

Supplementary Information

Highly Reversible Aqueous Zinc-ion Battery by Chelating Agent Triethanolamine as Electrolyte Additive

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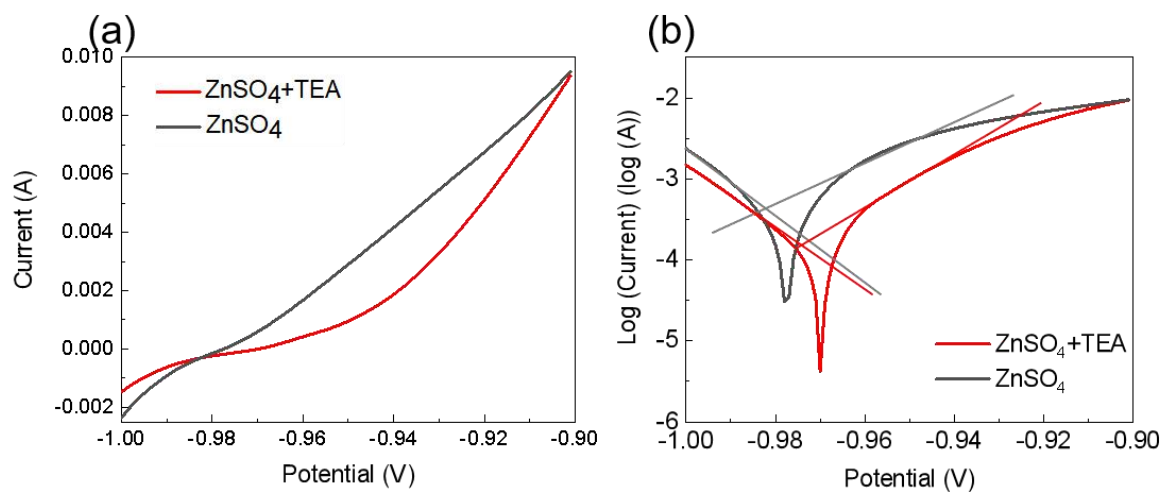


Figure S1. Linear sweep voltammetry (LSV) (a) and Linear polarization curves (b) of Zn foil in the electrolyte: electrolyte ZnSO₄+TEA and ZnSO₄.

Table S1

Electrolyte	ZnSO ₄	ZnSO ₄ +TEA
E _{corr} (V)	-0.985	-0.975
I _{corr} (μA cm ⁻²)	530	150

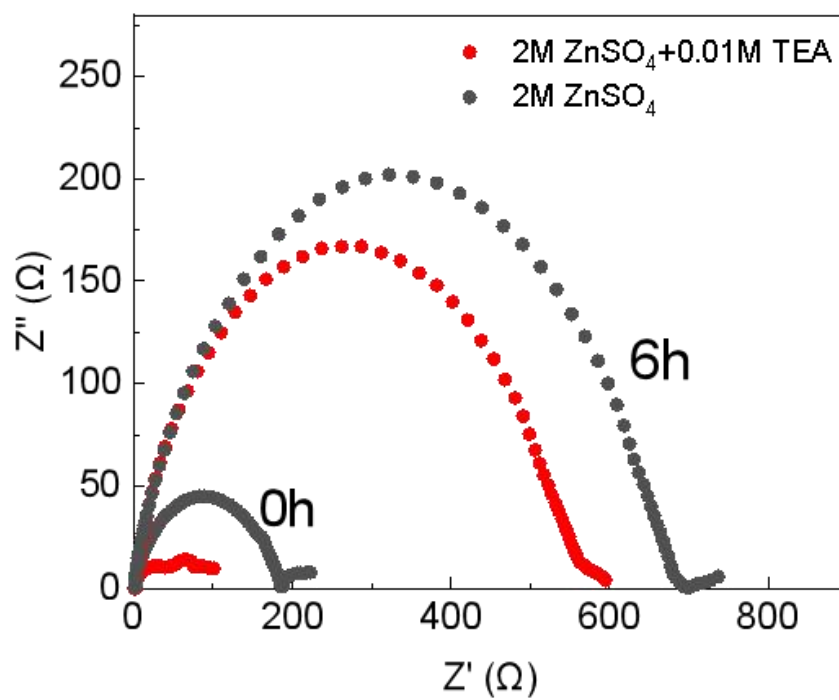


Figure S2. Electrochemical impedance spectroscopy (EIS) of symmetric cells Zn||Zn fresh and after standing 6 hours with electrolyte ZnSO₄+TEA and ZnSO₄.

