

Organic-inorganic hybrid ferrocene/AC as cathodes for wide temperature range aqueous Zn-ion supercapacitors

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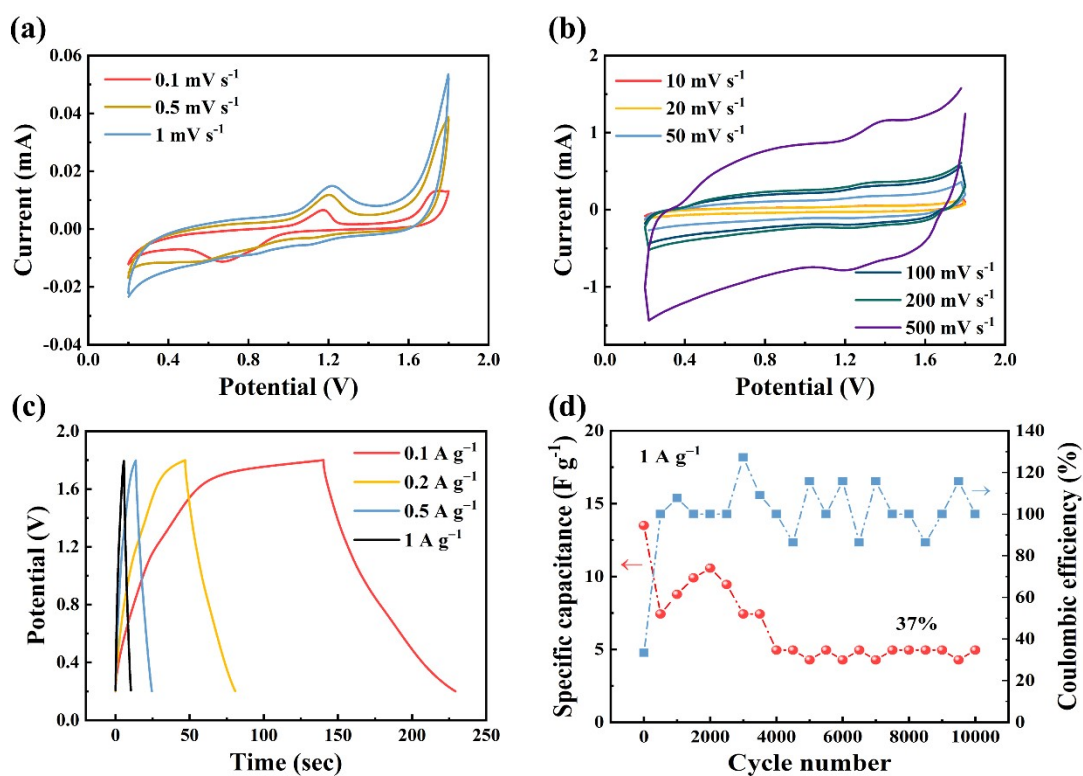


Fig. S1 Electrochemical behaviors of ZHSCs using ferrocene cathode (a) CV curves of low scan rates ($0.1\text{--}1\text{ mV s}^{-1}$); (b) CV curves of high scan rates ($10\text{--}500\text{ mV s}^{-1}$); (c) GCD profiles; (d) Long-term cycling at 1 A g^{-1} .

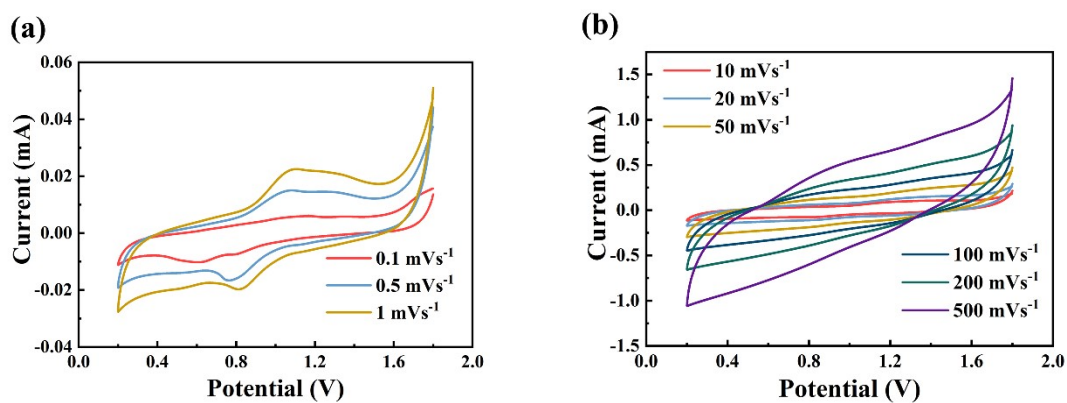


Fig. S2 CV curves of ZHSCs using ferrocene cathode in 1 M ZnSO_4 (a) $0.1\text{--}1\text{ mV s}^{-1}$; (b) $10\text{--}500\text{ mV s}^{-1}$.

