Electronic Supplementary Information

Rapid construction of a tellurium artificial interface for highly reversible zinc anode

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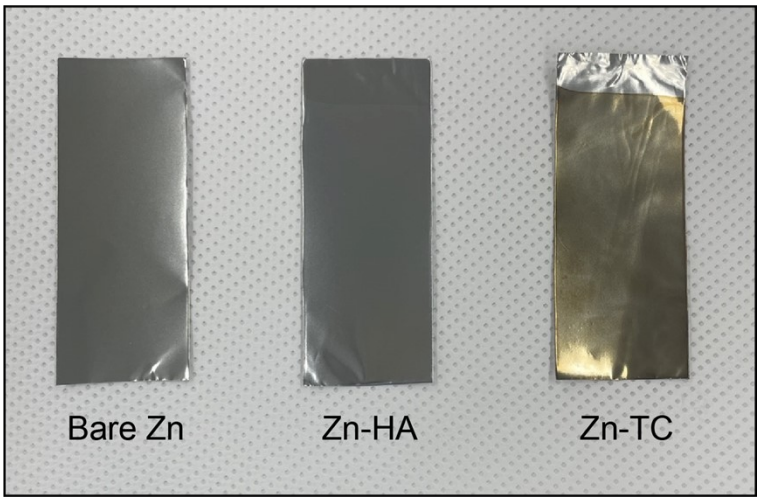

Fig. S1. Photograph of bare Zn, Zn-HA, and Zn-TC foils.

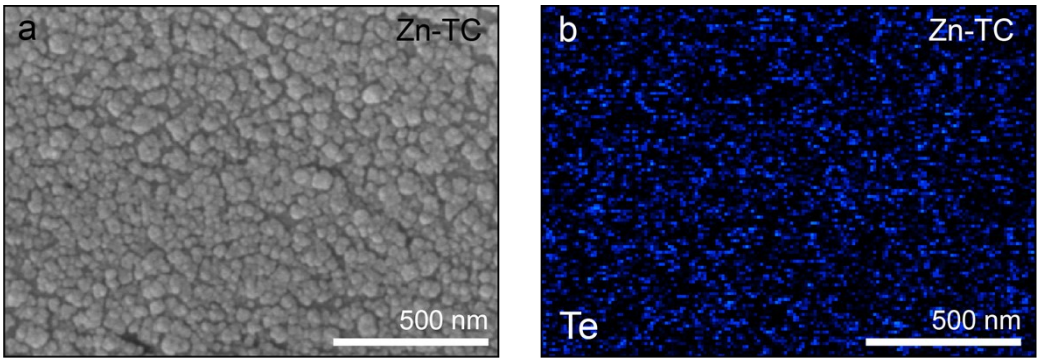

Fig. S2. (a) Surface SEM image of Zn-TC. (b) Surface EDS mapping of Zn-TC.

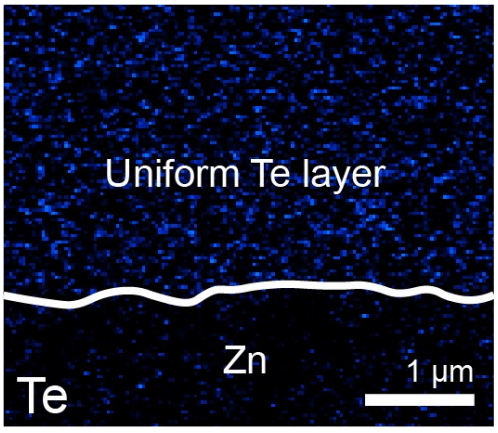

Fig. S3. Cross-sectional EDS mapping of Zn-TC.

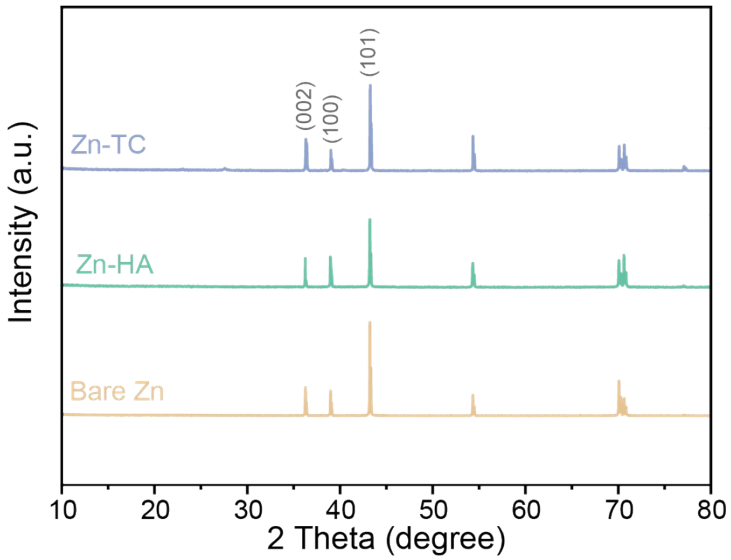

Fig. S4. XRD patterns of bare Zn, Zn-HA, and Zn-TC.

