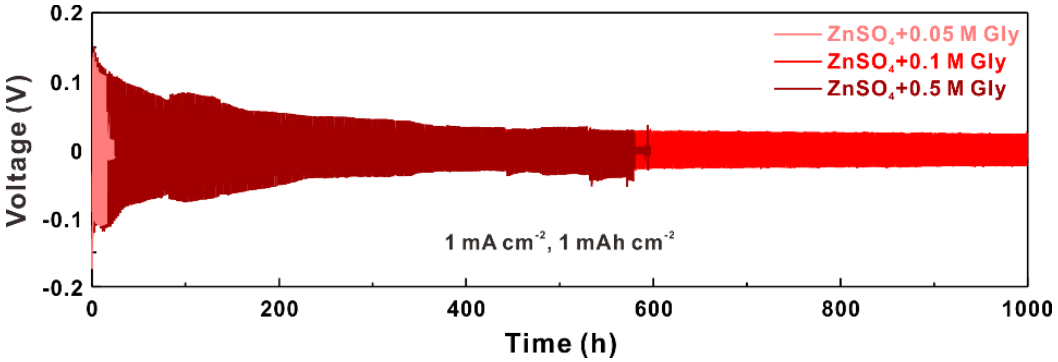

Fig. S1 The voltage profiles of Zn-Zn symmetric cells with 0.05/0.1/0.5 M Gly tested at the current density of 1 mA cm^{-2} with the areal capacity of 1 mAh cm^{-2}