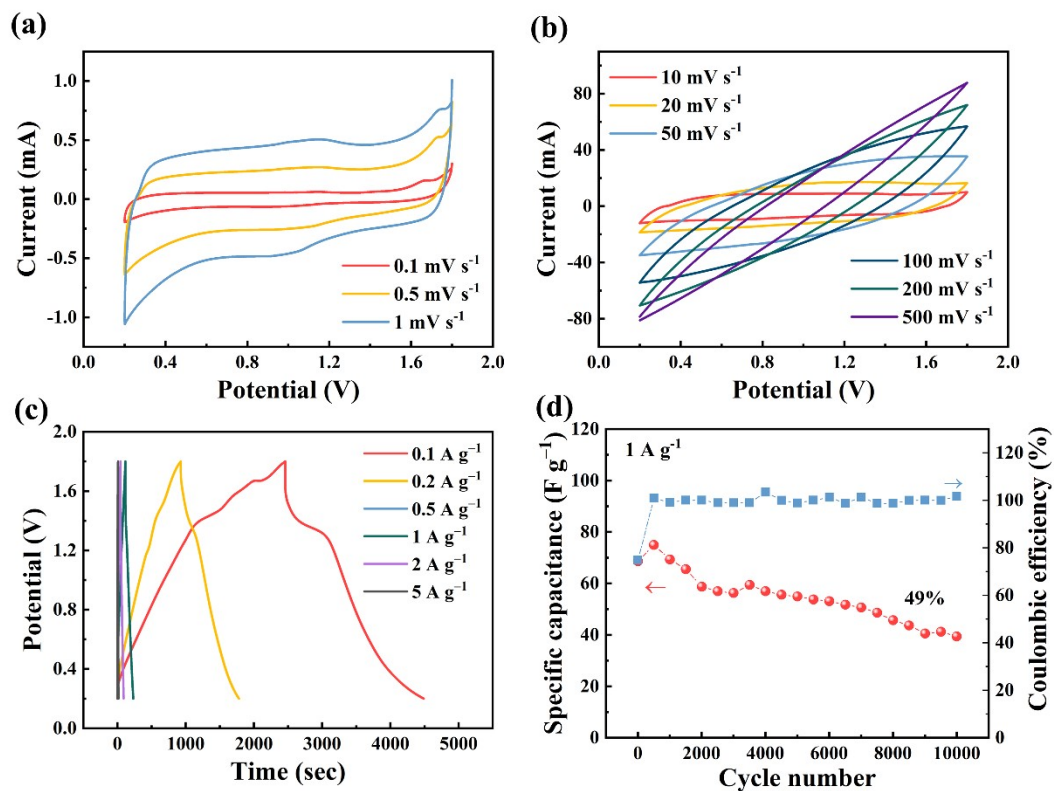


Fig. S3 Electrochemical behaviors of ZHSCs using AC cathode (a) CV curves of low scan rates ($0.1\text{--}1\text{ mV s}^{-1}$); (b) CV curves of high scan rates ($10\text{--}500\text{ mV s}^{-1}$); (c) GCD profiles; (d) Long-term cycling at 1 A g^{-1} .

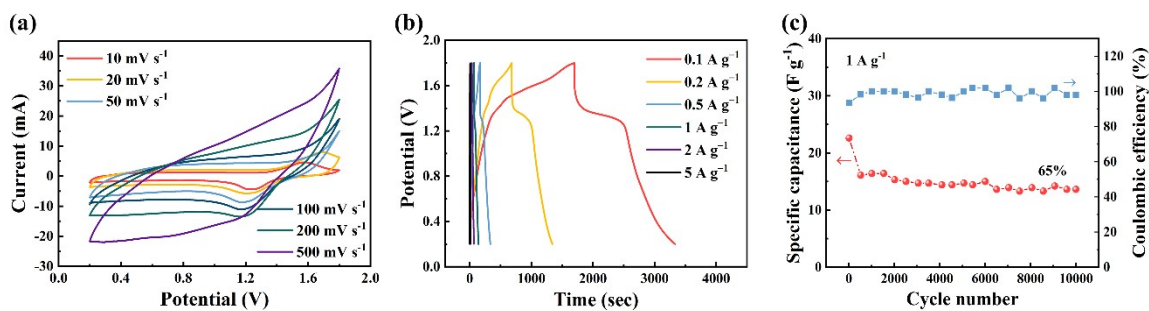


Fig. S4 Electrochemical behaviors of ZHSCs using hybrid cathode (ferrocene and AC in a mass ratio of 3:1) (a) CV curves; (b) GCD profiles; (c) Long-term cycling at 1 A g^{-1} .