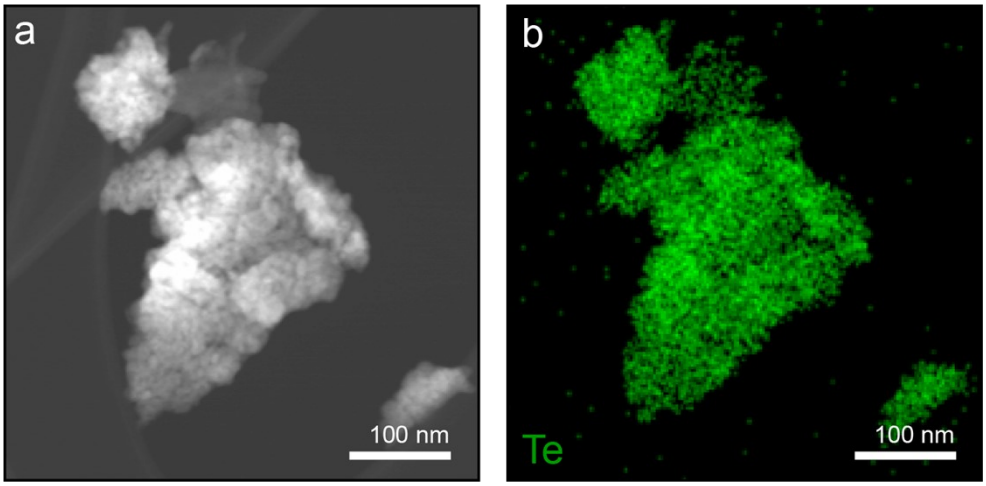

Fig. S5. HR-TEM image and EDS mapping of Te nanoparticles.

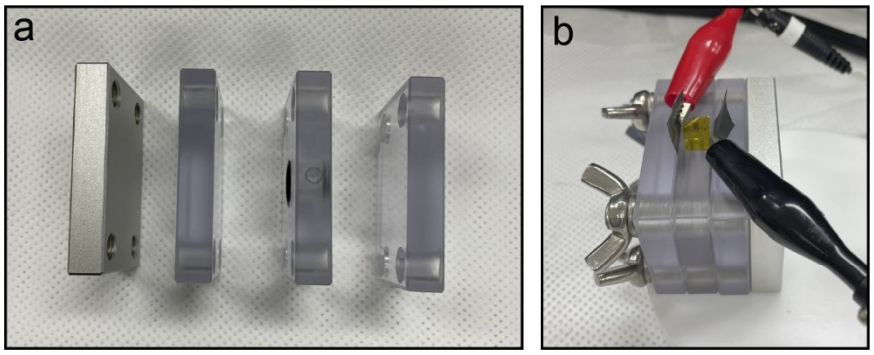

Fig. S6. Photographs of (a) CA cell components and (b) assembled CA cell.

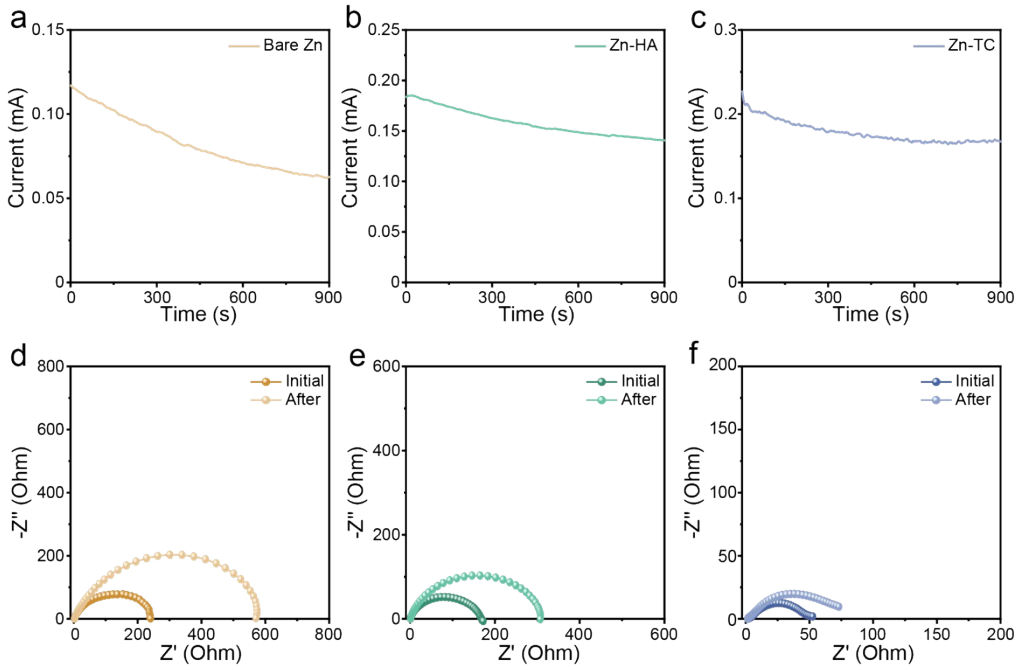

Fig. S7. Chronoamperograms of (a) bare Zn, (b) Zn-HA, and (c) Zn-TC symmetric cells during polarization. Nyquist plots of (d) bare Zn, (e) Zn-HA, and (f) Zn-TC symmetric cells before and after polarization.

