Electronic Supplementary Material (ESI) for New Journal of Chemistry.

Poly(2,3-disulfide-1,4-benzoquinone) as a high-performance cathode for rechargeable aqueous zinc-ion batteries

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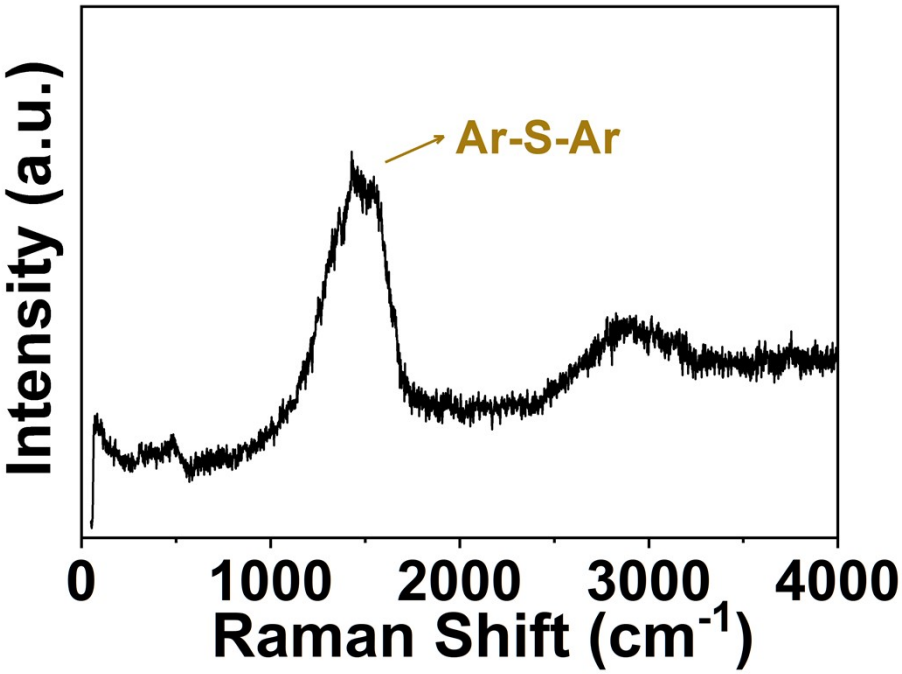

Figure S1. The Raman spectra of PSBQ.

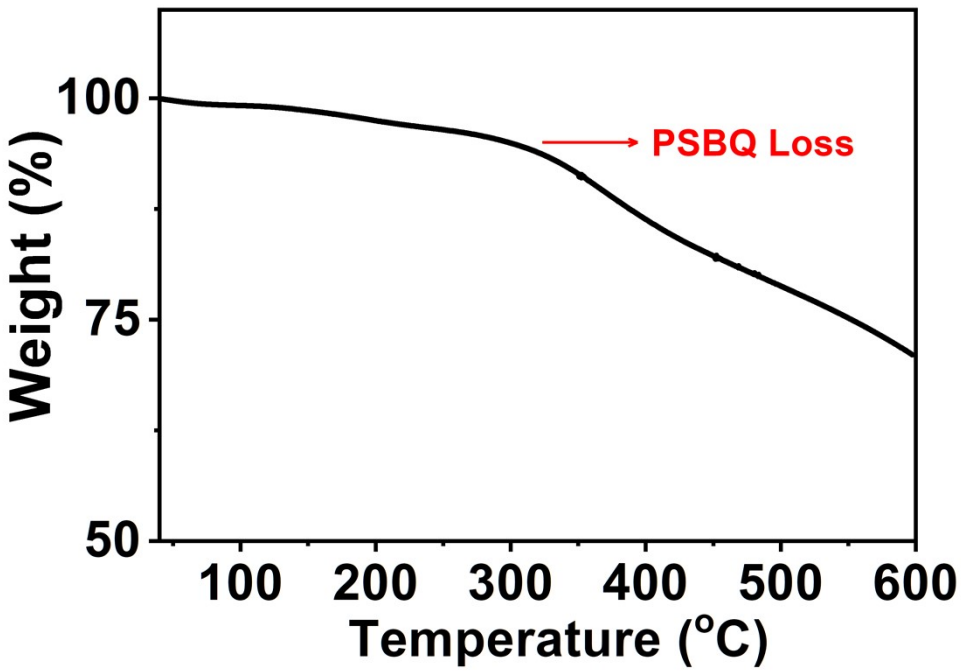

Figure S2. Thermal stability of PSBQ.

