Supporting Information

Boosting the Capacity and Stability of MoO_3 Cathode via Valence Regulation and Polypyrrole Coating for Rechargeable Zn Ion Battery

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The specific capacity ($C_{m,}$ mAh g^{-1}) is calculated by equation (1-1), where Δt (h) is the discharge time, I(mA) is the current density and m(g) is the loading mass of the active substance. All current densities in the article are related to the mass of the active material.

$$C_m = \frac{I \times \Delta t}{m} \tag{1-1}$$

Also, the energy density E_m (Wh kg^{-1}) and power density (P, W kg^{-1}) can be calculated for different GCDs profiles according to the following equation, where U(V) is the voltage window

$$E_m = \frac{I \int U dt}{m} \tag{1-2}$$

$$P = \frac{E_m}{t} \tag{1-3}$$

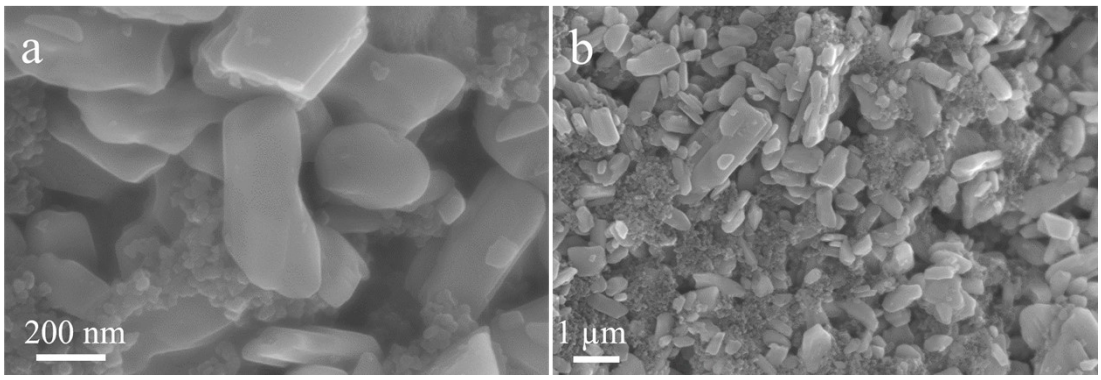

Figure S1 SEM images of commercial MoO_3.

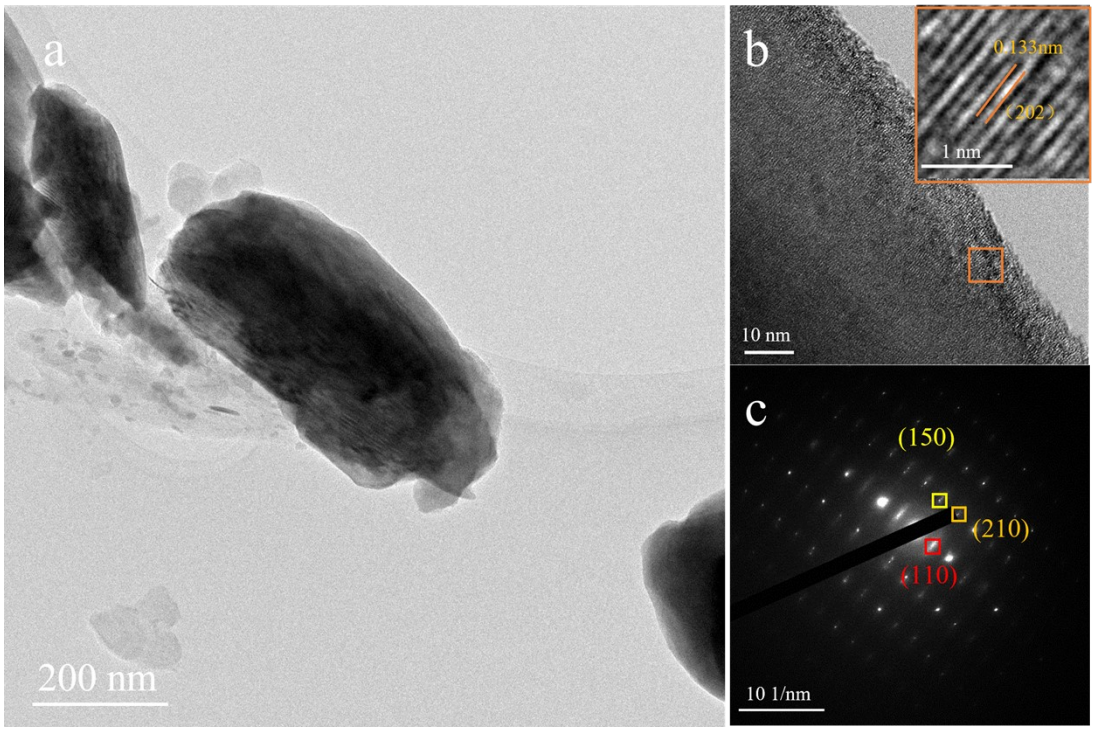

Figure S2 (a) TEM, (b) HRTEM, and (c) SAED images of commercial MoO_3.