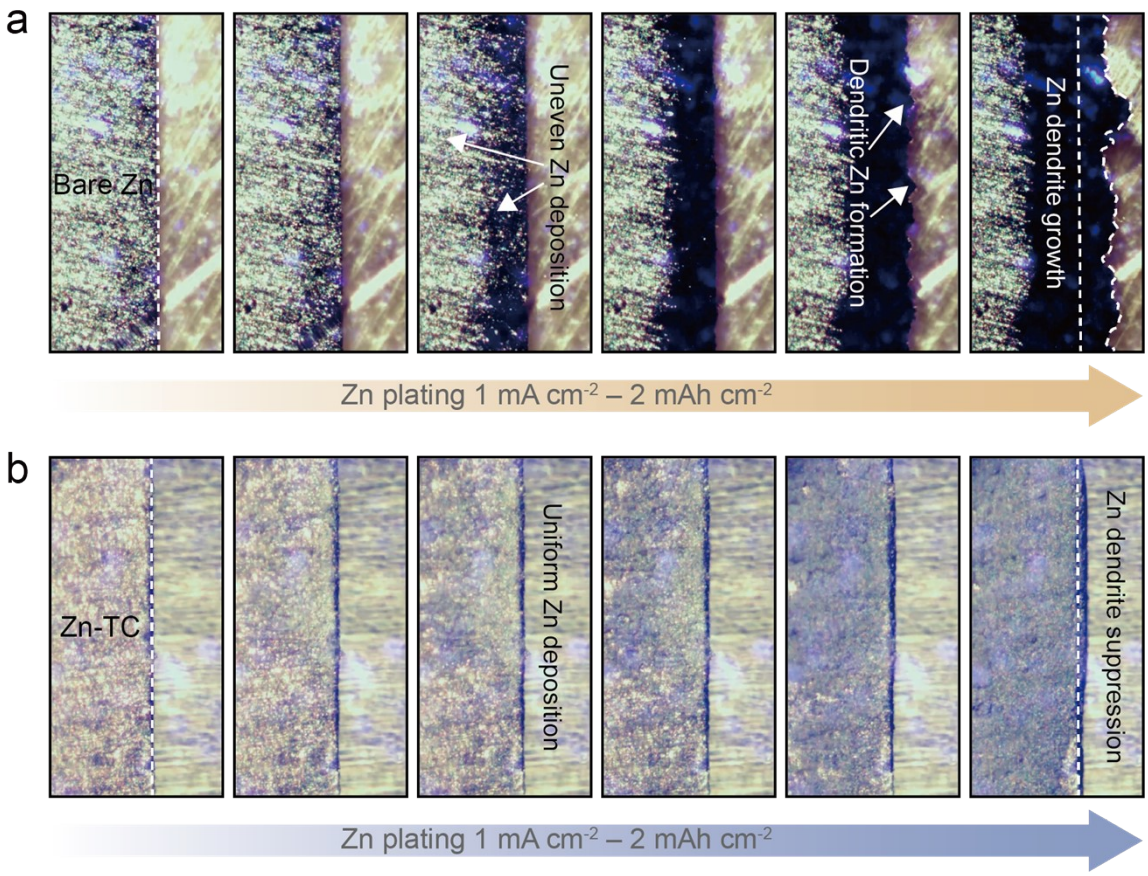

Fig. S8. Cross-sectional *operando* optical microscopy images of (a) bare Zn and (b) Zn-TC.

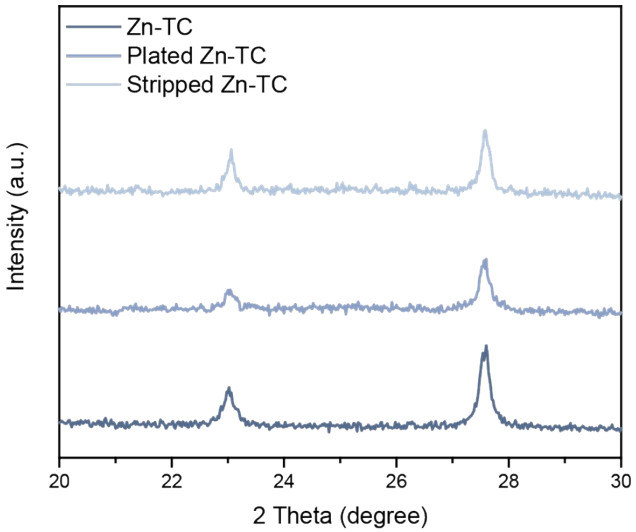

Fig. S9. XRD patterns of pristine Zn-TC and Zn-TC electrodes of the symmetric cell after 1st plating.