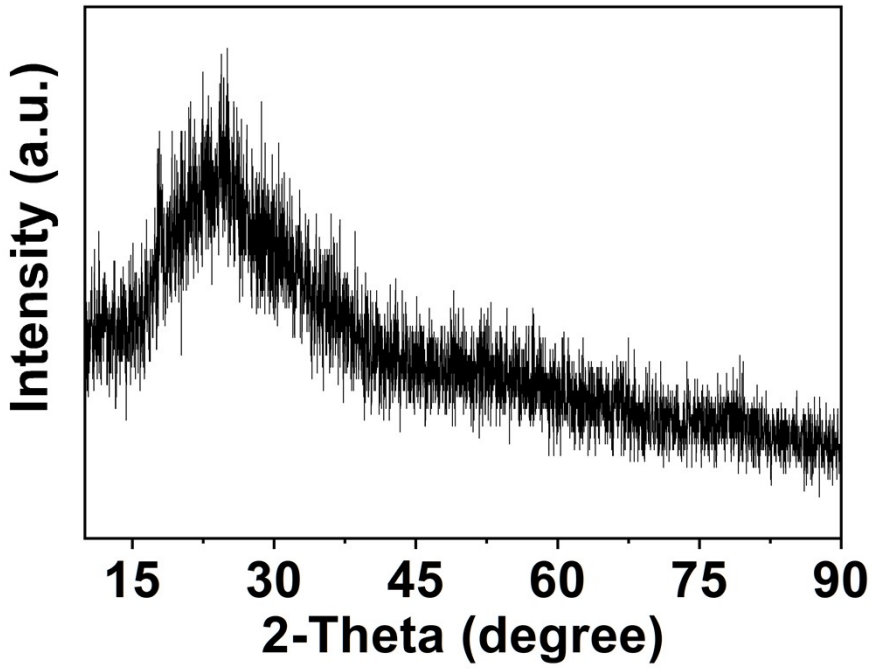

Figure S3. XRD spectra of PSBQ.

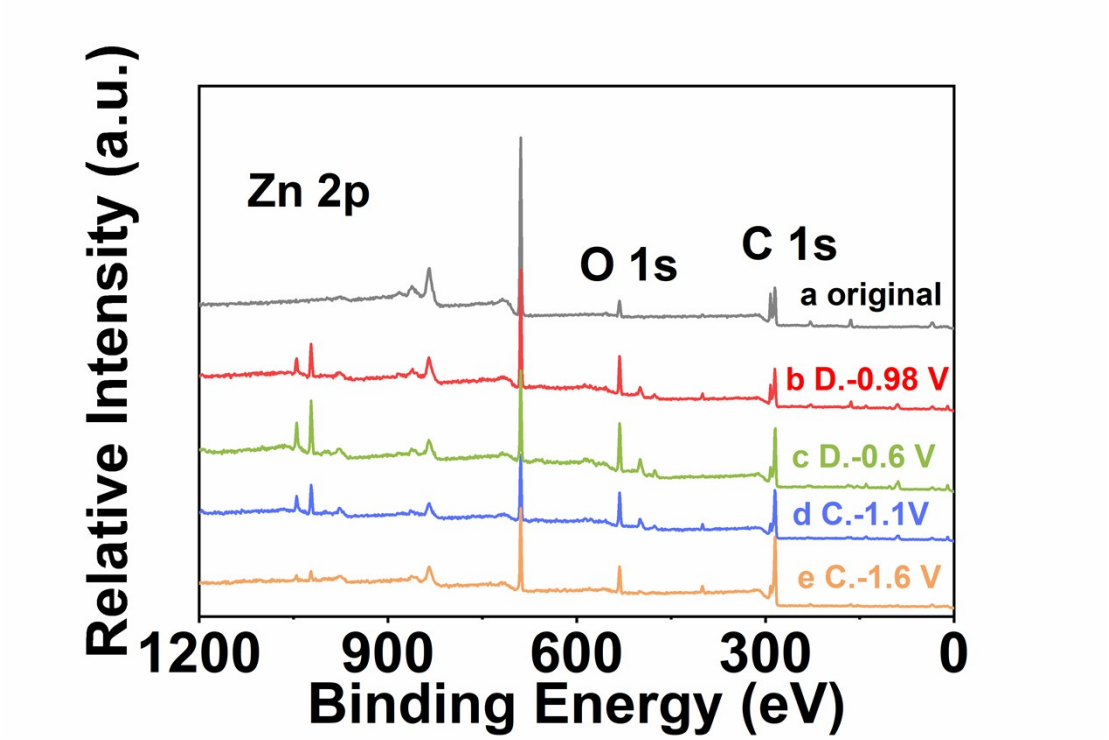

Figure S4. XPS spectra of PSBQ electrode in various states.