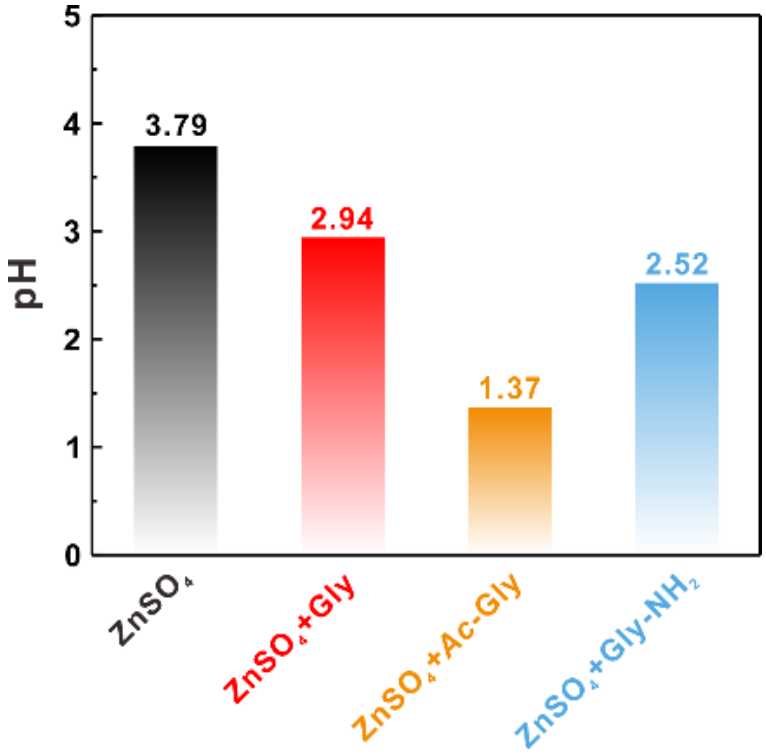

Fig. S2 The pH of bare $ZnSO_4$ electrolytes with/without Gly/*Ac*-Gly/Gly-NH_2

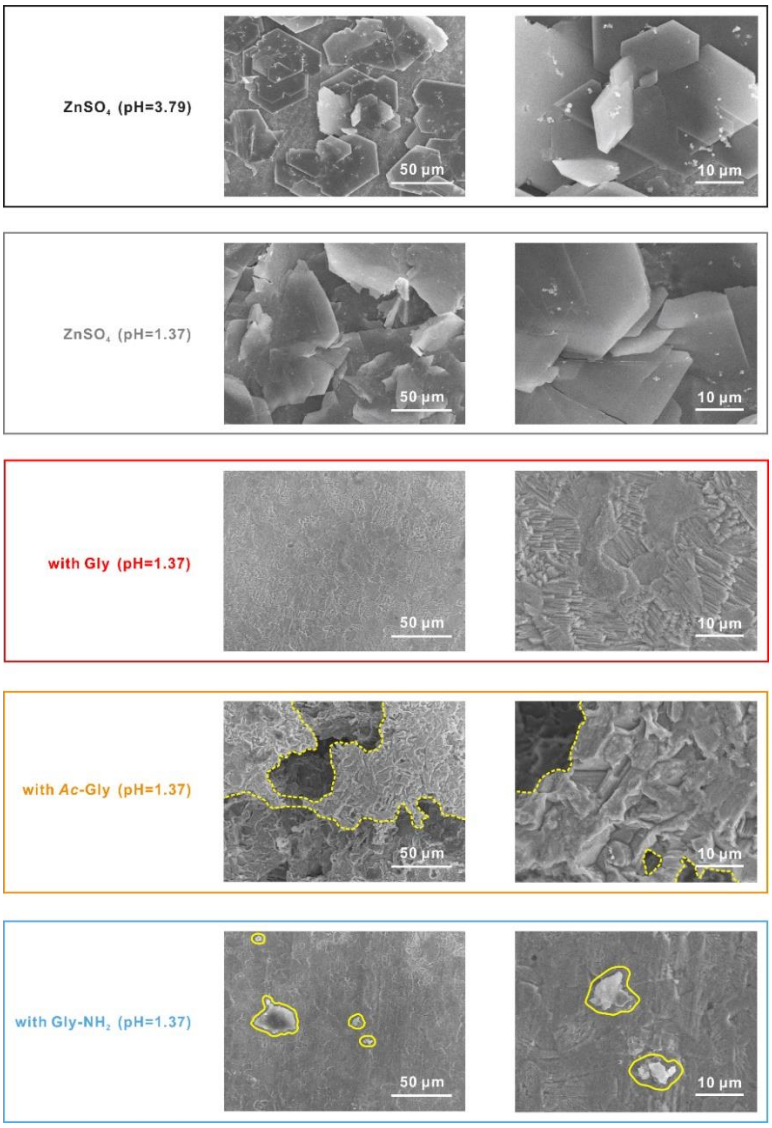

Fig. S3 SEM images of Zn plates surface morphologies soaked in different solutions for 7 days

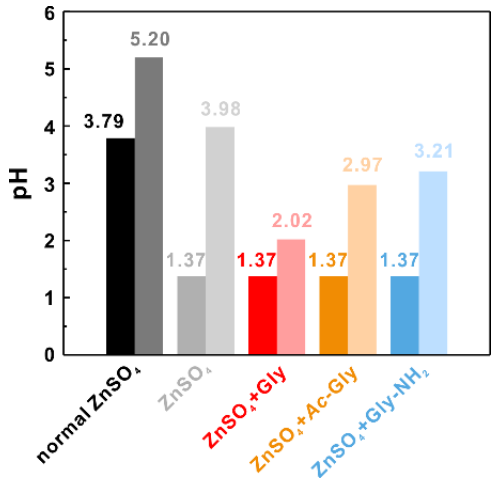

Fig. S4 The evolution of pH value before and after Zn plate immersed in different solutions for 7 days

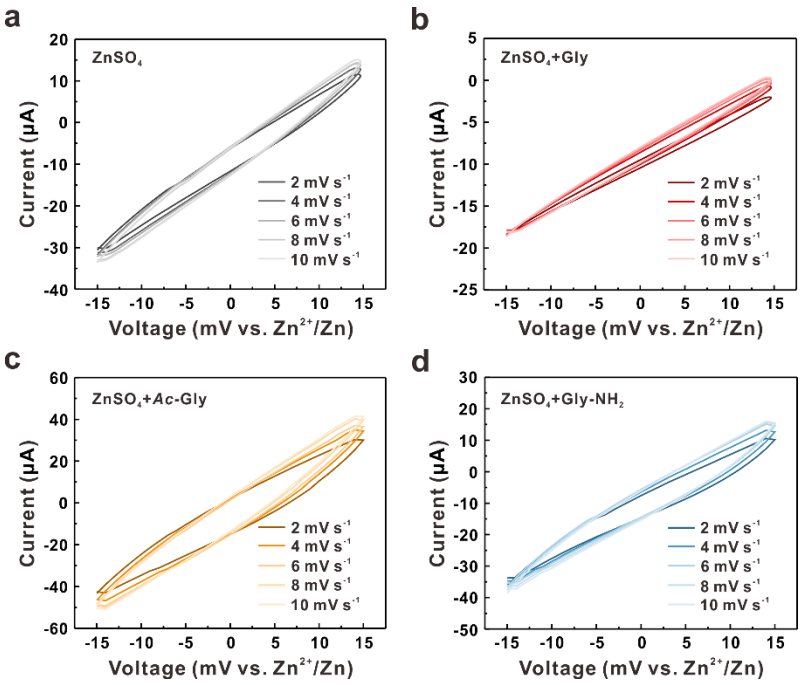

Fig. S5 CV curves of Zn-Zn symmetric cells at various scan rates from 2 to 10 mV s^{-1} in **a** bare $ZnSO_4$; **b** $ZnSO_4$+Gly; **c** $ZnSO_4$+*Ac*-Gly; and **d** $ZnSO_4$+Gly-NH_2 electrolytes