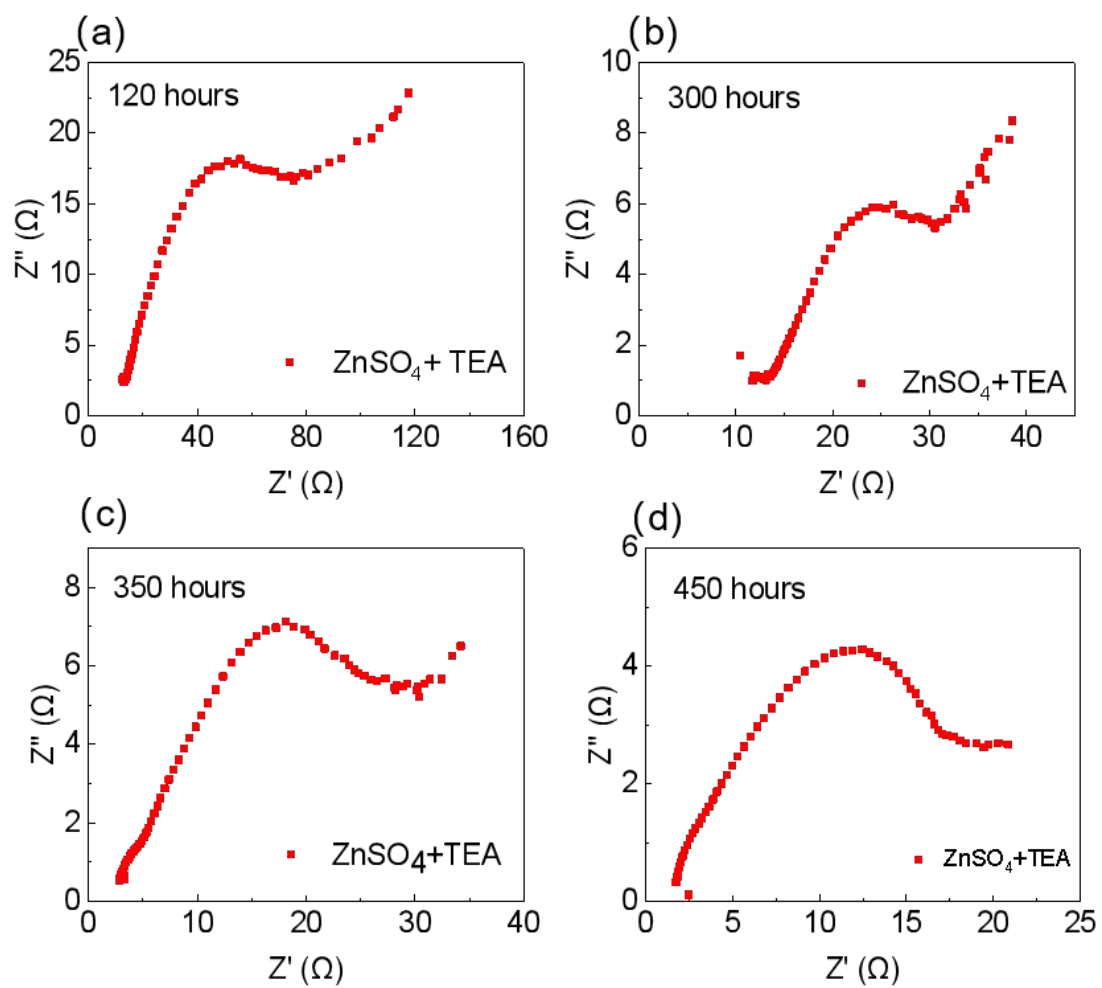


Figure S3. EIS of symmetric cell Zn||Zn at different cycle with electrolyte of ZnSO₄+TEA

