

**Supporting Information**

**Electrochemical reaction behavior of MnS in aqueous zinc ion battery**

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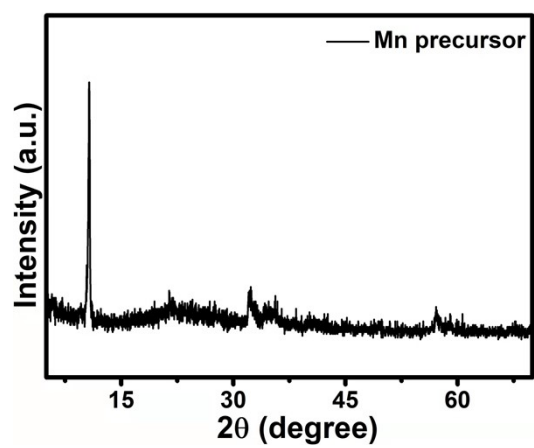
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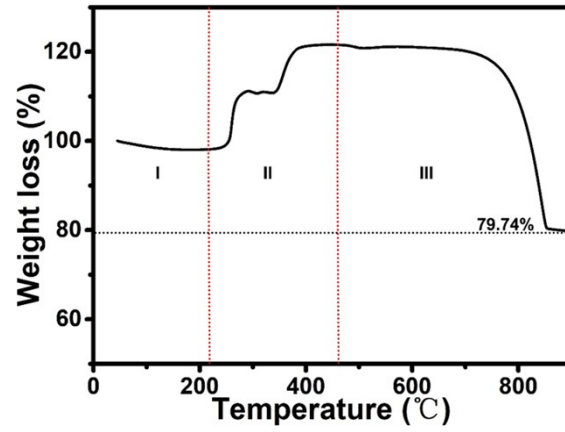
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**Figure S1.** XRD pattern of the prepared Mn-based organometallic precursor.



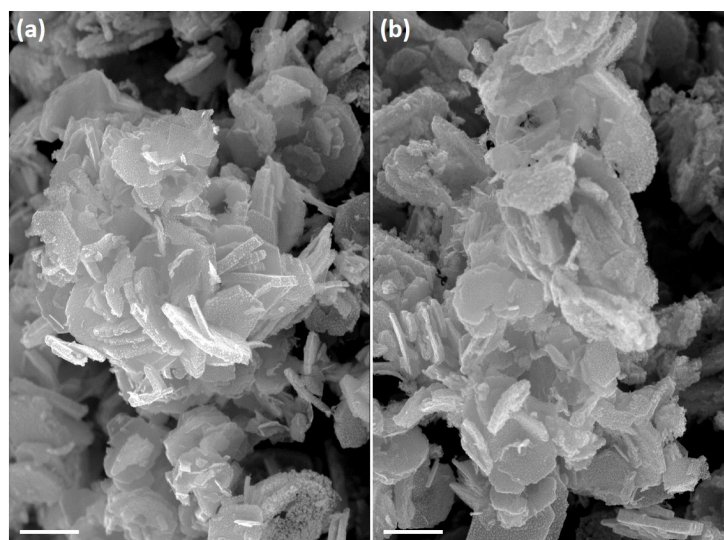
**Figure S2.** TGA of MnS/C.

MnS content in MnS/C composite:  $x$

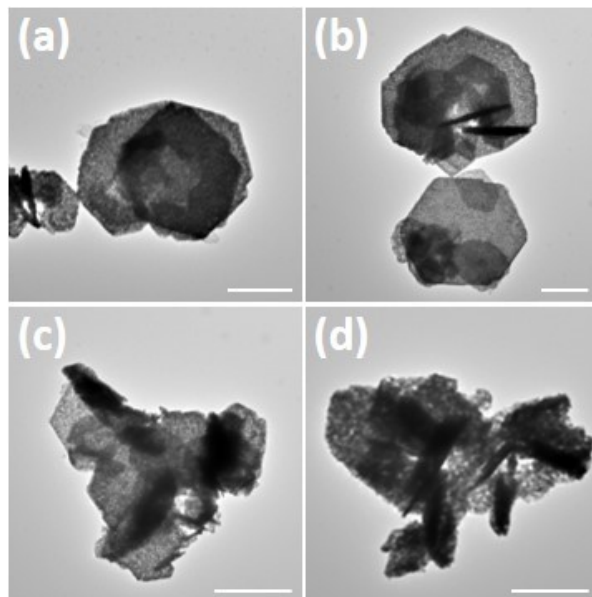
$$x = \frac{79.74\% \times 2M_{MnS}}{M_{Mn_2O_3}} \quad x = 87.93\%$$