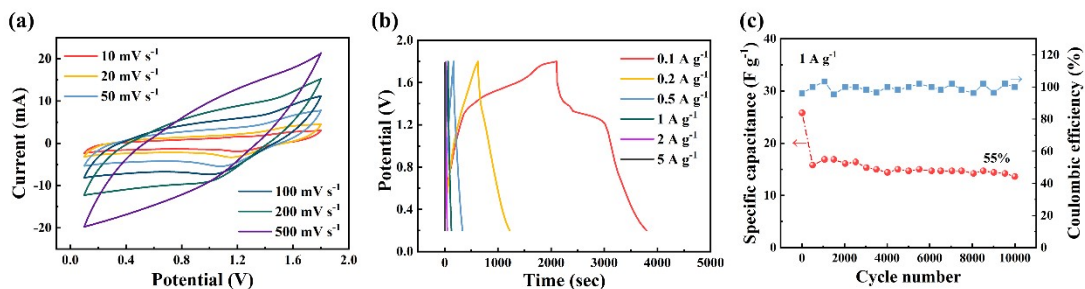


Fig. S5 Electrochemical behaviors of ZHSCs using hybrid cathode (ferrocene and AC in a mass ratio of 5:1) (a) CV curves; (b) GCD profiles; (c) Long-term cycling at 1 A g^{-1} .

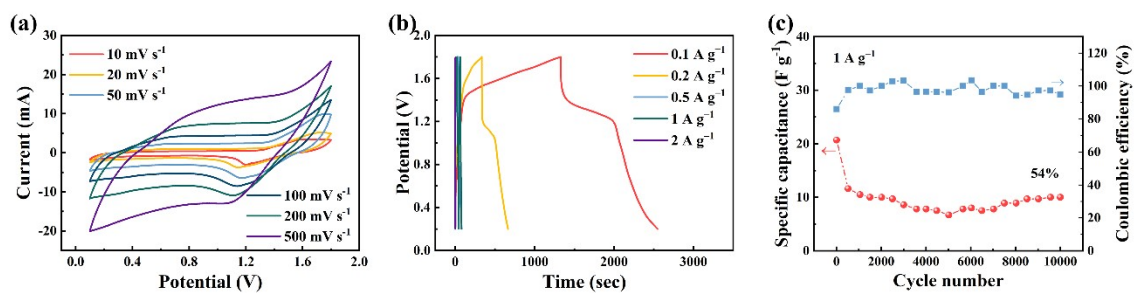


Fig. S6 Electrochemical behaviors of ZHSCs using hybrid cathode (ferrocene and AC in a mass ratio of 7:1) (a) CV curves; (b) GCD profiles; (c) Long-term cycling at 1 A g^{-1} .

