

Supporting Information

Natural Mineral Engineering of Zinc Anode: Attapulgite-Based Interfacial Modification for Dendrite-Free Aqueous Zinc-Ion Batteries

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1. Supplementary figures

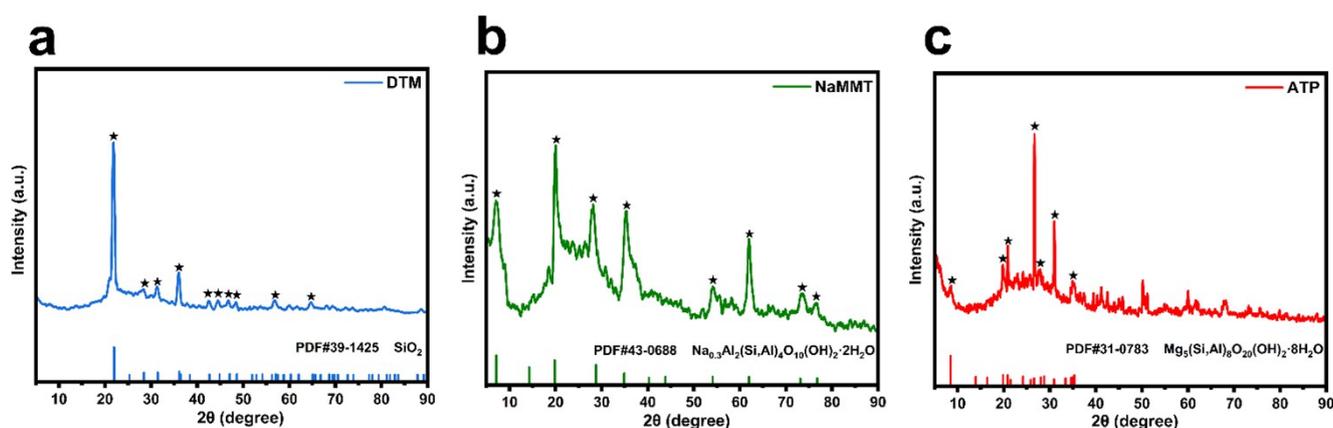


Figure S1. XRD patterns of (a) DTM, (b) NaMMT and (c) ATP.

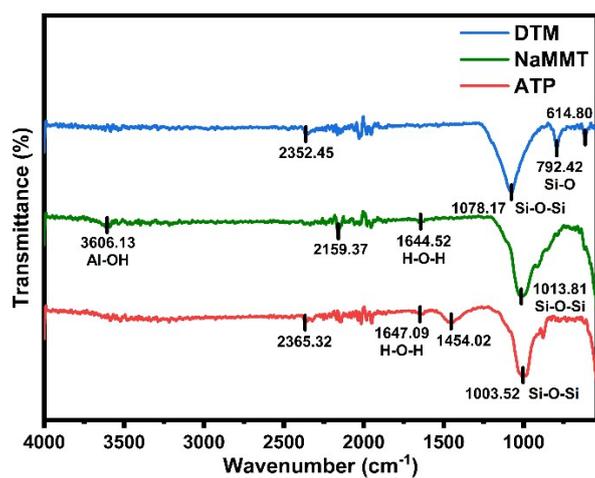


Figure S2. FTIR spectra.