C content in MnS/C composite:  $y$

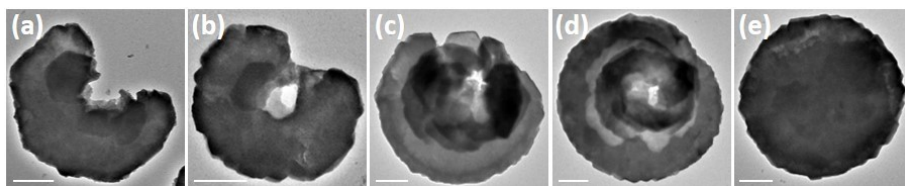
$$y = 100 - x \quad y = 12.07\%$$



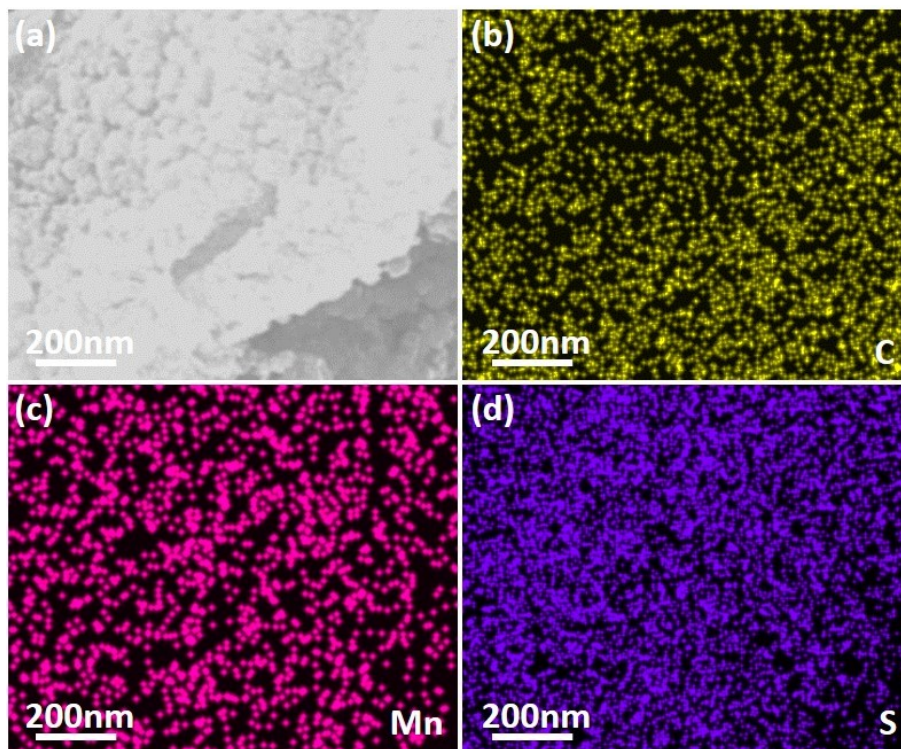
**Figure S3.** (a, b) SEM images of the MnS/C. The scale bar is 1  $\mu\text{m}$ .



