Supporting Information

Flexible and stable N-isopropylacrylamide/sodium alginate gel electrolytes for aqueous Zn-MnO_2 batteries

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1. Figure S1-S7

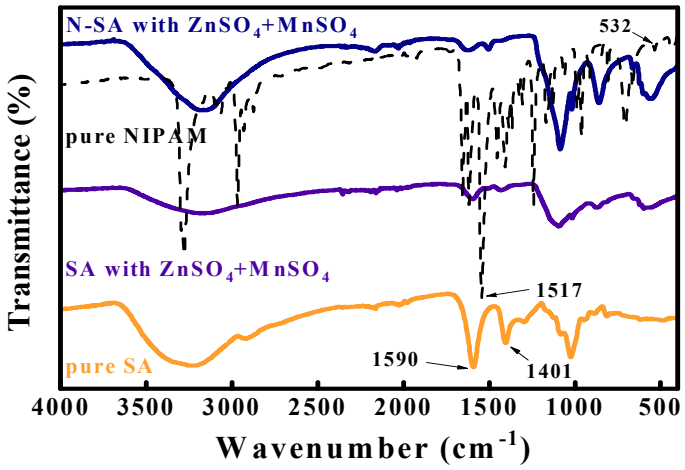

Figure S1. FTIR spectra of pure SA, pure NIPAM, SA and N-SA with $ZnSO_4$+$MnSO_4$.

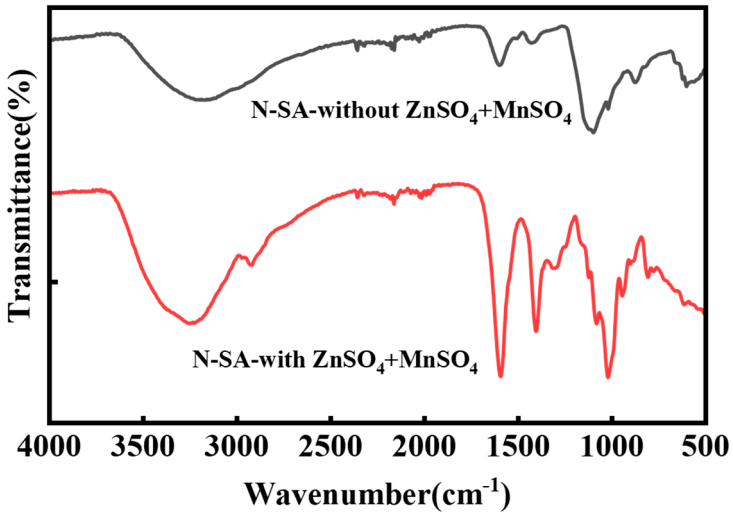

Figure S2. FTIR spectra of N-SA with and without $ZnSO_4$+$MnSO_4$.

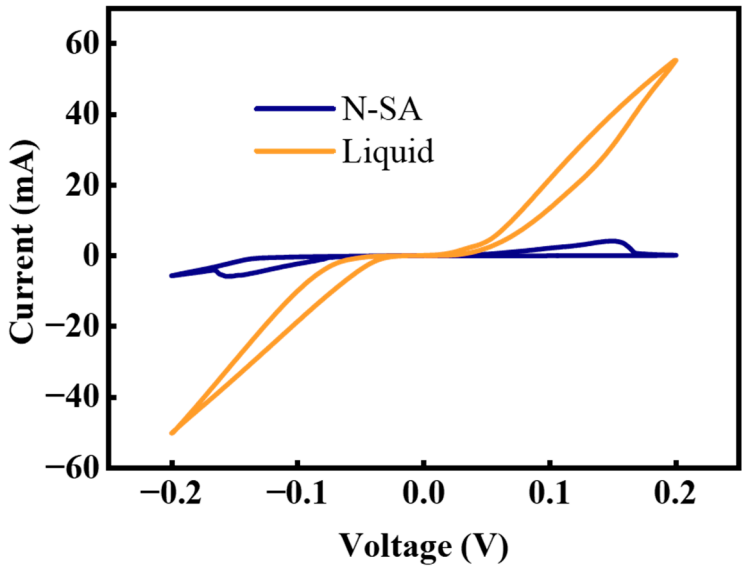

Figure S3. CV curves of symmetrical cells of the N-SA gel electrolyte and liquid electrolyte at 1 mV s^{-1}.