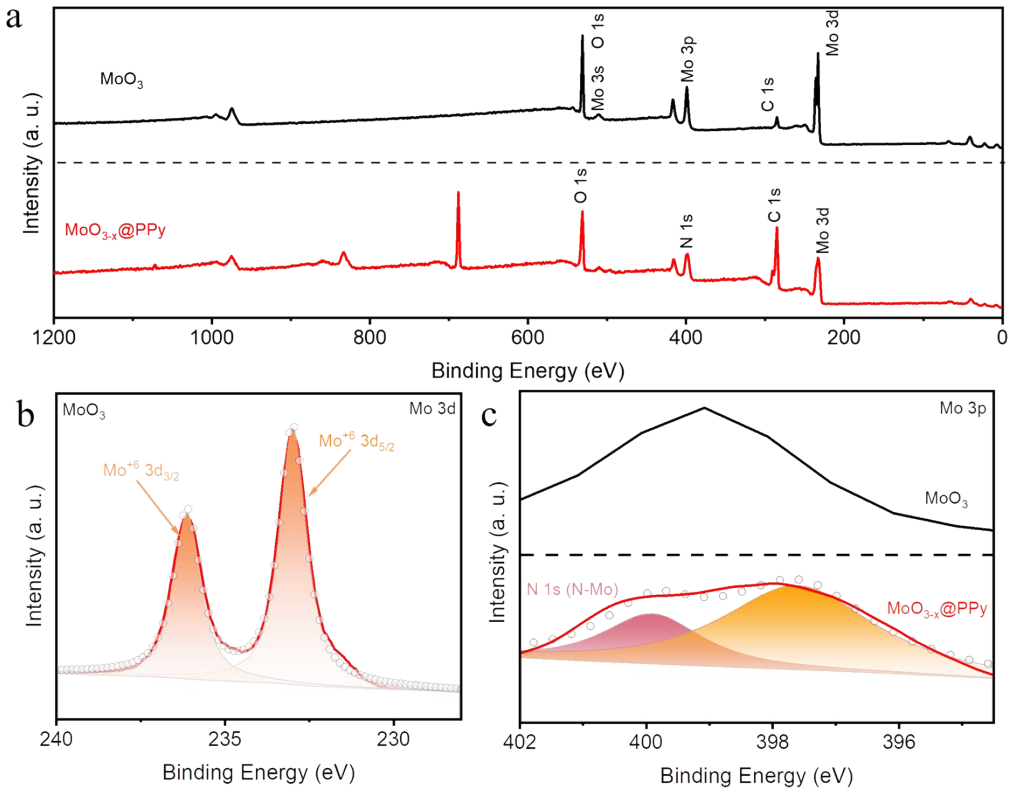

Figure S3 (a) The XPS survey spectra of the MoO_{3-x}@PPy electrode materials. (b) Mo 3d spectra of the MoO_3 sample. (c) XPS spectra of the Mo $3p_{3/2}$ and N 1s orbitals of MoO_3 and MoO_{3-x}@PPy