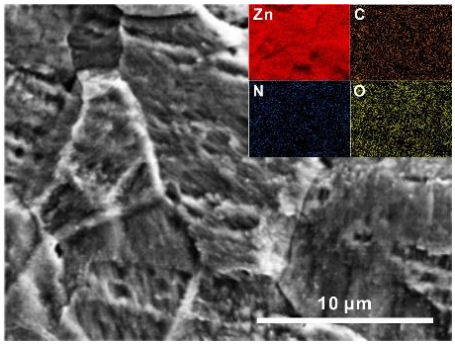

Fig. S6 SEM image of Zn plate soaked in Gly/H_2O solution for 7 days and the corresponding EDS mapping

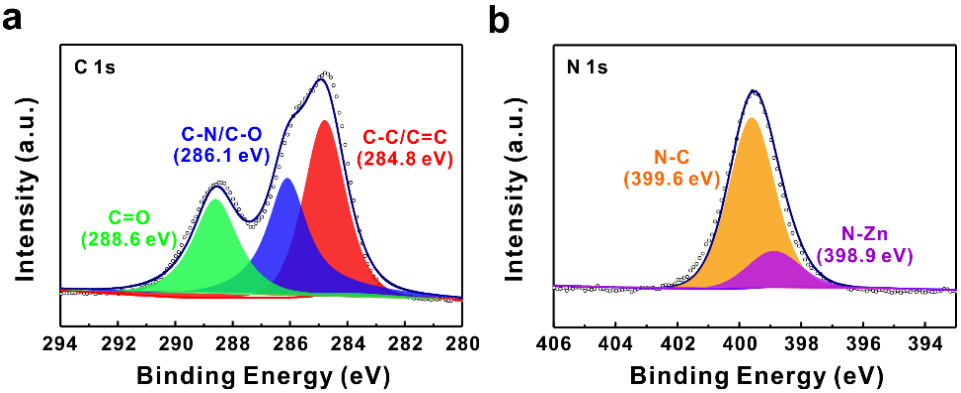

Fig. S7 The high-resolution XPS spectra of Zn plate soaked in Gly/H_2O solution for 7 days: **a** C 1s; **b** N 1s