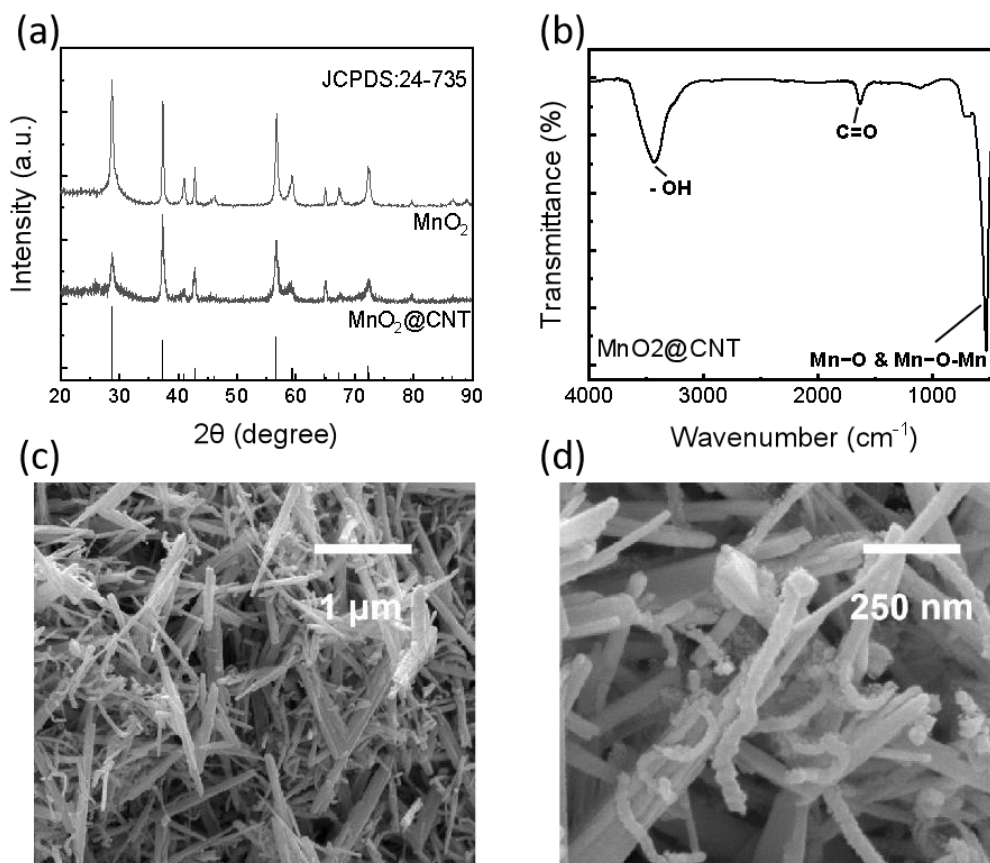


Figure S4. XRD of MnO₂@CNT (a), FTIR of MnO₂@CNT (b), and SEM images of MnO₂@CNT with different magnification (c and d).

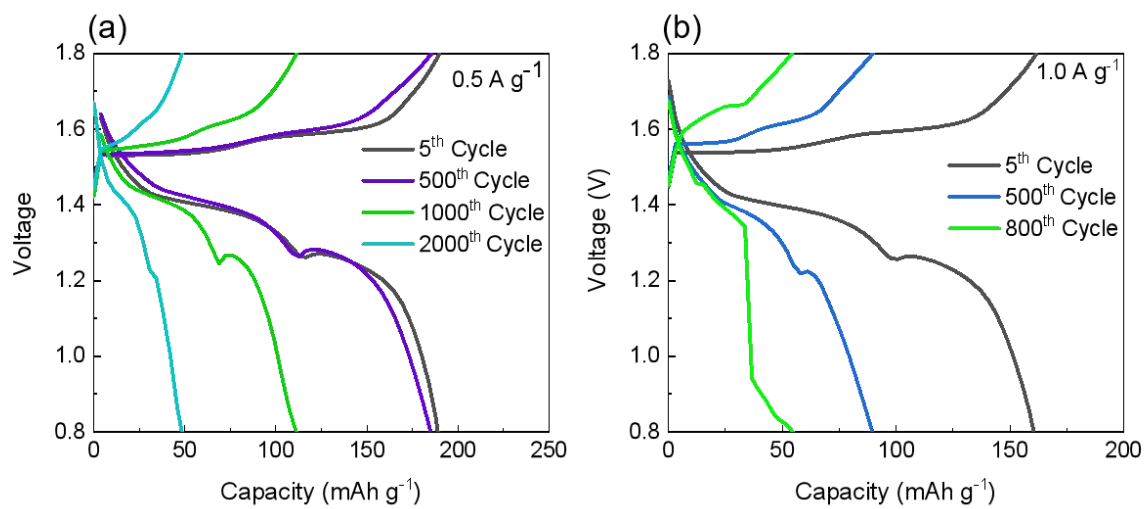


Figure S5. Charge/discharge curves of Zn||MnO₂@CNT in electrolyte without TEA additive for different cycles at 0.5 A g⁻¹ (a) and 1.0 A g⁻¹ (b).