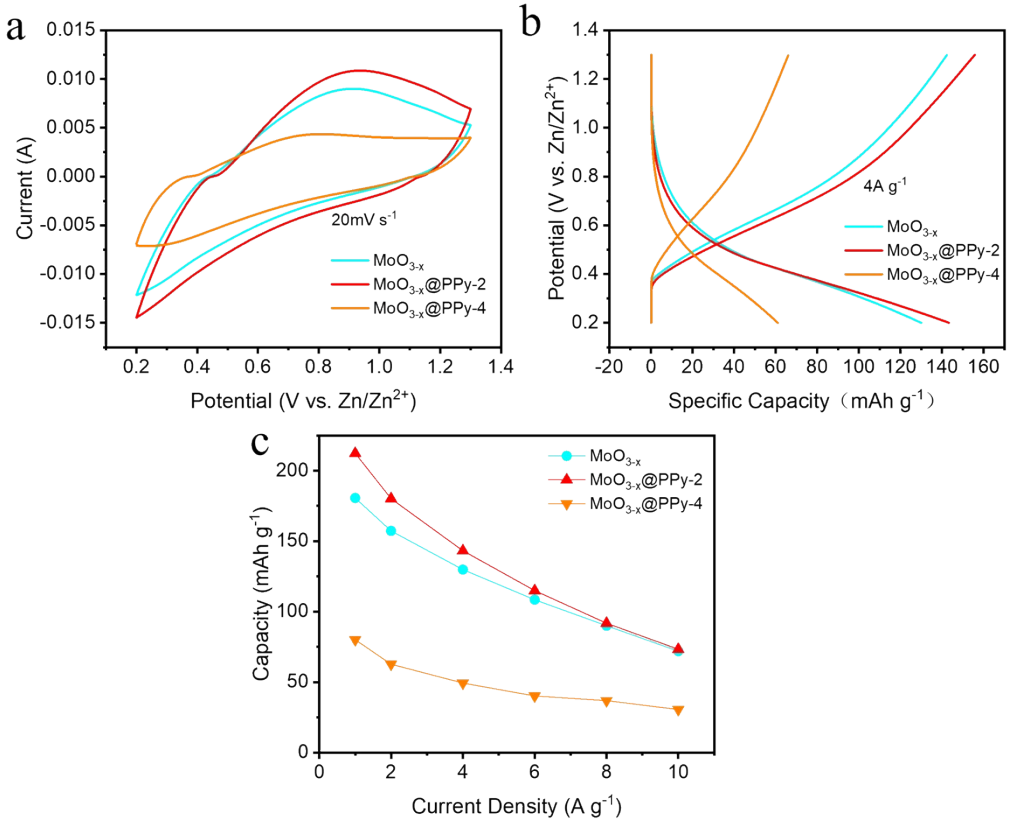

Figure S4 (a, b) CV and GCD curves for all batteries at a scan rate of 20 mV s^{-1} and a current density of 4 A g^{-1}. (b) Rate performance of Zn//MoO_{3-x} and Zn//MoO_{3-x}@PPy batteries with different thicknesses of PPy layers electrodeposited.

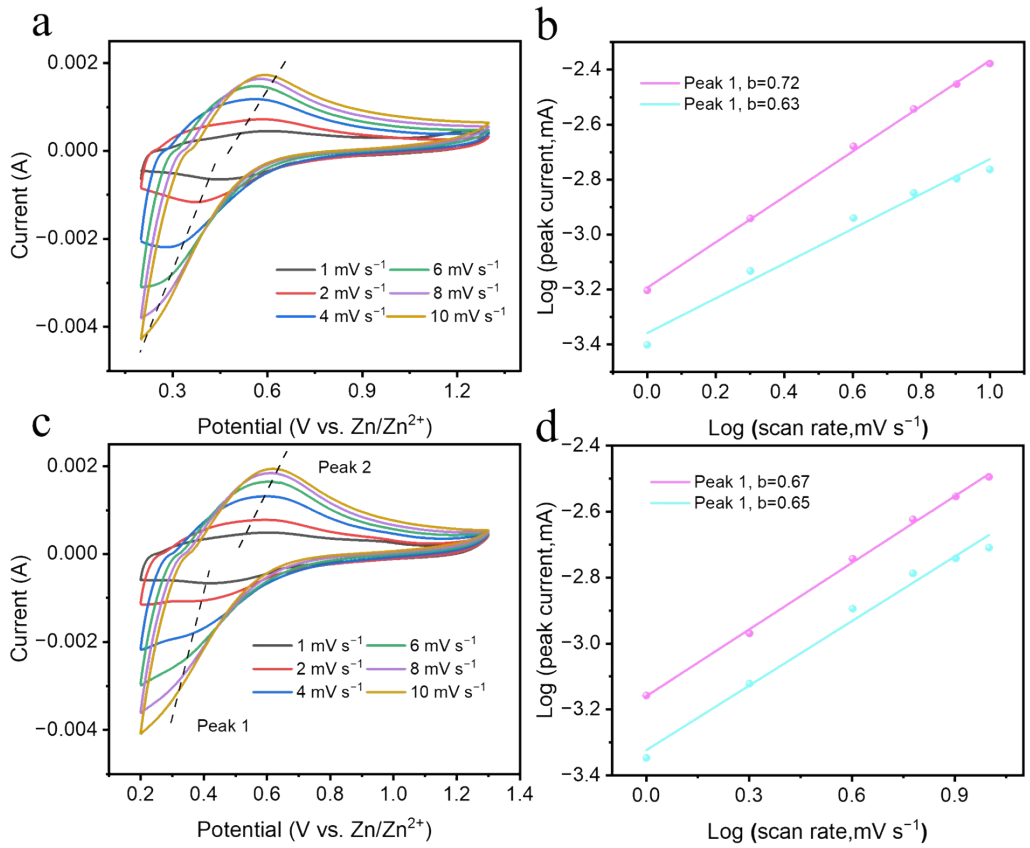

Figure S5 (a, c) CV curves for MoO_3 and MoO_{3-x} at a range of scan rates of 1, 2, 4, 6, 8 and 10 mV s^{-1}. (b, d) log(*i*) vs log(*v*) plots of the two peaks in the CV curve for MoO_3 and MoO_{3-x}.