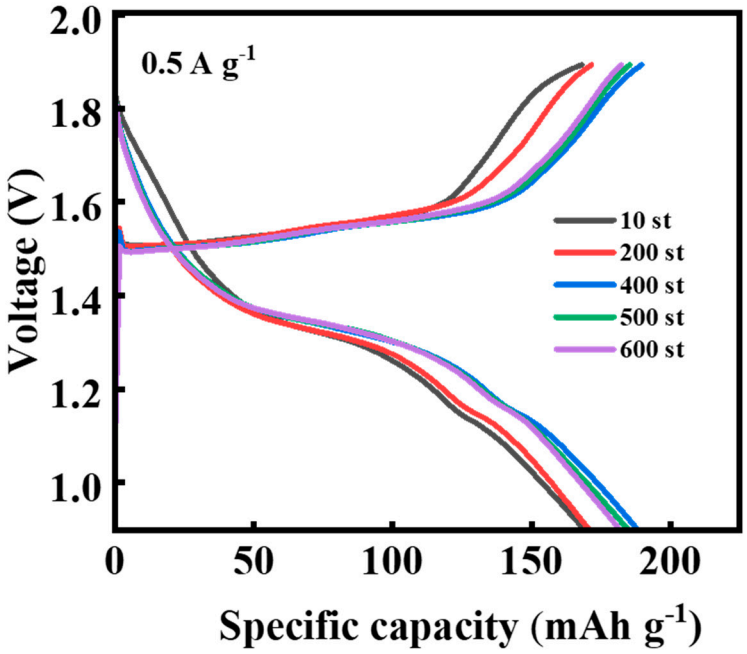

Figure S4. Discharge/charge profiles of Zn/MnO_2 cells with the N-SA hydrogel electrolyte at different cycles.

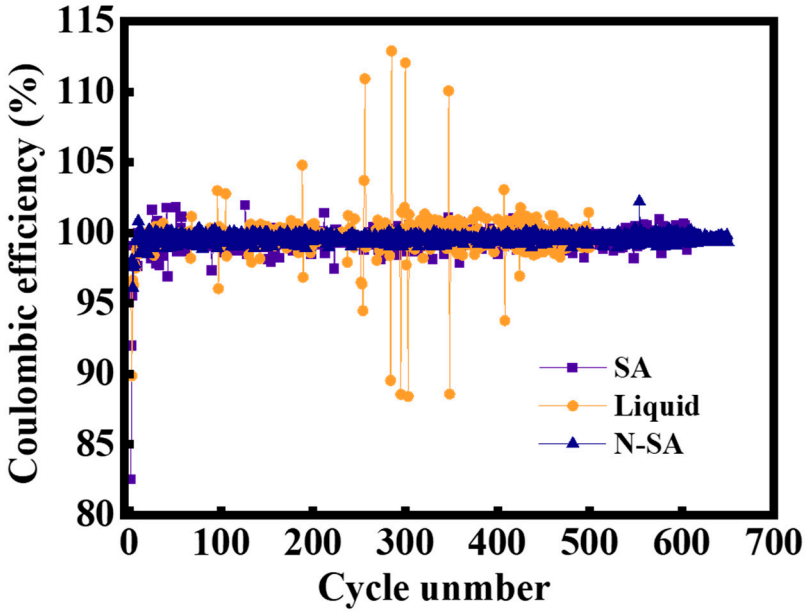

Figure S5. The coulombic efficiency of the Zn/MnO_2 asymmetric cells with the liquid, N-SA and SA gel electrolyte at 0.5 A g^{-1}.