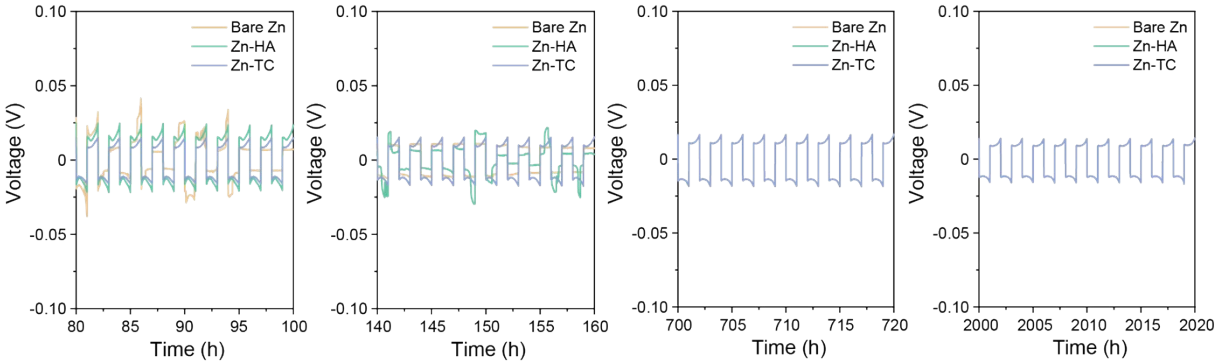

Fig. S10. Magnified voltage profiles for the long-term cycling test at 1 mA cm^{-2} for 1 mAh cm^{-2}.

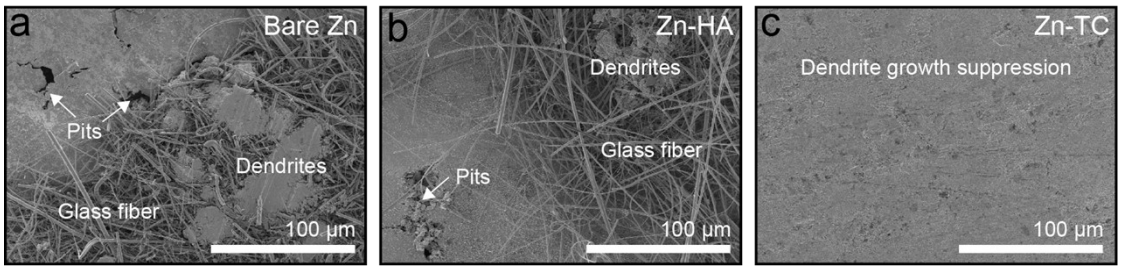

Fig. S11. SEM images of (a) bare Zn, (b) Zn-HA, and (c) Zn-TC electrodes, after 50 cycles in symmetric cell.

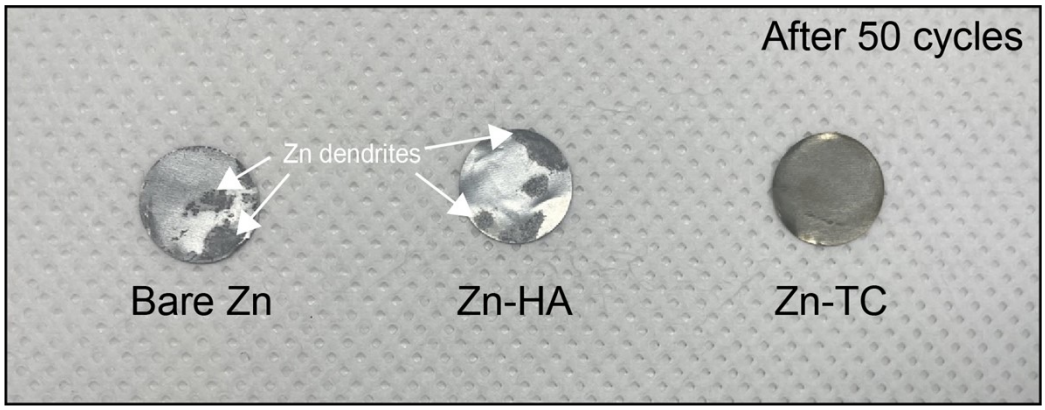

Fig. S12. Photographs of bare Zn, Zn-HA, and Zn-TC anodes after 50 cycles under symmetric cell condition.

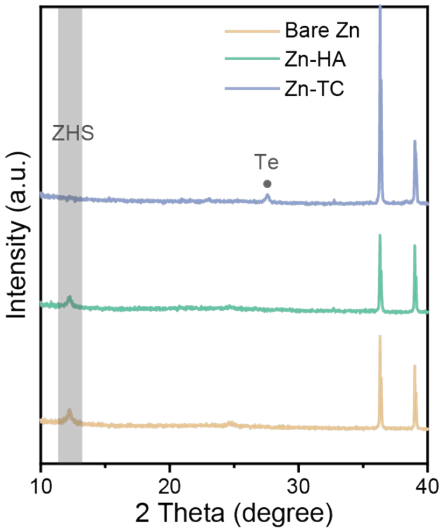

Fig. S13. XRD patterns of bare Zn, Zn-HA, and Zn-TC anodes of symmetric cells after 50 cycles.