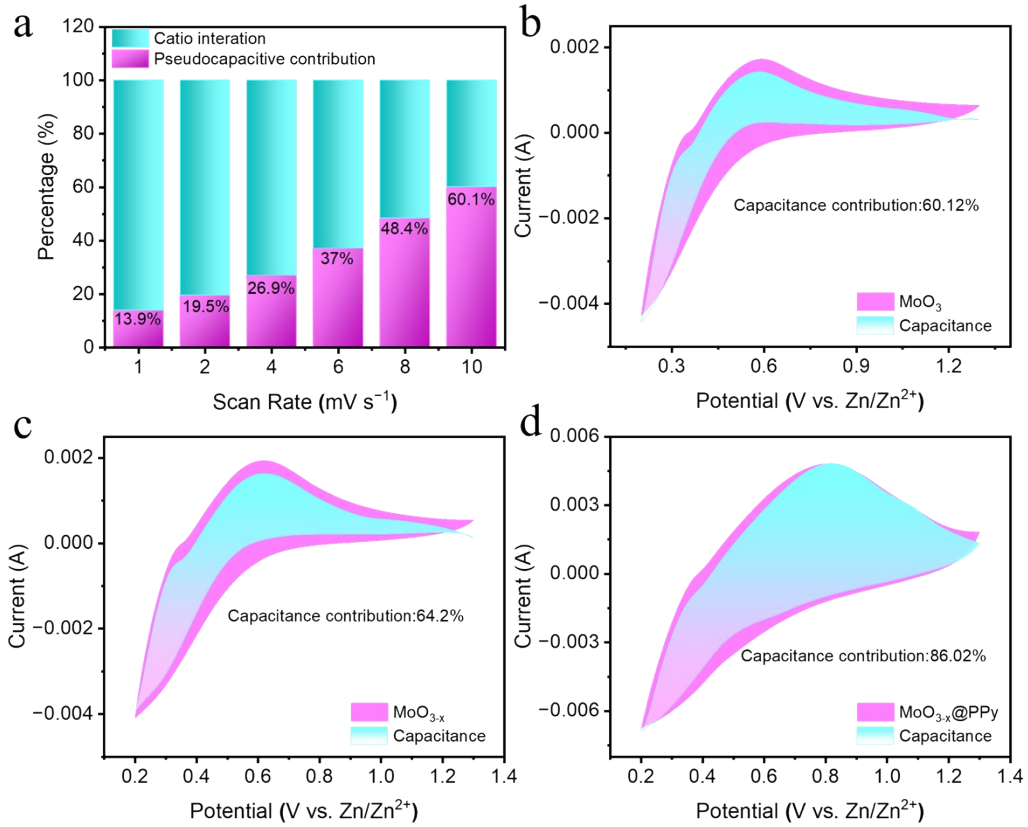

Figure S6 (a) Ratio of diffusion contribution and capacitance contribution of Zn//MoO_3 and (b, c, and d) Capacitive contribution (inset) and diffusion contribution of MoO_3, MoO_{3-x} and MoO_{3-x}@PPy electrodes at 10 mV s^{-1}.

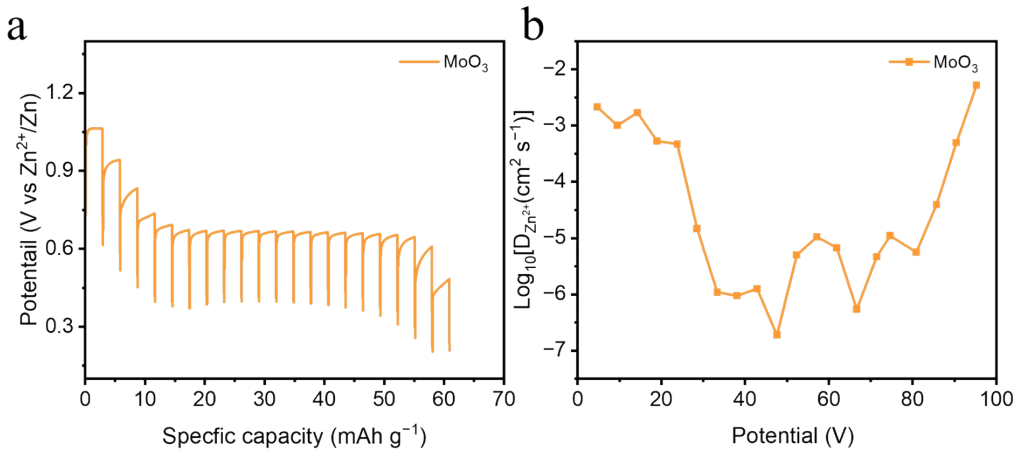

Figure S7 (a) Discharge GITT curves for Zn//MoO_3 at a current density of 2 A g^{-1} and (b) corresponding Zn^{2+} coefficients $D_{Zn^{2+}}$.