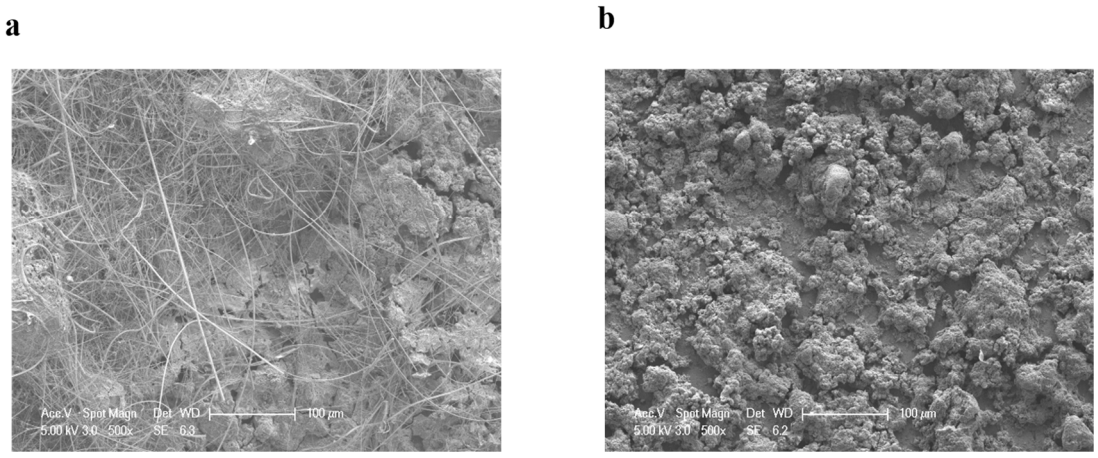

Figure S6. The SEM images of the positive electrodes collected from the cells with the liquid electrolyte (a) and N-SA hydrogel electrolyte (b) at 0.5 A g^{-1} after 300 cycles.

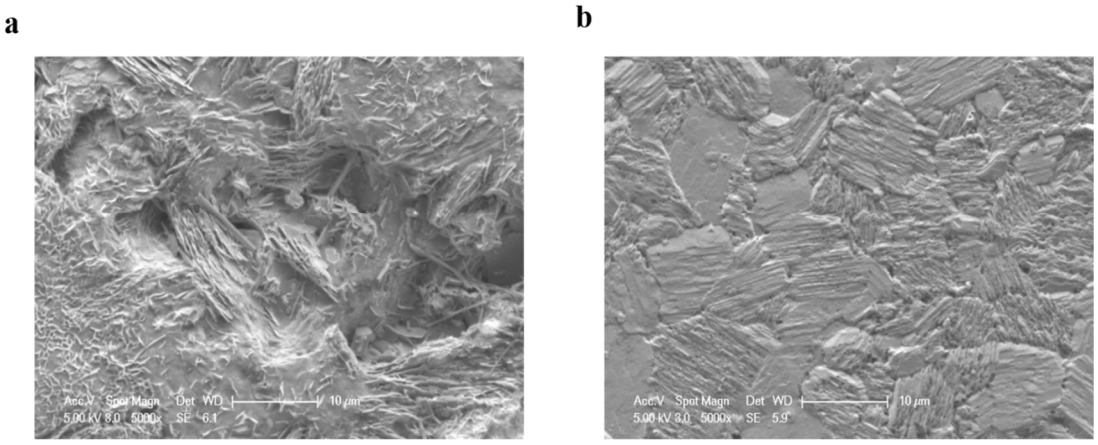

Figure S7. The SEM images of the Zn negative electrodes collected from the cells with the liquid electrolyte (a) and N-SA hydrogel electrolyte (b) at 0.5 A g^{-1} after 500 cycles.

2. Table S1

Table S1. The capacity retention of our Zn-MnO_2 battery with N-SA at room temperatures, in comparison with that of previously reported typical aqueous batteries (mainly including aqueous zinc-ion batteries (AZIBs).

Aqueous battery	Electrolyte	Specific capacity (mAh g^{-1})	Retention	Ref.
Zn/α-MnO_2	N-SA hydrogel	182@650 cycles at 0.5 A g^{-1}	98%	**This work**
Zn/MnO_2	GG/SA/EG hydrogel	137@1000 cycles at 6 A g^{-1}	91.25%	[1]
Zn/MnO_2@rGO	PVA-B-G hydrogel	220 @2000 cycles at 1 A g^{-1}	93.7%	[2]
Zn/MnO_2	PVA-COOH hydrogel	177@1000 cycles at 1C	83%	[3]
Zn/MnO_2 @rGO	PAM-Lap hydrogel	97@600 cycles at 2 A g^{-1}	--	[4]
Zn/MnO_2 @SWCNTs	AMP-Mn/PVA hydrogel	95@600 cycles at 2 A g^{-1}	99.97%	[5]
Zn/MnO_2@CNT	SPI/PAAM hydrogel	299.3@500 cycles at 0.2 C	78.2%	[6]
Zn/MnO_2	PHEMA hydrogel	97@1000 cycles at 0.5 A g^{-1}	95%	[7]
Zn/MnO_2	PSPAZn hydrogel	110@220 cycles at 0.5 A g^{-1}	77.1%	[8]

References

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