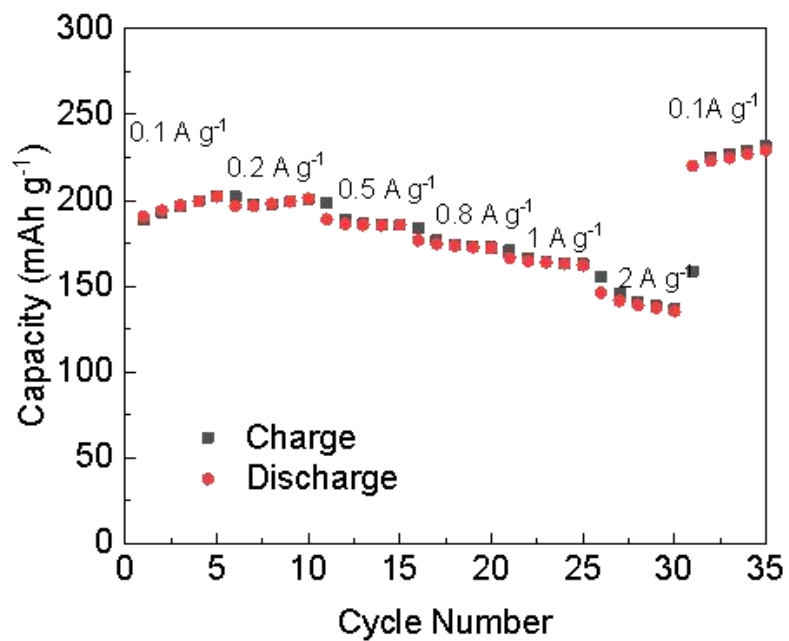


Figure S 6 Rate performance of Zn||MnO₂@CNT in electrolyte without TEA additive from current density 0.1-2 A g⁻¹