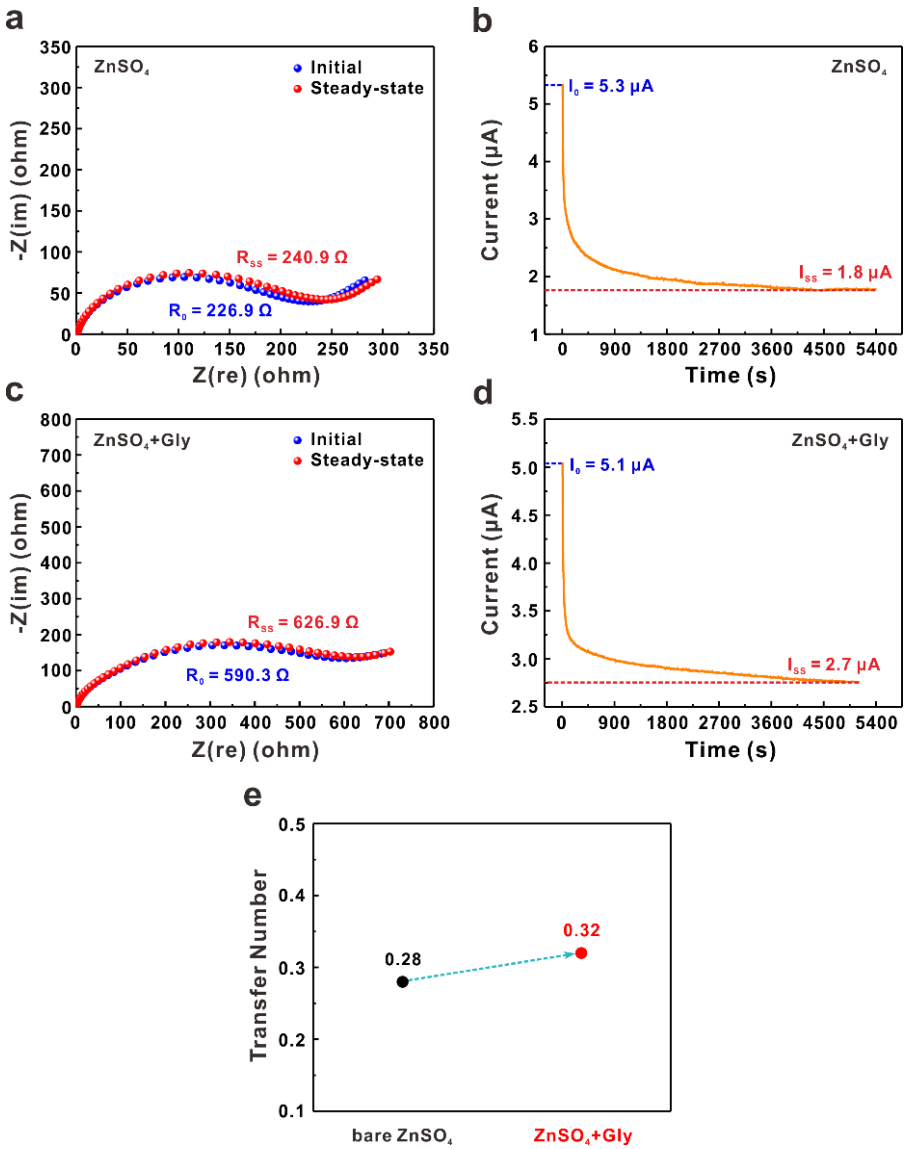

Fig. S8 EIS spectra of the Zn-Zn symmetric cells **a** without and **c** with Gly additive before and after polarization. The corresponding chronoamperograms of the Zn-Zn symmetric cells **b** without and **d** with Gly additive under the applied overpotential of 5 mV. **e** Calculated Zn^{2+} transfer numbers ($t(Zn^{2+})$) of $ZnSO_4$ electrolyte with/without Gly