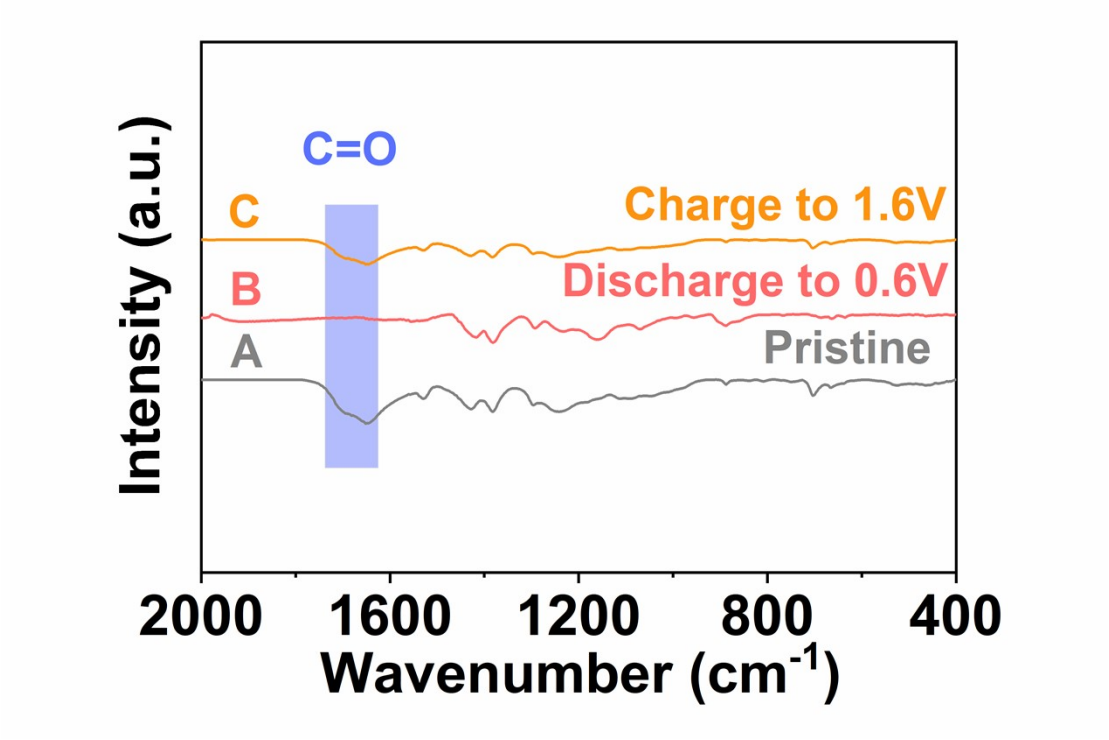

Figure S5. Ex situ IR spectra of PSBQ electrode in charge and discharge states.

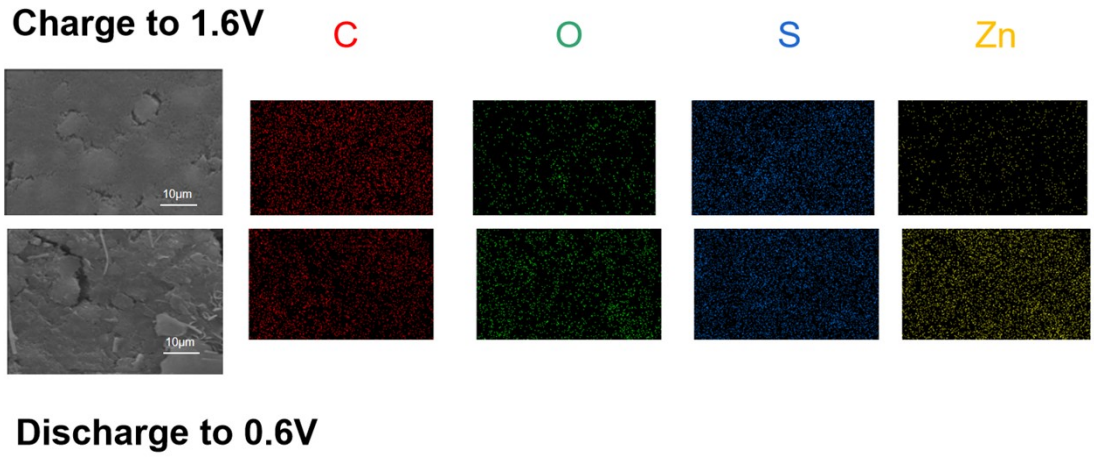

Figure S6. SEM-mapping of PSBQ electrode in charge and discharge states.