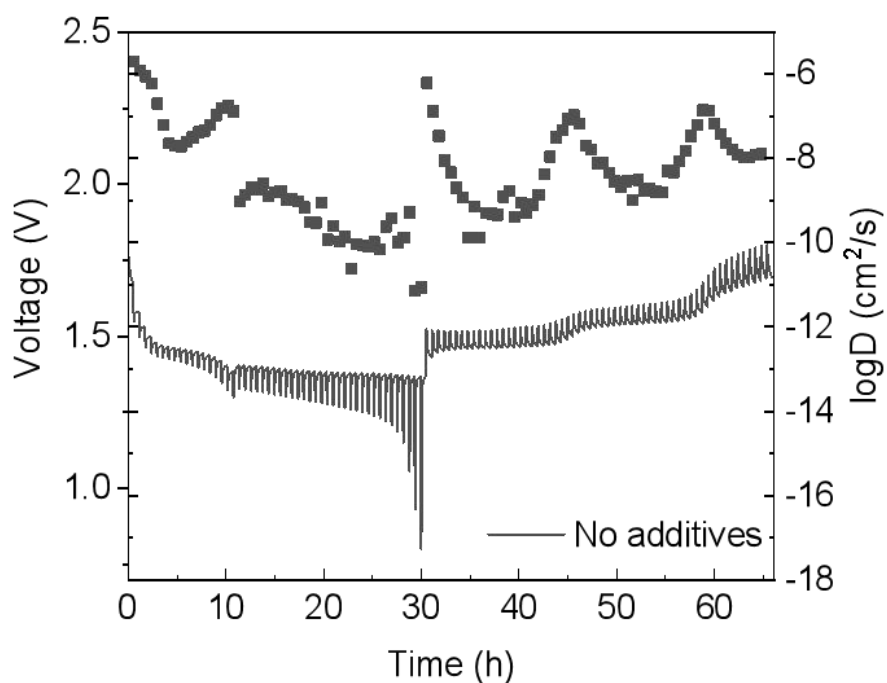


Figure S 7. GITT of Zn||MnO₂@CNT in electrolyte without TEA additive

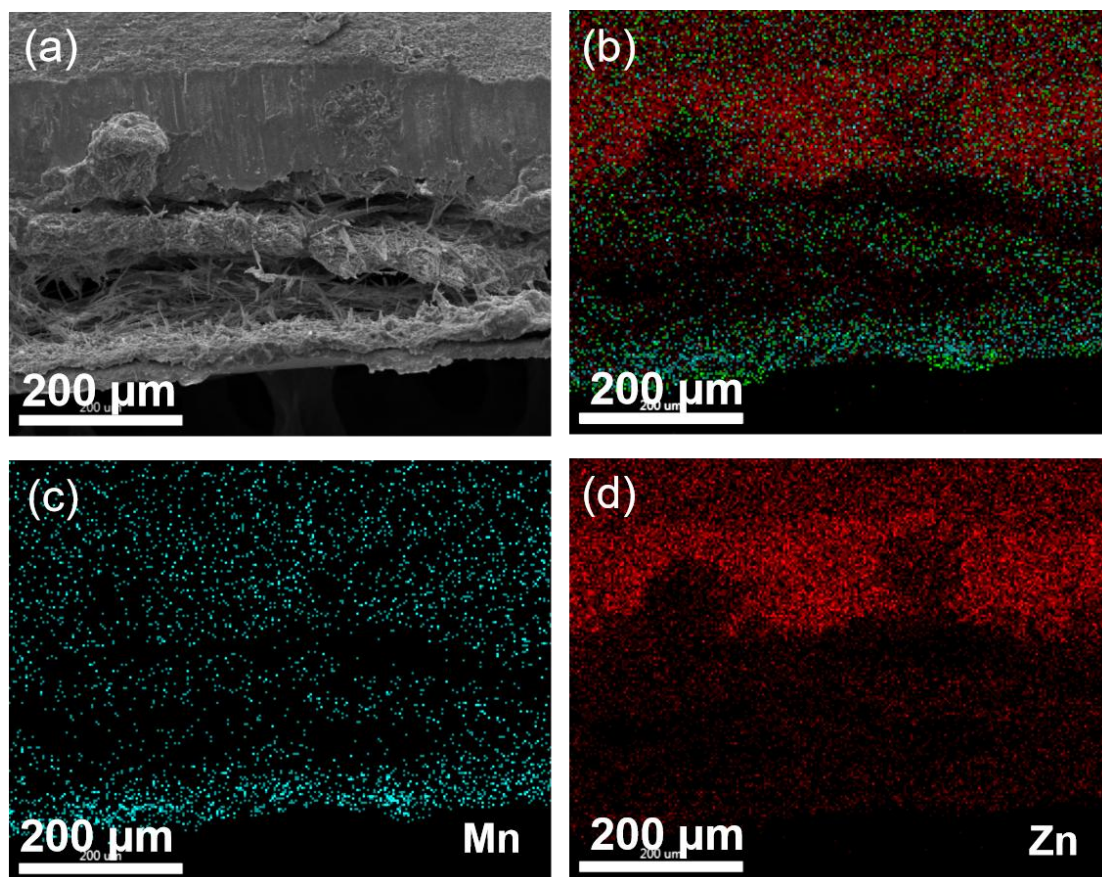


Figure S8. SEM image of cross-section of cell Zn||MnO₂@CNT with TEA additive in electrolyte (a), EDS mapping (b) of elements Mn (c) and Zn (d).