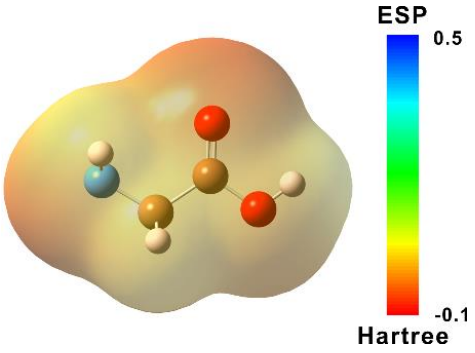

Fig. S9 Electrostatic potential mapping of Gly molecule

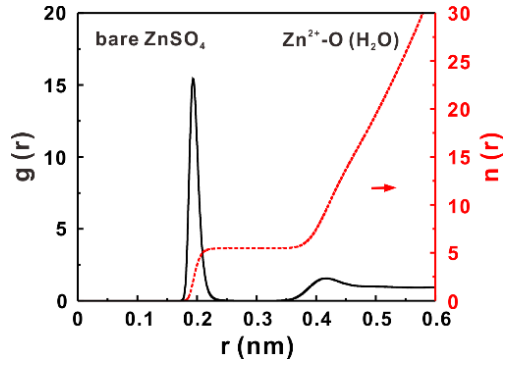

Fig. S10 Simulated RDF for Zn^{2+}-O (H_2O) in bare $ZnSO_4$ electrolyte

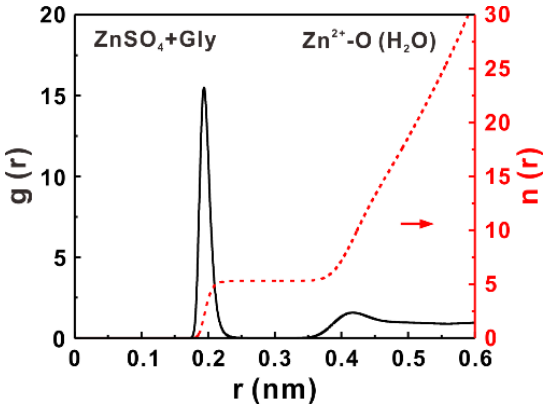

Fig. S11 Simulated RDF for Zn^{2+}-O (H_2O) in $ZnSO_4$+Gly electrolyte

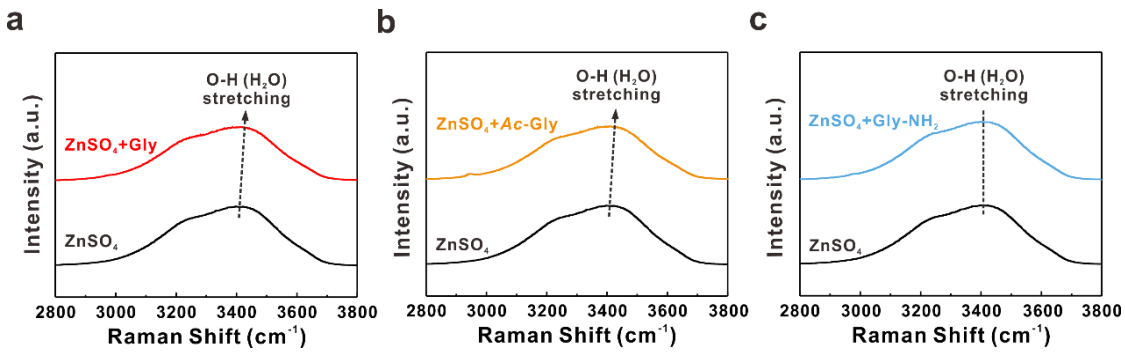

Fig. S12 Raman spectra for different electrolytes

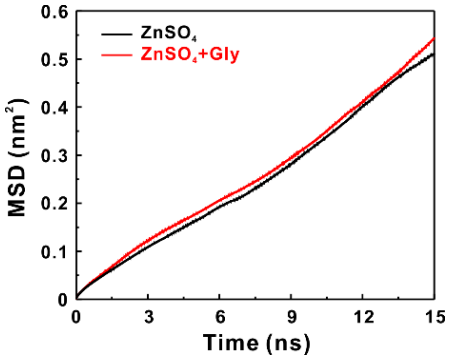

Fig. S13 MSD as a function of time under $ZnSO_4$ and Gly-containing electrolytes

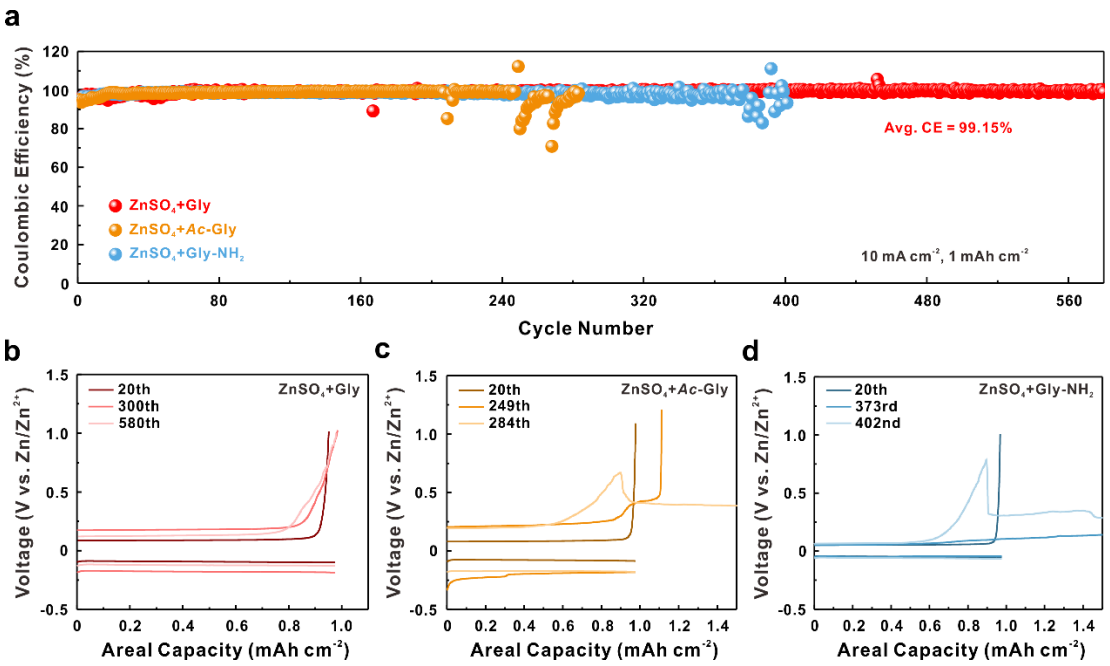

Fig. S14 a CE comparison of Zn-Ti cells in $ZnSO_4$+Gly/*Ac*-Gly/Gly-NH_2 electrolytes at 10 mA cm^{-2} and 1 mAh cm^{-2} and **b**, **c**, **d** corresponding voltage profiles at different cycles, respectively