**Figure S4.** (a-d) TEM images of the MnS/C. The scale bar is 1  $\mu\text{m}$ .

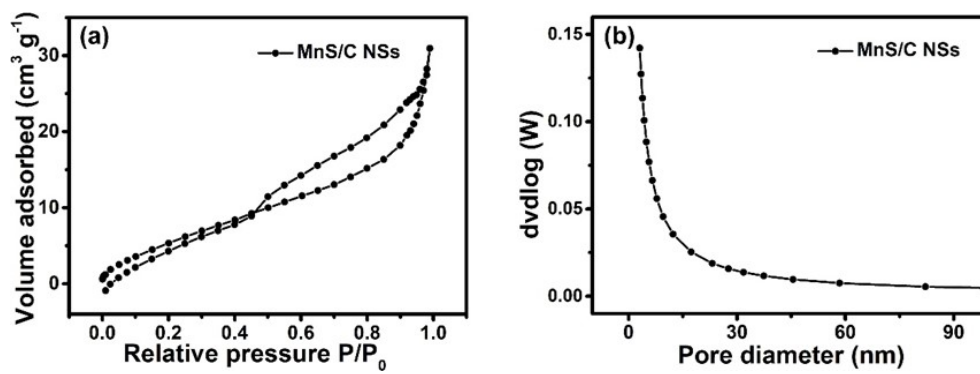


**Figure S5.** The time-dependent TEM images of the lab-prepared Mn-based organometallic precursor collected at different times: (a) 2, (b) 4, (c) 6, (d) 8, and (e) 10 h. The scale bar is 500 nm.



**Figure S6.** (a) SEM image and its corresponding line scan EDS elemental mapping results of (b) C, (c) Mn, and (d) S.





**Figure S7.** (a) N<sub>2</sub> adsorption-desorption isotherm of MnS/C composite. (b) pore size distribution of hollow MnS/C.

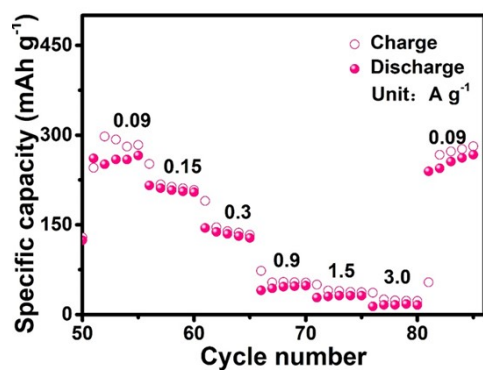
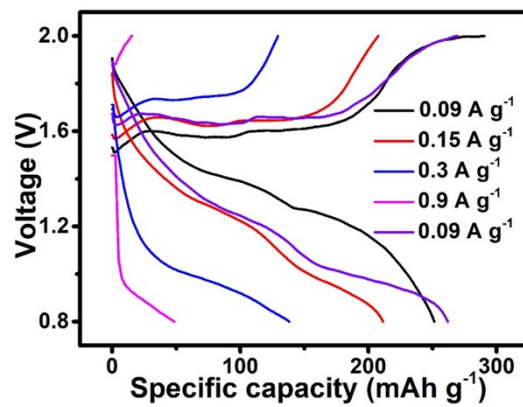
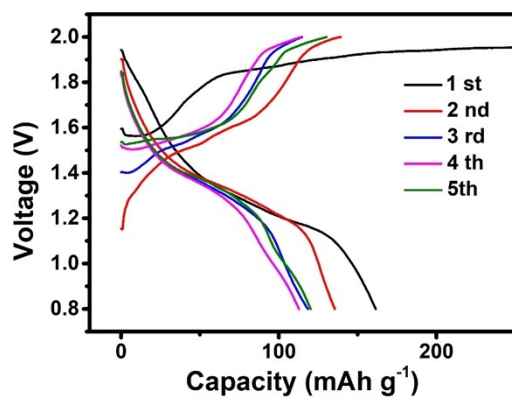


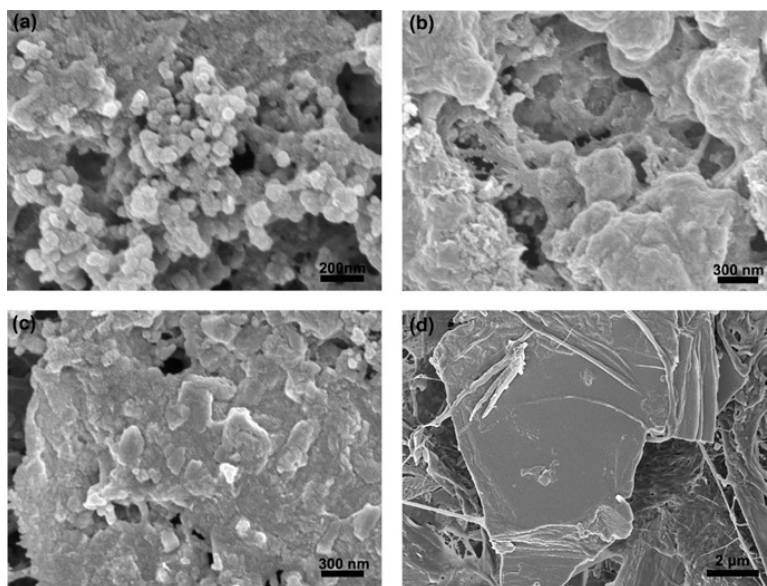
Figure S8. Rate capabilities of MnS/C electrodes.