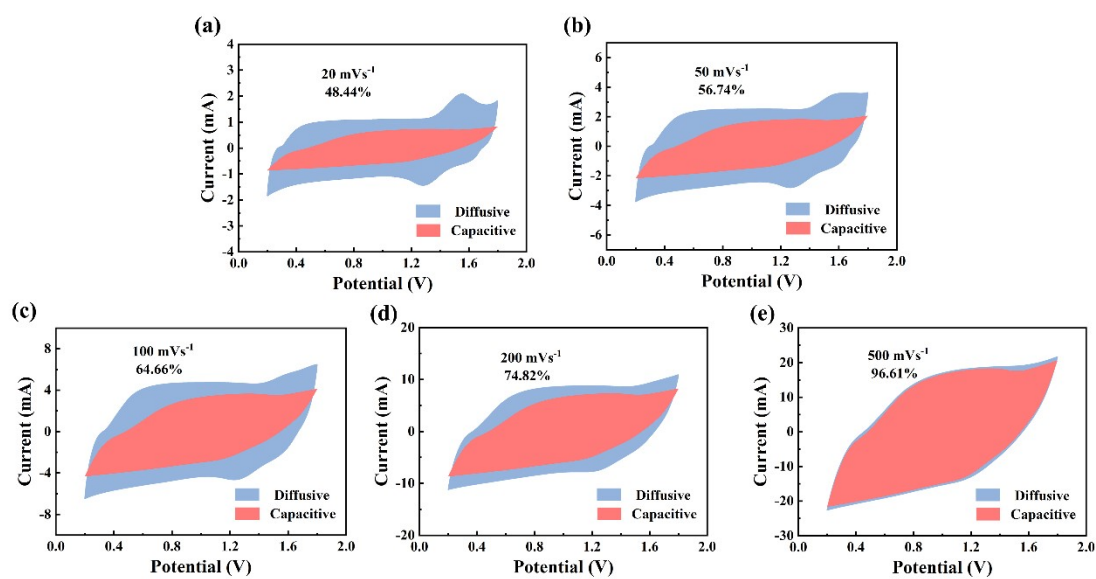


Fig. S7 Capacitive contribution to the total current from CV analysis at different scan rates (the red region).

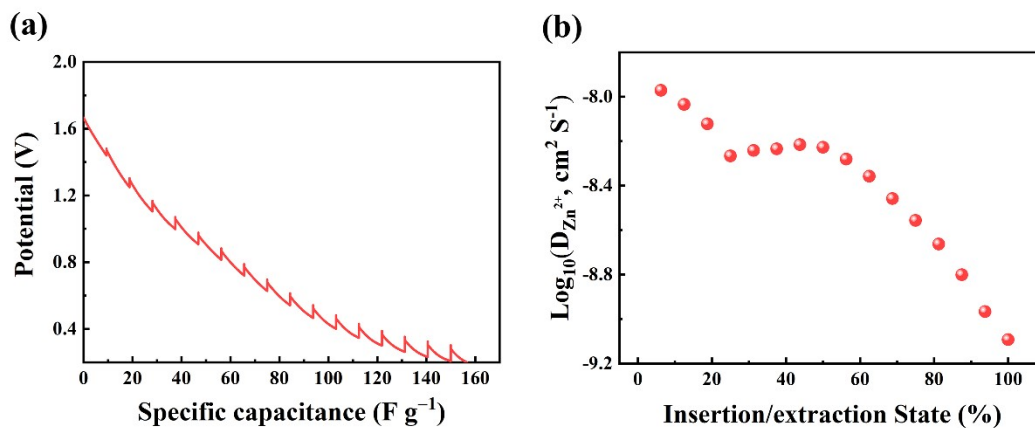


Fig. S8 (a) Discharge curve in GITT measurements of ZHSCs using AC cathode; (f) The corresponding Zn²⁺ diffusion coefficient during the discharge process.

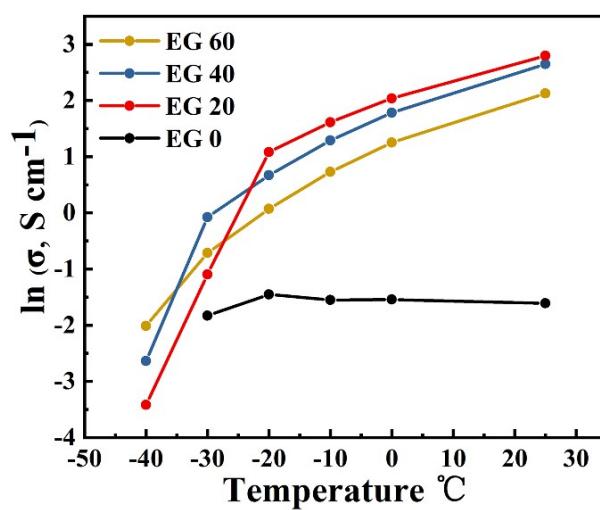


Fig. S9 The ionic conductivities of EG0, EG20, EG40 and EG60.

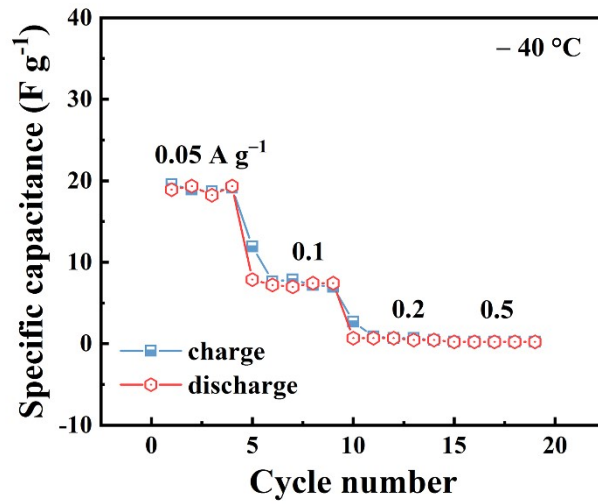


Fig. S10 Rate performance of ZHSCs using ferrocene/AC cathode at -40 °C.