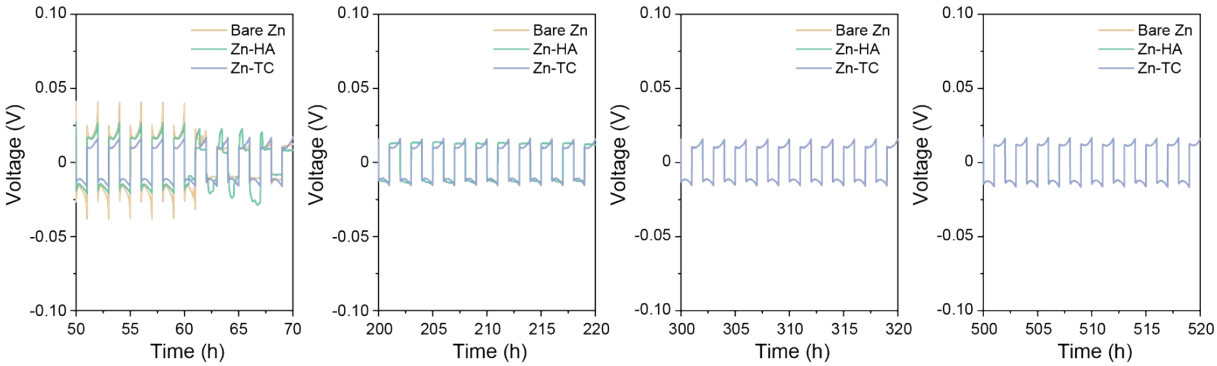

Fig. S14. Magnified voltage profiles for the long-term cycling test at 3 mA cm^{-2} for 3 mAh cm^{-2}.

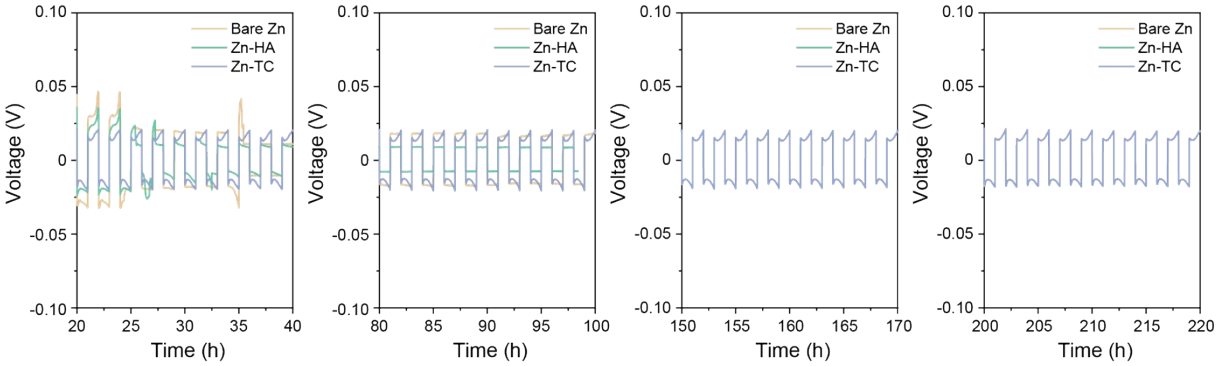

Fig. S15. Magnified voltage profiles for the DOD test at 13 mA for 13 mAh.

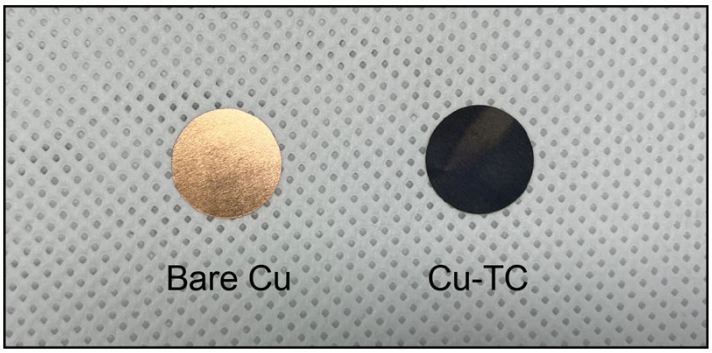

Fig. S16. Photograph of bare Cu and Cu-TC electrodes.

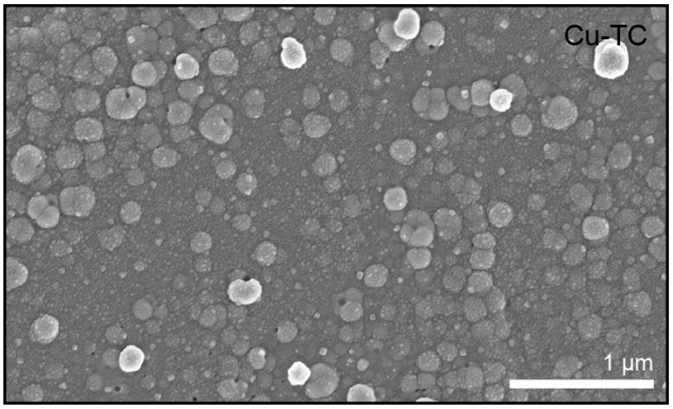

Fig. S17. Surface SEM image of Cu-TC electrode.