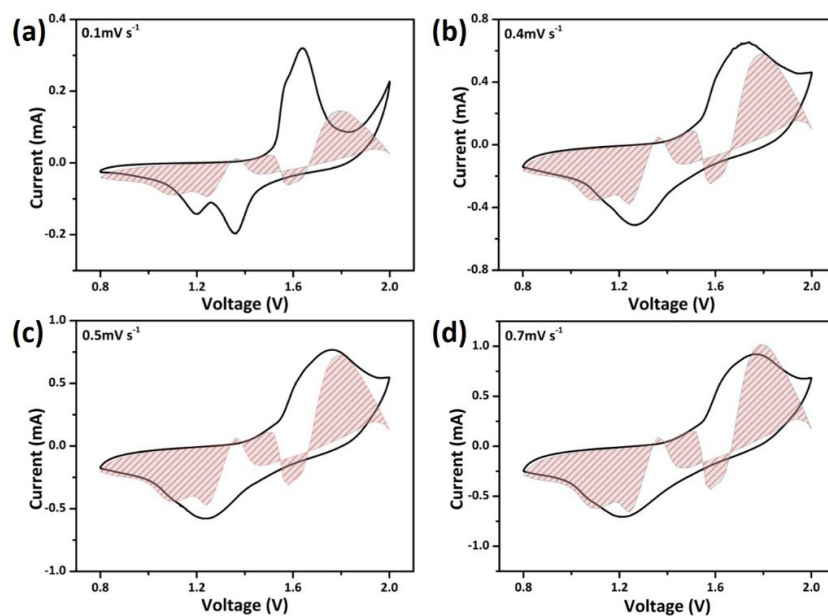
**Figure S9.** Galvanostatic charge/discharge curves of MnS/C electrode.



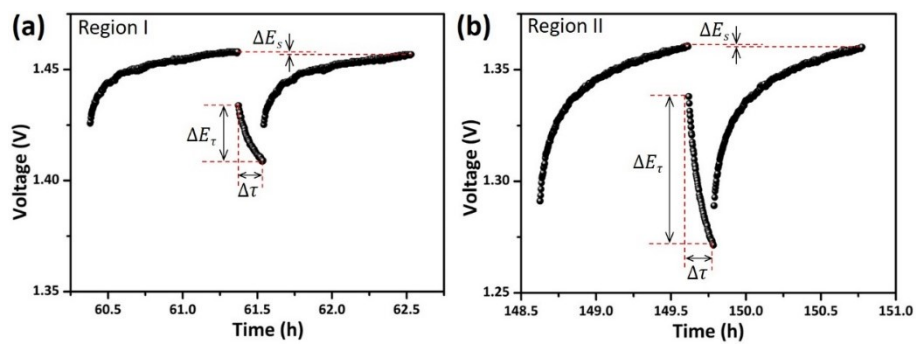
**Figure S10.** Charge and discharge curves at different cycles at 100 mA g<sup>-1</sup>.



**Figure S11.** SEM images of MnS/C electrode after cycling. (a) 1st, (b) 2 nd, (c) 20 th, (d) 1000 th.



**Figure S12.** The capacitive contribution ratio of MnS/C at different scan rates: (a) 0.1, (b) 0.4, (c) 0.5, and (d) 0.7 mV s<sup>-1</sup>.



**Figure S13.** The typical voltage evolution in a single titration in region (a) I and (b) II.