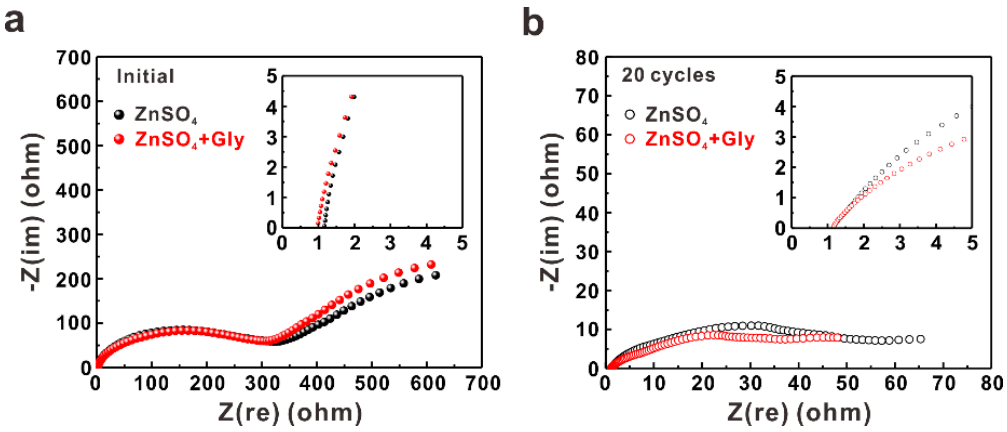

Fig. S15 EIS results of Zn-Zn symmetric cells using bare $ZnSO_4$ and $ZnSO_4$+Gly electrolytes **a** before and **b** after 20 cycles

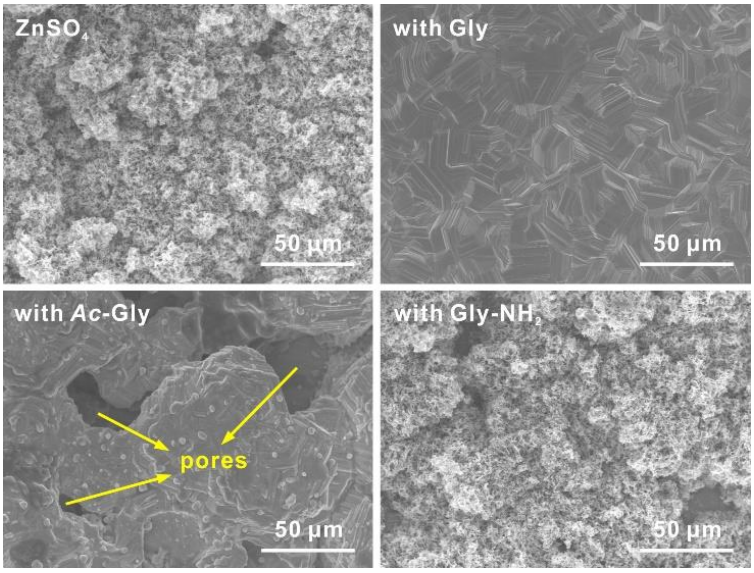

Fig. S16 The SEM images of Zn electrodeposition on Zn plates in different electrolytes for 2 h at 5 mA cm^{-2}

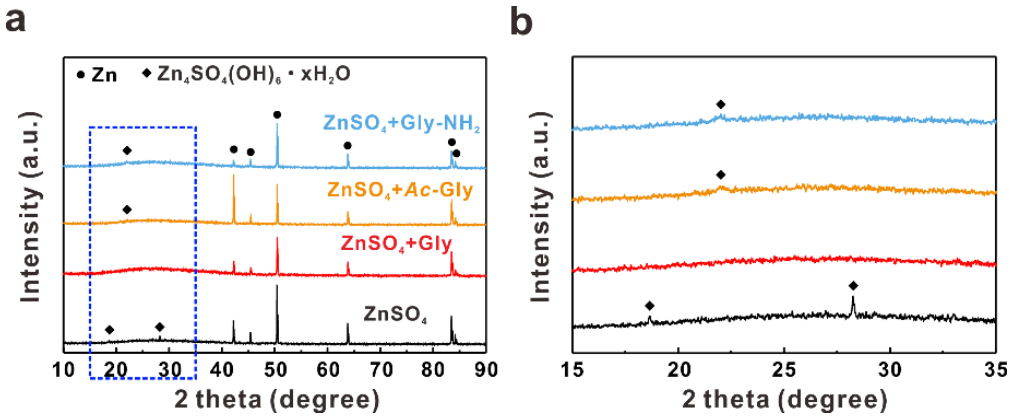

Fig. S17 a XRD patterns of Zn anode after 50 cycles in different electrolytes. **b** Partial XRD patterns at 2 theta among 15°-35°