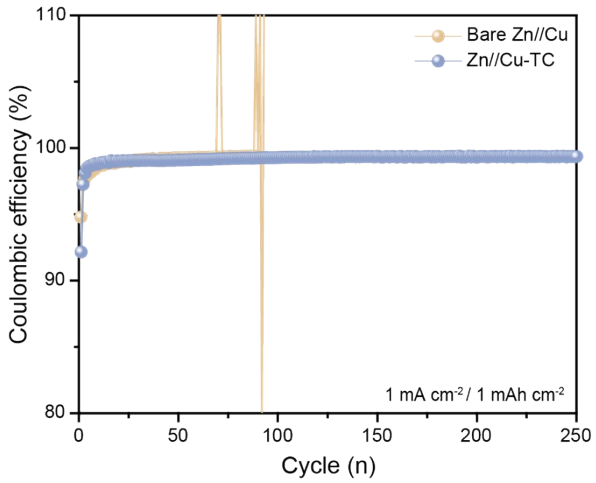

Fig. S18. Galvanostatic cycling at 1 mA cm^{-2} for 1 mAh cm^{-2} in the asymmetric cells.

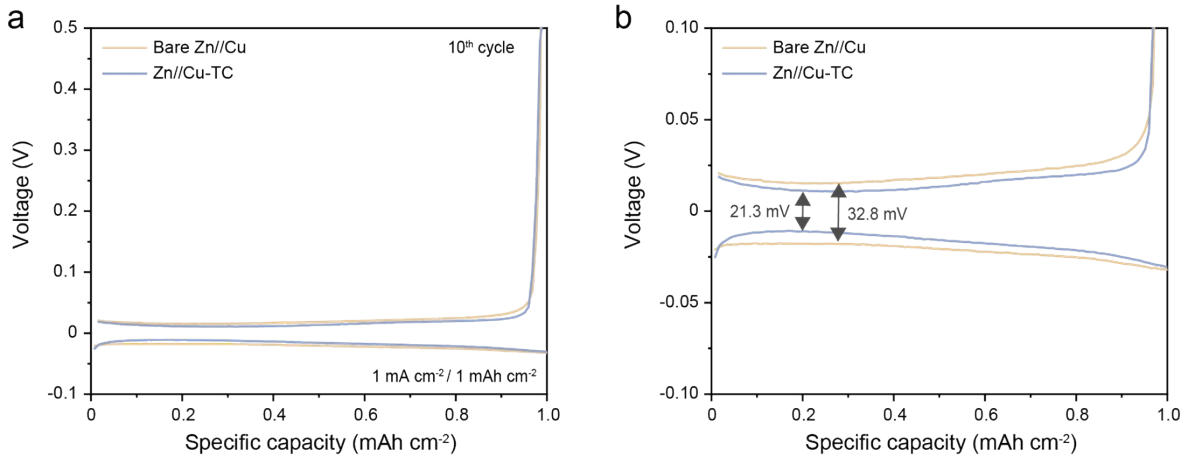

Fig. S19. Voltage profiles of the asymmetric cells at (a) 10th cycle and (b) polarization.

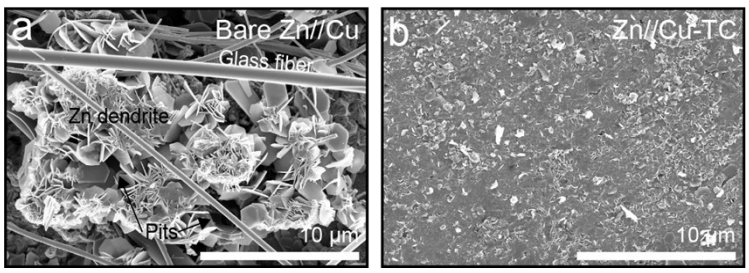

Fig. S20. Surface SEM images of (a) bare Zn//Cu and (b) Zn//Cu-TC after 10 cycles.

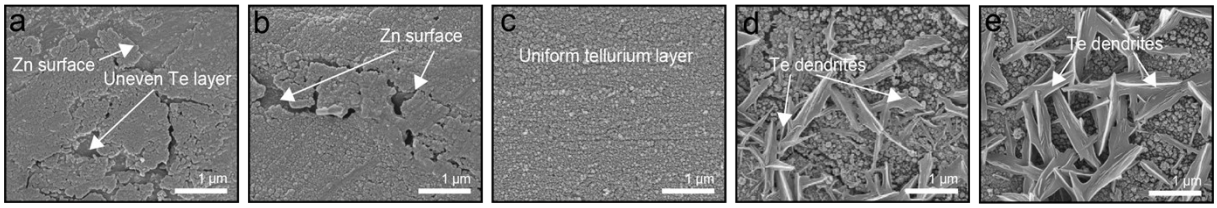

Fig. S21. Surface SEM images of Zn-TC electrodes treated for (a) 2 s (Zn-TC (thin)), (b) 5 s, (c) 10 s, (d) 20 s and (e) 30 s (Zn-TC (thick)).