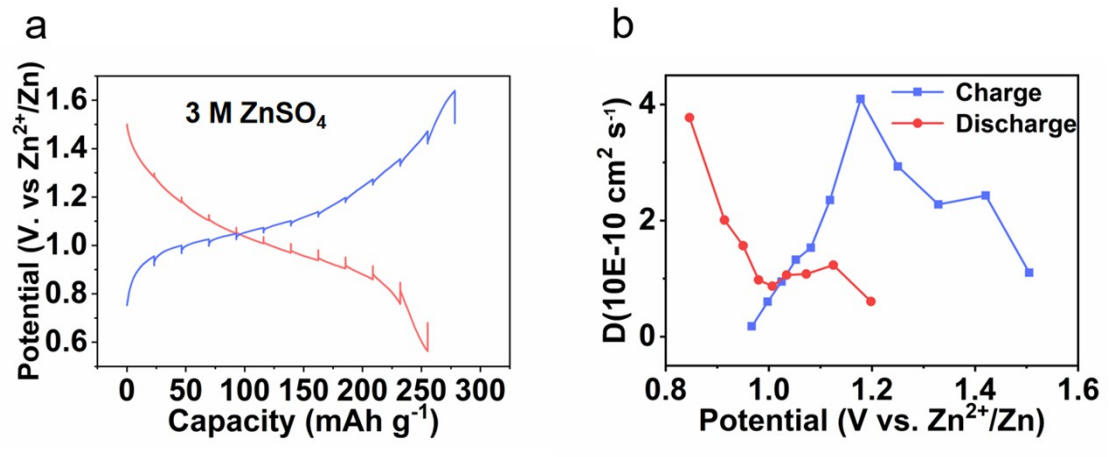

Figure S7. (a) GITT curve for Zn||PSBQ battery with 3 M $ZnSO_4$ Aqueous electrolyte. (b) Diffusion coefficient.