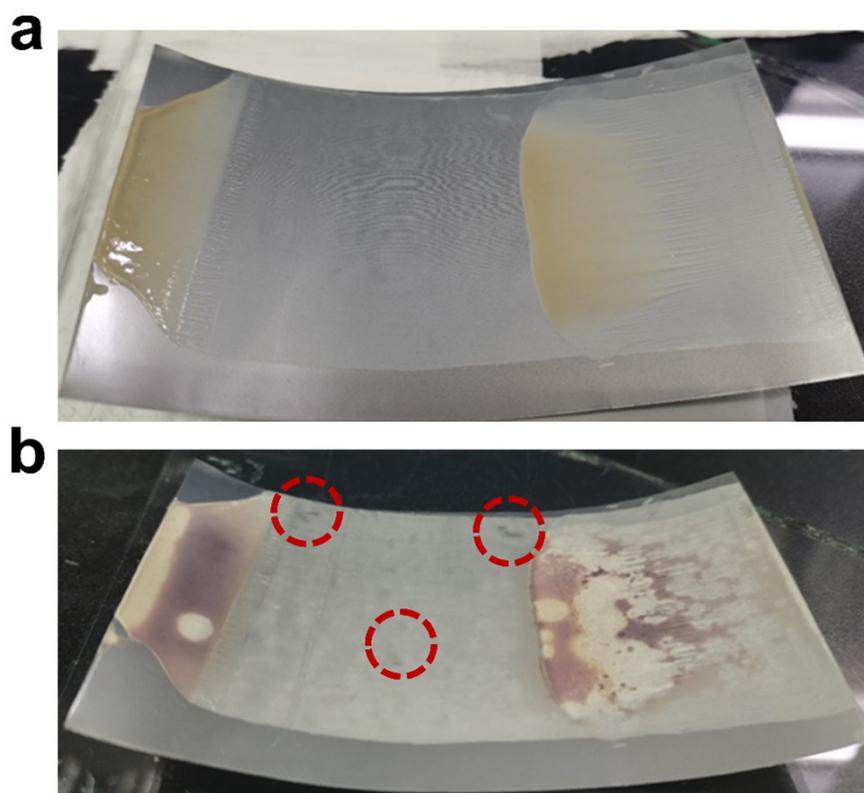


Figure S3. Digital images of zinc foil with attached ATP-modified coating thinner than that prepared using a 120 μm quadrilateral applicator: (a) Before vacuum drying, (b) After vacuum drying (three relatively obvious exposed areas are indicated by red circles).

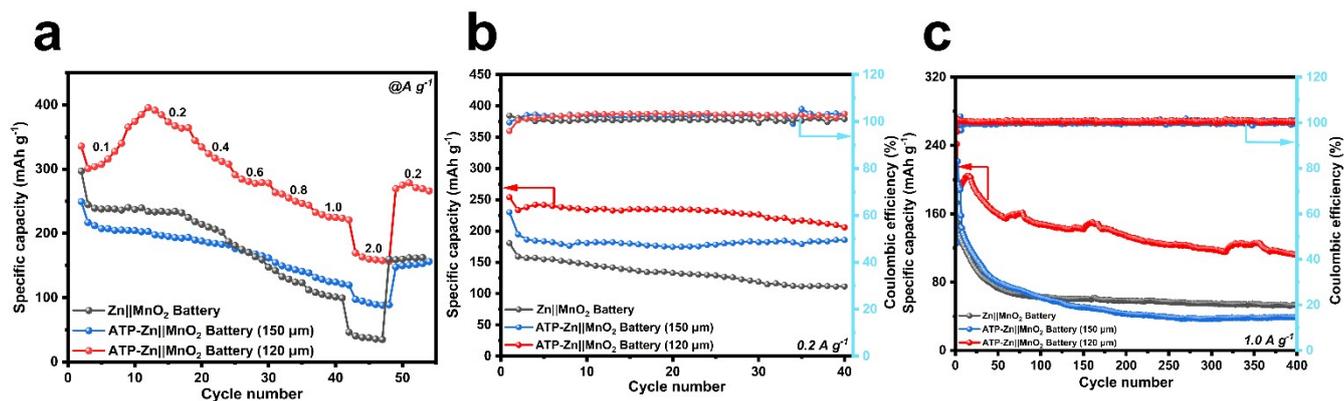


Figure S4. Electrochemical performance comparison of full cells with ATP-modified coatings on zinc anodes prepared using a 150 μm quadrilateral applicator: (a) Rate performance, (b) Cycling performance at 0.2 A g⁻¹, (c) Cycling performance at 1.0 A g⁻¹.

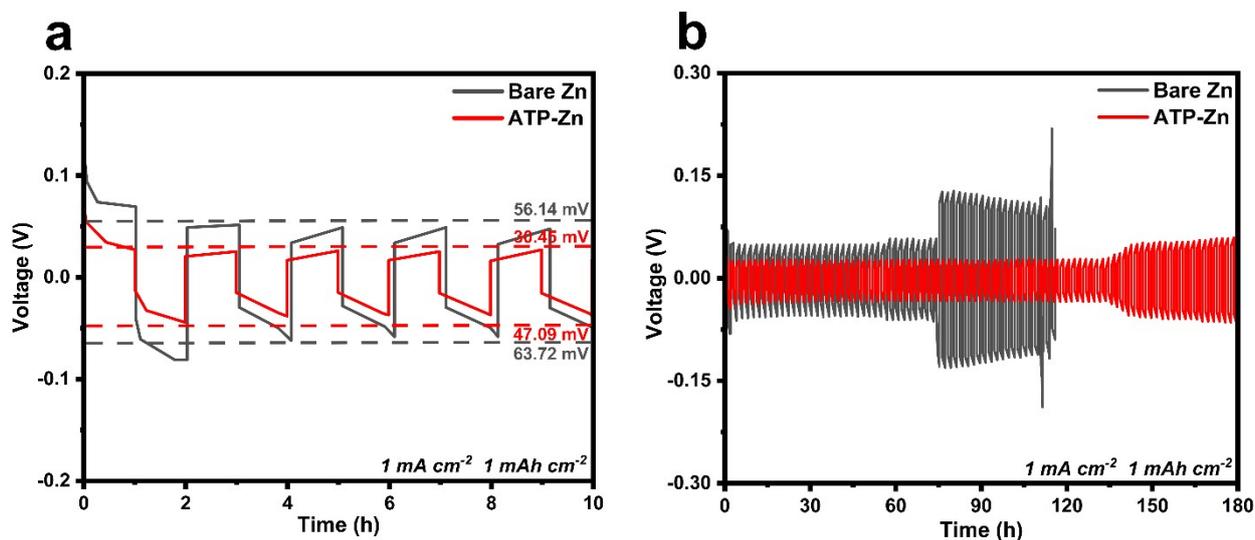


Figure S5. Electrochemical performance of symmetric cells with zinc anodes before and after ATP coating modification: (a) Voltage-time curve during the initial cycling stage, (b) Cycling performance.