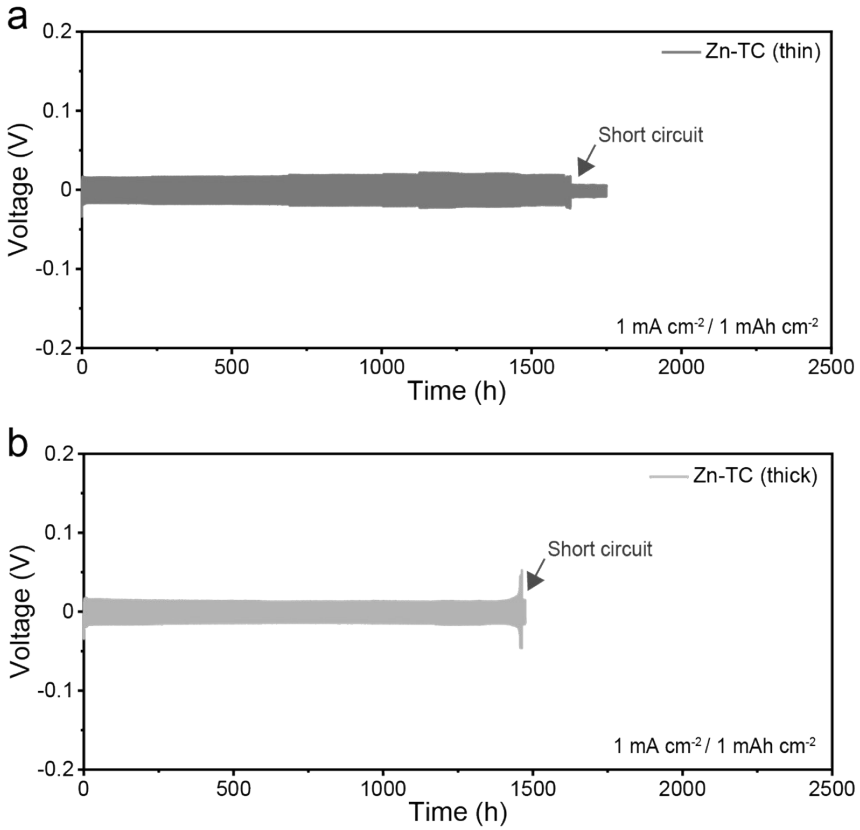

Fig. S22. Long-term galvanostatic cycling at 1 mA cm^{-2} for 1 mAh cm^{-2} in (a) Zn-TC (thin) and (b) Zn-TC (thick) symmetric cell.

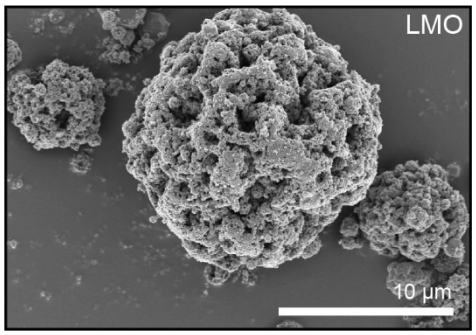

Fig. S23. SEM image of LMO cathode.

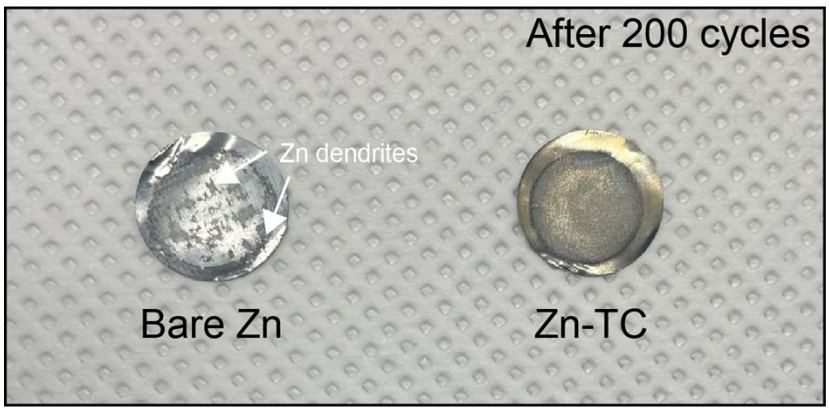

Fig. S24. Photographs of disassembled Zn anodes of (a) bare Zn//LMO and (b) Zn-TC//LMO full cell after 200 cycles.

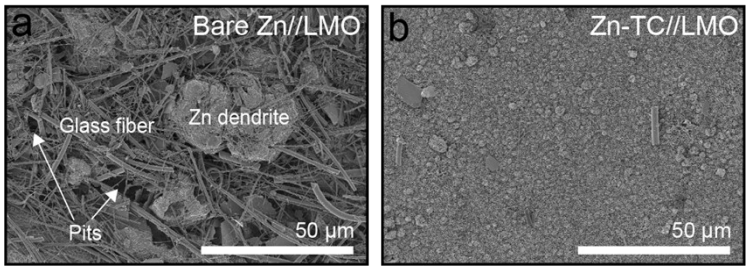

Fig. S25. SEM images of disassembled (a) separator of bare Zn//LMO and (b) Zn anode of Zn-TC//LMO after 200 cycles.