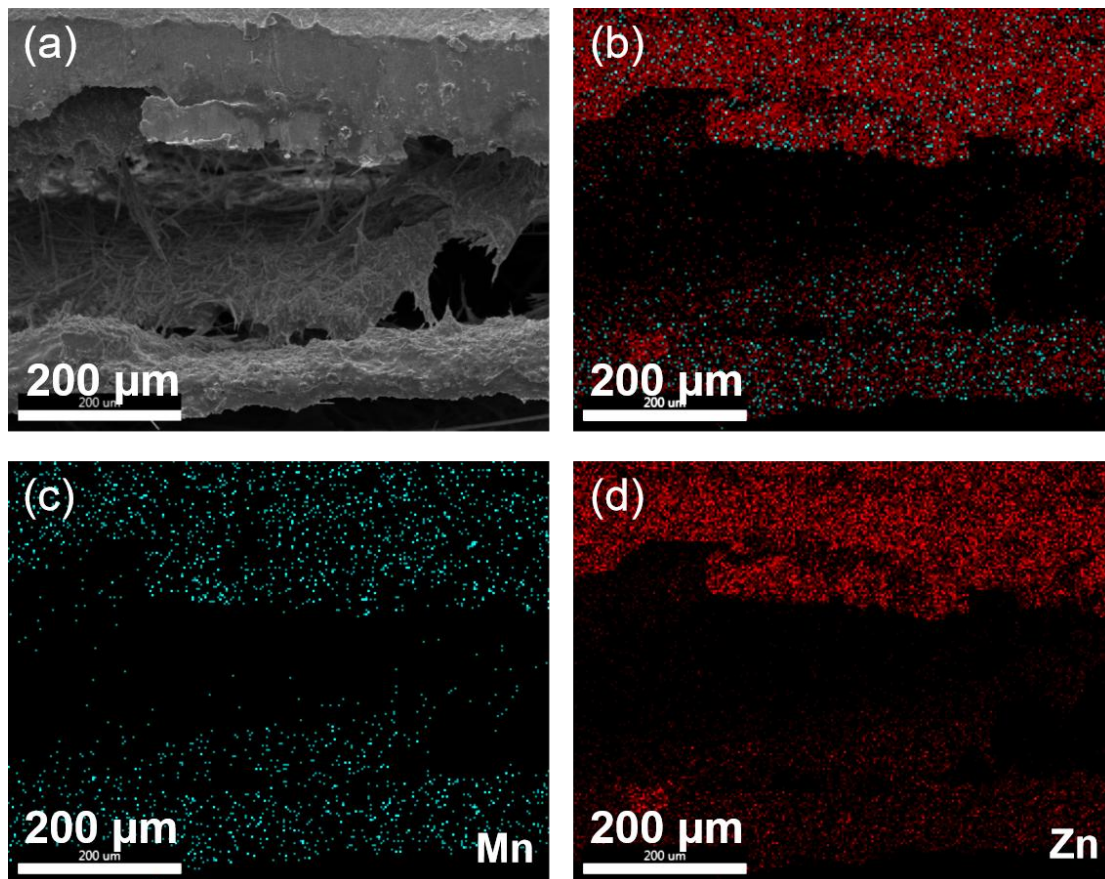


Figure S9. SEM image of cross-section of cell Zn||MnO₂@CNT without TEA additive in electrolyte (a), EDS mapping (b) of elements Mn (c) and Zn (d).

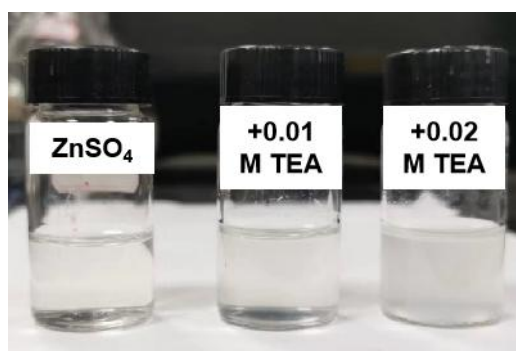


Figure S10 Photograph of solutions: 2M ZnSO₄, 2M ZnSO₄+0.01 M TEA, and 2M ZnSO₄+0.02 M TEA.

Table 2. Recent studies of electrolyte additive in aqueous zinc-ion battery.

Additive	Cthode	Electrolyte	Cycling stability	Ref.
SDS	Na ₂ MnFe(CN) ₆	1 M ZnSO ₄ + 1 M Na ₂ SO ₄	75% after 2000 cycles at 0.8 A g ⁻¹	[1]
glucose	MnO ₂	1 M ZnSO ₄	80 % after 1000 cycles at 3 A g ⁻¹	[2]
BIS-TRIS	MnO ₂	2 M ZnSO ₄	86% after 600 cycles at 0.5 A g ⁻¹	[3]
TEHS	MnO ₂	0.5 M ZnSO ₄	83% after 200 cycles at 0.2 A g ⁻¹	[4]
EDTA	MnO ₂ /graphite	2 M ZnSO ₄	81% after 1000 cycles at 1 A g ⁻¹	[5]
EDTA	MnO ₂	2M ZnSO ₄	71% after 500 cycles at 1 mA cm ⁻²	[6]
PAM	MnO ₂	2M ZnSO ₄ + 0.1M MnSO ₄	87% after 200 cycles at 0.2 A g ⁻¹ 98% after 600 cycles at 1 A g ⁻¹	[7]
TEA	MnO ₂ /CNT	2M ZnSO ₄ + 0.1M MnSO ₄	78% after 2000 cycles at 0.5 A g ⁻¹	This work

Reference

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