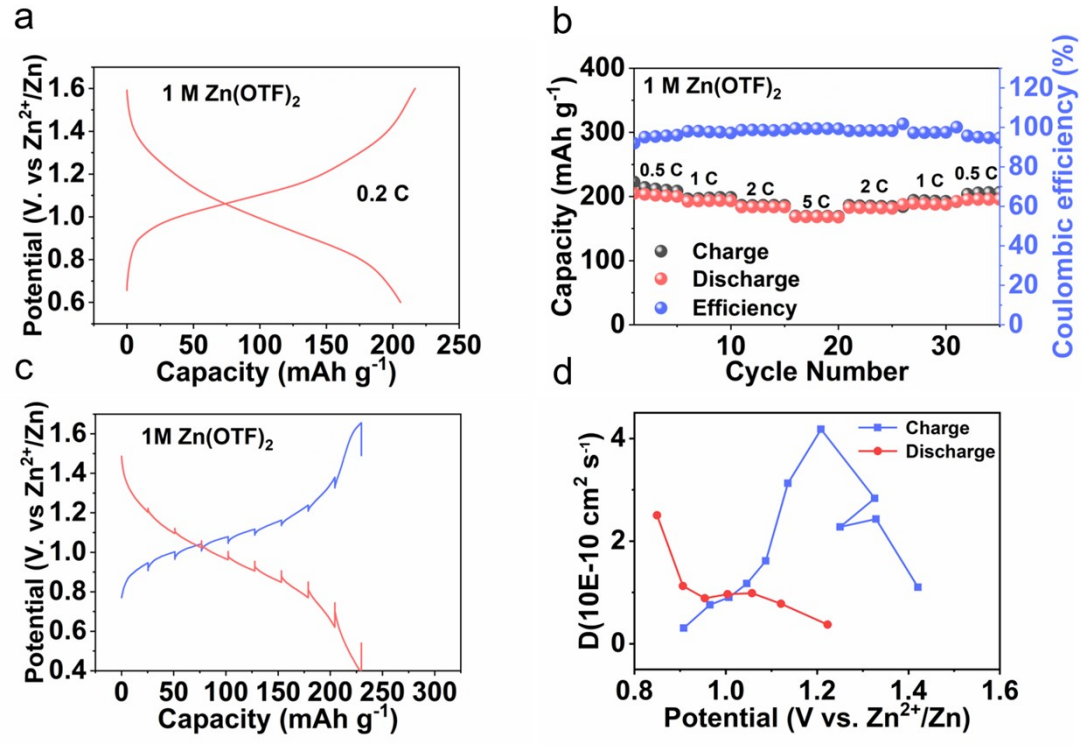

Figure S8. (a) Typical discharge/charge curves at a current density of 0.2C with electrolyte of 1M $Zn(OTF)_2$ in DMF. (b) Rate capability. (c) GITT curve for Zn||PSBQ battery with electrolyte of 1M $Zn(OTF)_2$ in DMF. (d) Diffusion coefficient.

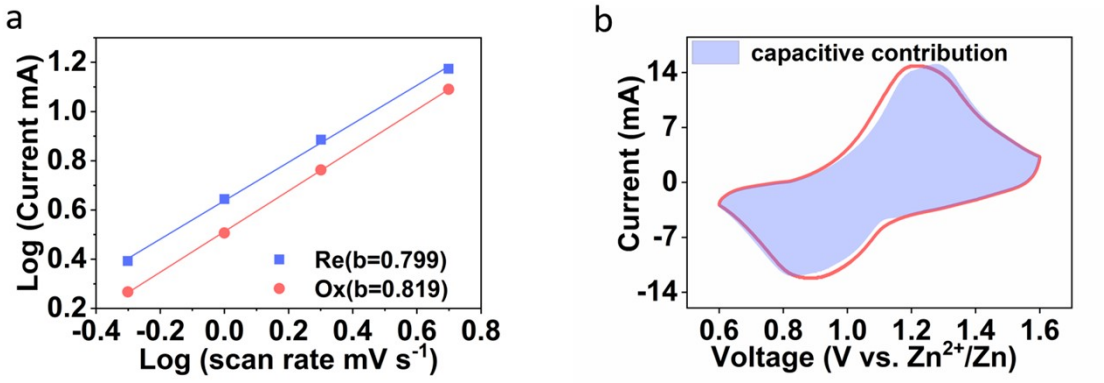

Figure S9. (a) Logarithmic relationship of peak current and scan rate. (b) CV curve at 0.5 mV s^{-1} with capacitive currents ($k1v$) outlined in the blue area.

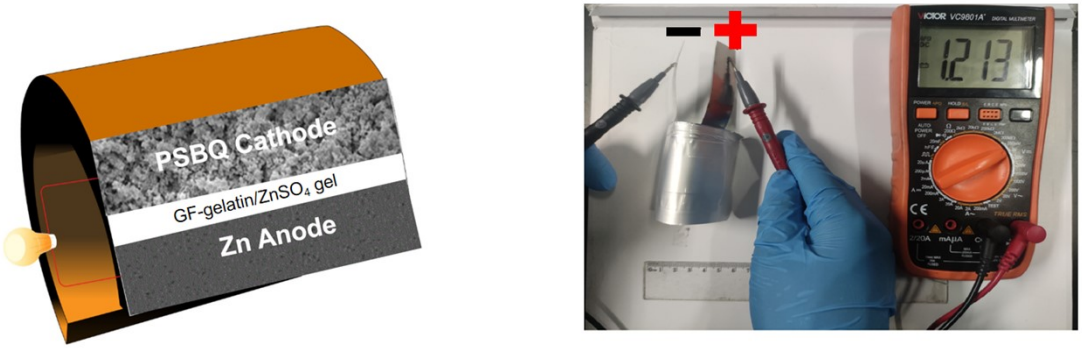

Figure S10. The image of open-circuit voltage of Flexible Zn||PSBQ battery.