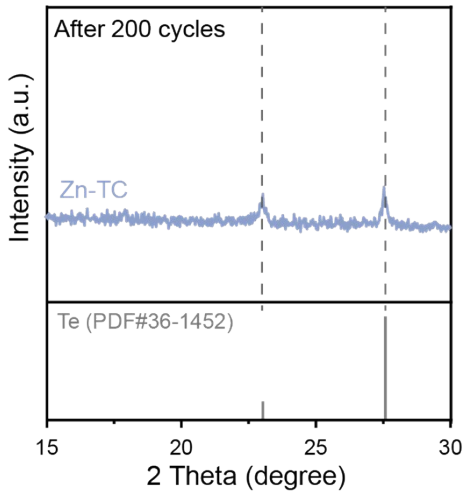

Fig. S26. XRD pattern of Zn-TC electrode of Zn-TC//LMO full cell after 200 cycles.

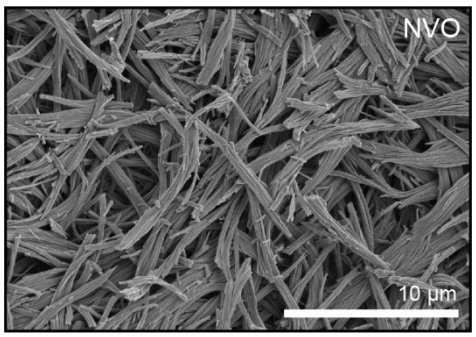

Fig. S27. SEM image of NVO nanofiber powder.

Table S1. Comparison of the cycle stability of zinc metal electrodes under symmetric cell condition with other zinc surface modification studies.

Sample	Modification method	Electrolyte	Current density [mA cm^{-2}]; Areal capacity [mAh cm^{-2}]	Cycling life [h]	Ref.
Zn-TC	Immersion method	2 M $ZnSO_4$	1;1 13;13 (50% DOD)	2500 300	This work This work
NGO@Zn	Immersion method (Langmuir–Blodgett method)	1 M $ZnSO_4$	1;1	1200	[1]
AC-Zn	Immersion method	2 M $ZnSO_4$	1;0.5	1914	[2]
GFA-5	Immersion method	1 M $ZnSO_4$	1;1	2000	[3]
PFPE-Zn	Drop-casting method	1 M $ZnSO_4$	1;1	300	[4]
Zn@PFSA	Drop-casting method	1 M $ZnSO_4$	1;1	800	[5]
Zn@ZnOPC	Hydrothermal method; Blade-coating method	2 M $ZnSO_4$	1;1	450	[6]
HAC-modified Zn	Blade-coating method	3 M $ZnSO_4$	1;1	1500	[7]
PVDF-SBA15@Zn	Spin-coating method	3 M $ZnSO_4$	1;1	460	[8]
Zn@PDMS/TiO_{2-x}	Spin-coating method	1 M $ZnSO_4$	1;1	900	[9]
Zn@600nm-ZIF-8	Chemical vapor deposition method	2 M $ZnSO_4$	1;1	1100	[10]
(C2F4)n-C@Cu@Zn	Chemical vapor deposition method	2 M $ZnSO_4$	1;1	1200	[11]
Zn@ZnF_2	Electrochemical growth method	2 M $ZnSO_4$	1;1	800	[12]
Tar-Zn	Ultrasonic coating	2 M $ZnSO_4$	1;1	1600	[13]

Table S2. Comparison of the cycle stability of full cells with other zinc surface modification studies.

Sample	Modification method	Current density [A g^{-1}]	Capacity retention	Ref.
Zn-TC//LMO	Immersion method	1	67% after 1000 cycles	This work
Zn-TC//NVO		5	80.6% after 1000 cycles	This work
PM@Zn//LMO	Freeze-thaw process; Immersion method	0.24	80% after 350 cycles	[14]
SAP-GF//LMO	Immersion method	0.2	61.3% after 500 cycles	[15]
fs-Zn//β-MnO_2	Immersion method (HCl + LiF etching)	2	ca. 50% after 500 cycles	[16]
Cys–Zn@Zn//MnO_2	Immersion method	1	ca. 38% after 1000 cycles	[17]
SCOFs@Zn//α-MnO_2	Blade-coating method	1	ca. 20% after 1000 cycles	[18]
Zn@graphene//α-MnO_2	Blade-coating method	8	63% after 1000 cycles	[19]
Zn@CTF//CVO (calcium-doped V_2O_5)	Ionothermal method; blade-coating method	1	ca. 70% after 500cycles	[20]
Zn@Ag//V_2O_5	Thermal evaporation	2	74.7% after 1500cycles	[21]
TiO_2@(LMO-A0.5)	Calcination; hydrolysis reaction	0.1	88% after 200 cycles	[22]
LLP@ZF//MnO_2	Laser lithography	1	75% after 500 cycles	[23]

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