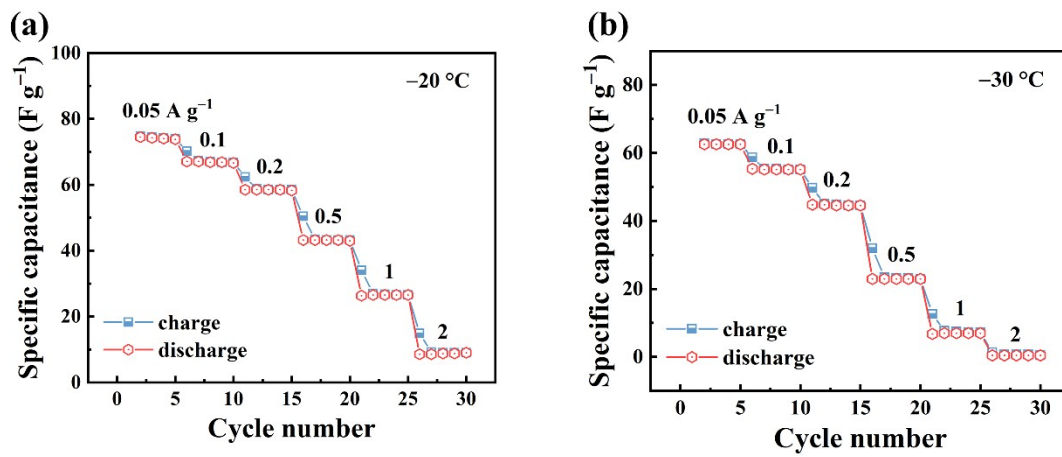


Fig. S11 Rate performance of ZHSCs using AC cathode at -20 °C and -30 °C.

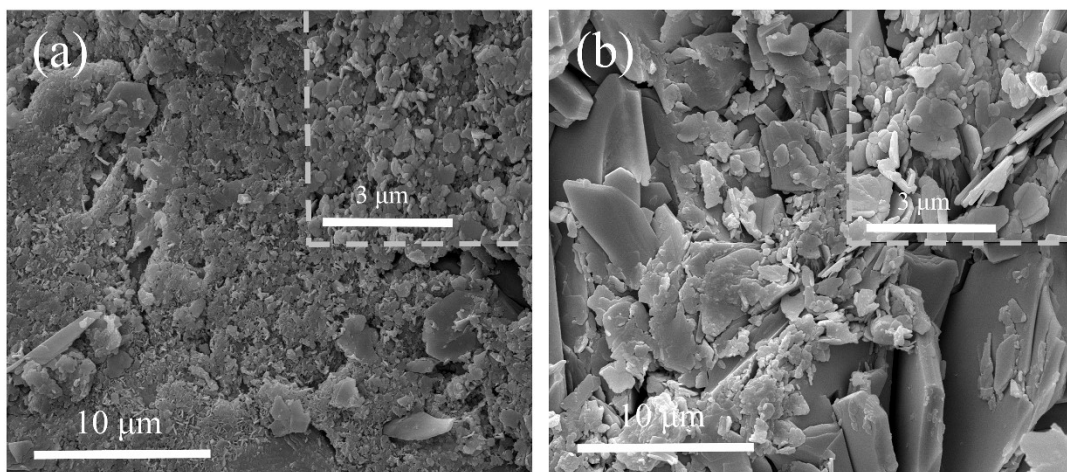


Fig. S12 SEM images after cycling (a) Zn anode in Zn // AC SCs; (b) Zn anode in Zn // ferrocene/AC SCs.

Table S1 The specific surface area, total pore volume for adsorption, total pore volume of micropores of the three samples.

Sample	Specific surface area ($\text{m}^2 \text{g}^{-1}$)	Total pore volume for adsorption ($\text{cm}^3 \text{g}^{-1}$)	Total pore volume of micropores ($\text{cm}^3 \text{g}^{-1}$)
ferrocene	4.859	0.031	0.001
AC	2458.658	1.361	0.982
ferrocene/AC	961.601	0.620	0.343