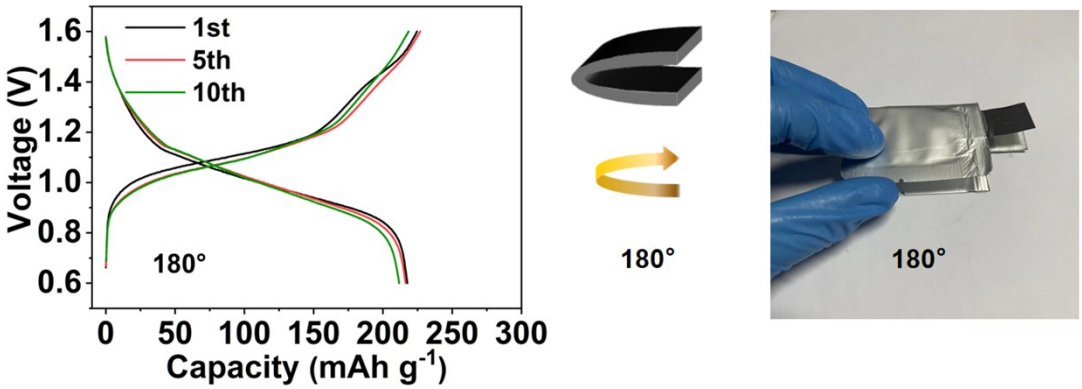

Figure S11. Zn||PSBQ flexible battery selected discharge/charge curve at 180° .

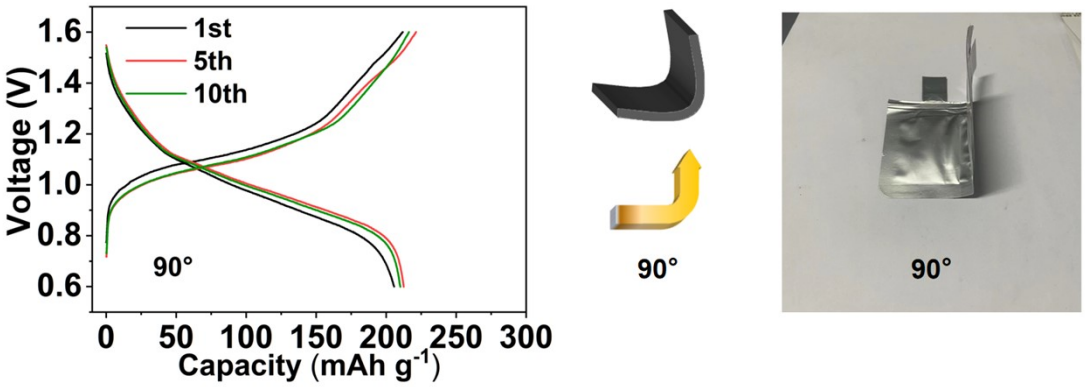

Figure S12. Zn||PSBQ flexible battery selected discharge/charge curve at 90° .

Table S1. Comparison of the electrochemical performance of Zn-PSBQ battery with reported aqueous Zn-polymer batteries at a current density of about 1 A g^{-1}.

Cathode Materials	Electrolyte	Discharge capacity (mAh g^{-1}) [a)]	Voltage range (V)	Working Voltage (V)	Energy Density (Wh kg^{-1}) [a)]
OAP[1]	3 M $Zn(CF_3SO_3)_2$	105.1	0.2-1.2	0.65	68.3
PCSA[2]	3 M $Zn(CF_3SO_3)_2$	40	0.2-1.6	0.875	35
PQTU[3]	1 M $ZnSO_4$	40	0.2-1.7	1	40
PBQS[4]	3 M $Zn(CF_3SO_3)_2$	126	0.2-1.7	1	126
PTMA[5]	2 M $Zn(CF_3SO_3)_2$	80	1-1.8	1.5	120
PQN14[6]	1 M $Zn(CF_3SO_3)_2$	67	0.2-1.6	0.7	46.9
2，6-NAPD[7]	1 M $ZnSO_4$	58	0.5-1.5	0.8	46.4
PDBS[8]	2 M $ZnSO_4$	230	0.4-1.4	0.7	161
PSBQ	**3 M $ZnSO_4$**	**198**	**0.6-1.6**	**1.1**	**217**

[a)]The values are calculated based on the mass of stoichiometric cathode.

Table S2. Elemental analysis of PSBQ-Zn based on the XPS data.

Elemental Name	Peak BE	FWHM eV	Area (P)CPS.eV	Atomic %
F1s	689.08	2.81	248805.1	21.52
Zn2p3	1021.94	3.01	153952.49	3.58
C1s	284.41	1.76	216601.73	56.56
O1s	531.77	3.11	148212.25	16.01
S2p	167.72	5.11	16520.11	2.33

References

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