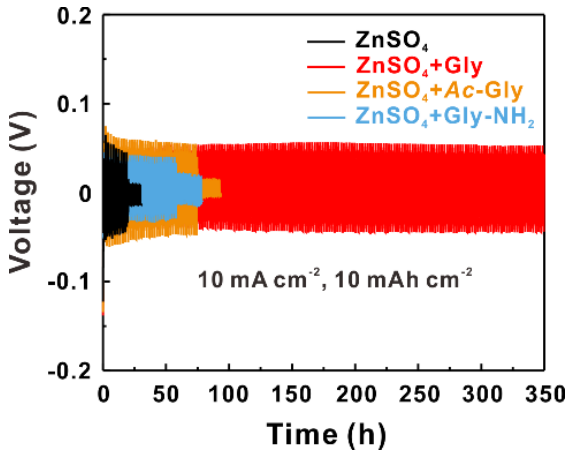

Fig. S18 The voltage profiles of Zn-Zn symmetric cells with/without Gly/*Ac*-Gly/Gly-NH_2 tested at the current density of 10 mA cm^{-2} with the areal capacity of 10 mAh cm^{-2}

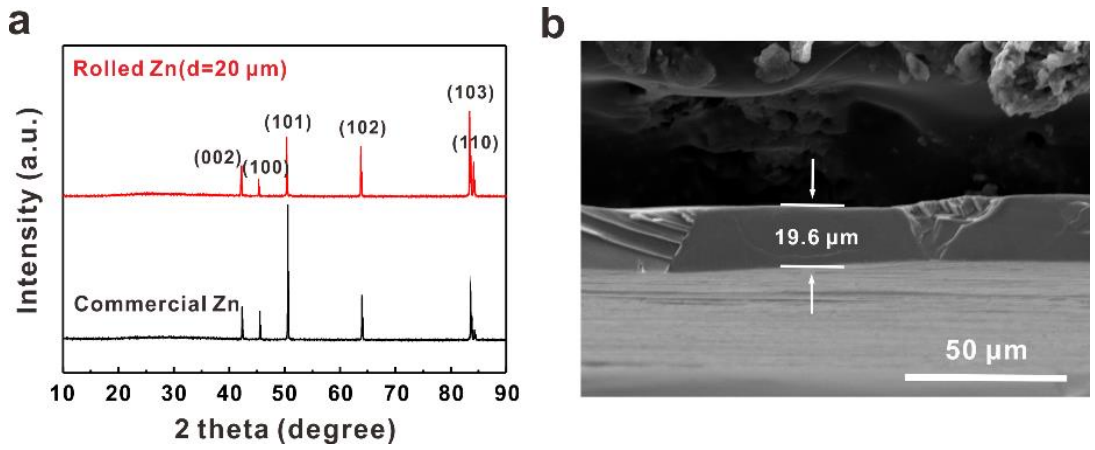

Fig. S19 a XRD patterns of commercial Zn plate and rolled Zn foil. **b** The cross-section SEM image of rolled Zn foil

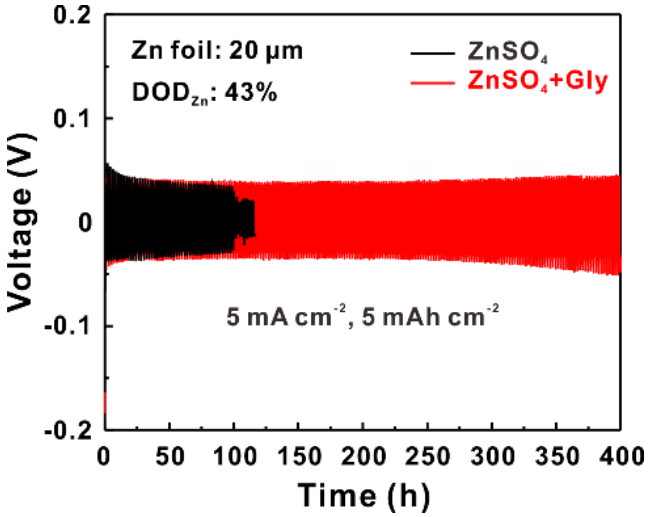

Fig. S20 The voltage profiles of Zn-Zn symmetric cells with/without Gly tested at the current density of 5 mA cm^{-2} with the areal capacity of 5 mAh cm^{-2} (rolled Zn foil as anode with the DOD$_{Zn}$ of 43%)