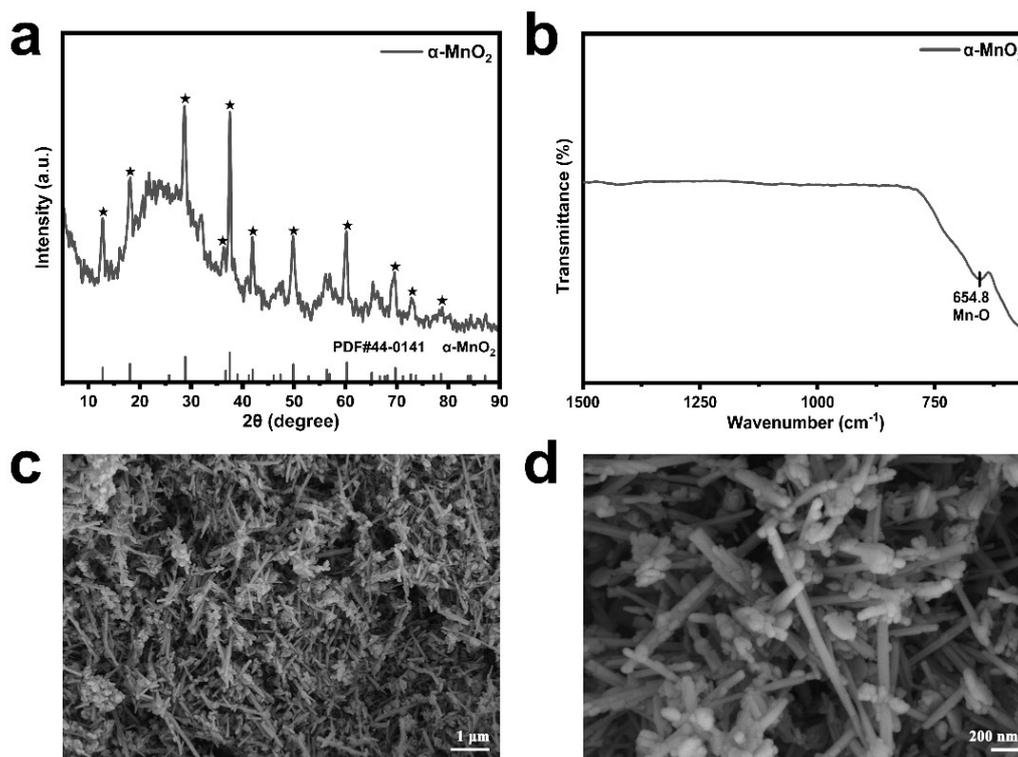


Figure S6. (a) XRD pattern of MnO₂. (b) FTIR spectrum of MnO₂. (c) Low-magnification SEM image of MnO₂. (d) High-magnification SEM image of MnO₂.

2. Supplementary table

Table S1. Comparison of main parameters and cycling performance of this work with recently reported Zn-based symmetrical cells.

Electrode	Electrolyte	Current density (mA cm ⁻²)	Capacity (mAh cm ⁻²)	Voltage hysteresis (mV)	Life (h)	Reference
ATP-Zn	2M ZnSO₄	0.25 1	0.05 1	44 47	1300 180	This work
Zn foil	water@ZnMOF-808 solid-electrolyte	0.1	0.01	~100	360	[1]
Zn powder	1M Zn(TFSI) ₂ + 20M LiTFSI	0.2	0.068	~150	~170	[2]
nano-CaCO ₃ -coated Zn	3M ZnSO ₄ + 0.1M MnSO ₄	0.25	0.05	80	800	[3]
nano-HfO ₂ coating	2M ZnSO ₄	0.4	0.1	48	150	[4]
MMT-Zn	2M ZnSO ₄	1	0.25	50	100	[5]

Zn@CF	2M ZnSO ₄ + 0.1M MnSO ₄	1	1	/	160	[6]
Zn@ZIF-8	2M ZnSO ₄	1	1	25	50	[7]
Zn plate@TiO ₂	3M Zn(CF ₃ SO ₃) ₂ + 0.1M Mn(CF ₃ SO ₃) ₂	1	1	~57.2	150	[8]
100TiO ₂ @Zinc	3M Zn(SO ₃ CF ₃) ₂	1	1	72.5	150	[9]

Reference

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