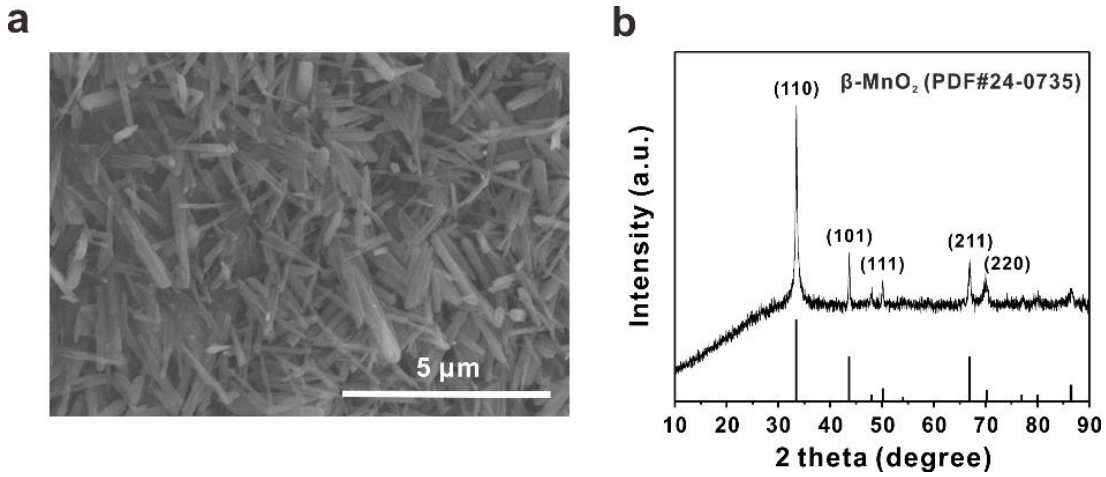

Fig. S21 a SEM image and **b** XRD pattern of β-MnO$_2$ cathode (PDF#24-0735)

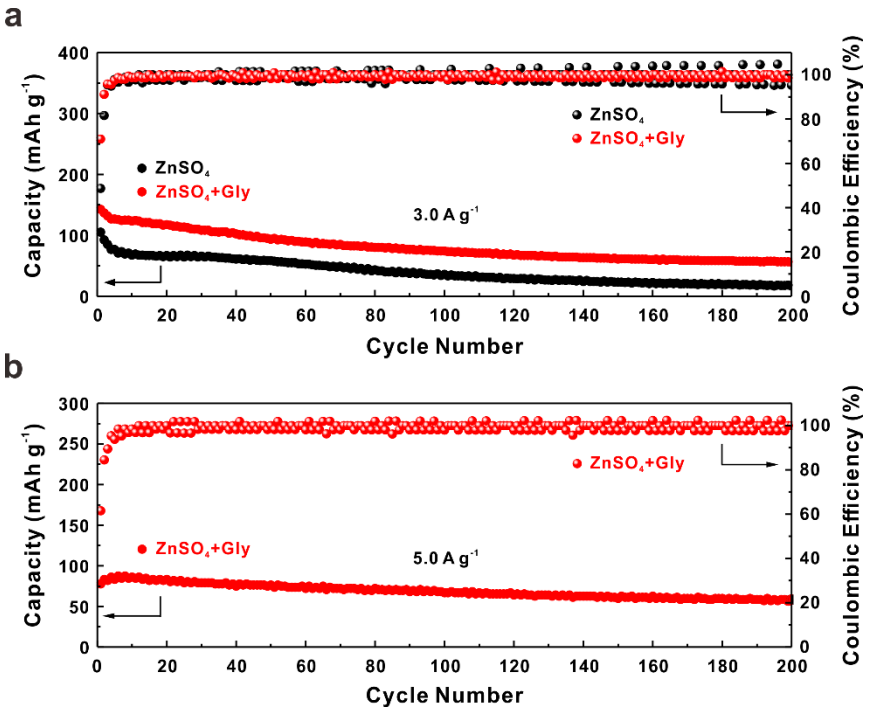

Fig. S22 Cycling performances of Zn-MnO_2 full cells at the current density of **a** 3.0 A g^{-1} and **b** 5.0 A g^{-1} with/without Gly. 0.1 M $MnSO_4$ was added into each electrolyte

Table S1 The corrosion current density (j_{cor}) and corrosion potential (V_{cor}) of Zn anodes cycled in different electrolytes derived from Fig. 1c

Electrolytes	Corrosion current density j_{cor} (mA cm^{-2})	Corrosion potential V_{cor} (V)
bare $ZnSO_4$	4.23	-0.975
$ZnSO_4$ + Gly	1.11	-0.974
$ZnSO_4$ + *Ac*-Gly	1.45	-0.975
$ZnSO_4$ + Gly-NH_2	1.30	-0.974

Table S2 The growth rate of current density between 50-200 s in different electrolytes derived from Fig. 2b

Electrolytes	Current density increased from 50-200 s (mA cm^{-2})	Growth rate (mA cm^{-2} s^{-1})
bare $ZnSO_4$	5.28	0.035
$ZnSO_4$ + Gly	2.75	0.018
$ZnSO_4$ + *Ac*-Gly	3.24	0.022
$ZnSO_4$ + Gly-NH_2	3.42	0.023