Electronic Supplementary Material (ESI) for Inorganic Chemistry Frontiers.

Electronic structure manipulation of $MoSe_2$ nanosheets with fast reaction kinetics toward long-life sodium-ion half/full batteries

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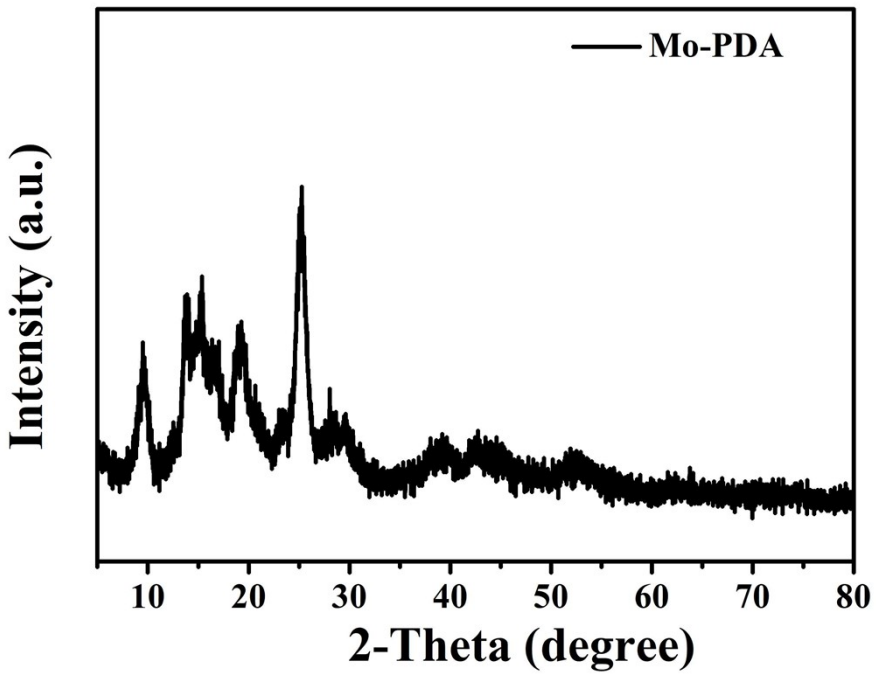

Figure S1. XRD pattern of Mo-PDA precursor.

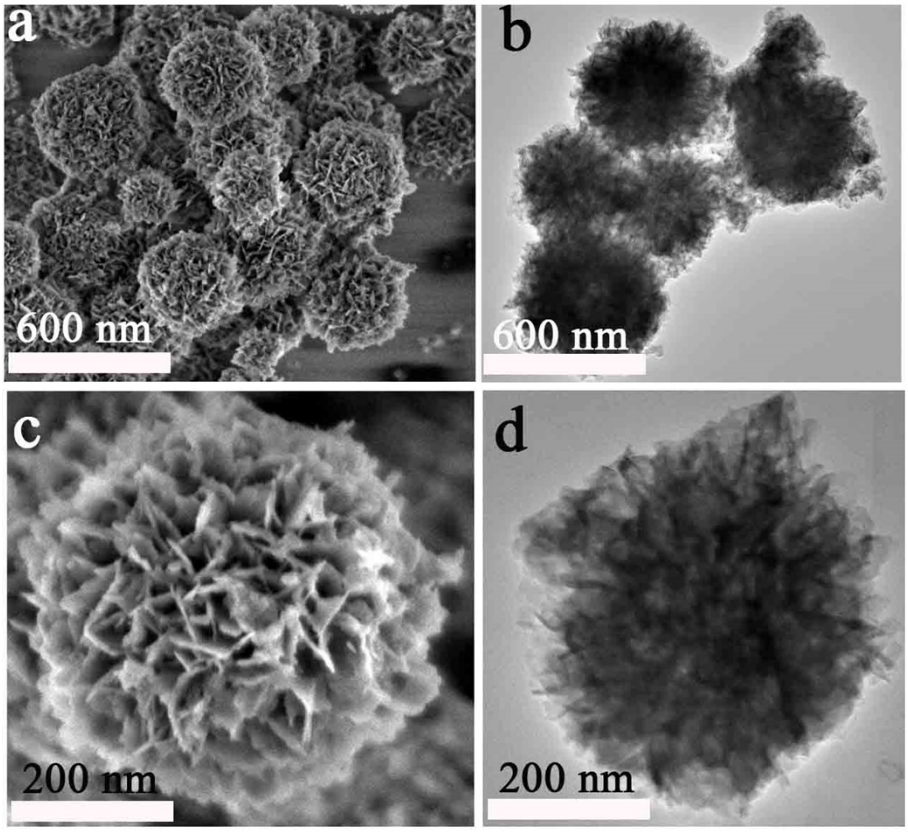

Figure S2. (a) and (c) SEM image of Mo-PDA precursor. (b) and (d) TEM image of Mo-PDA precursor.

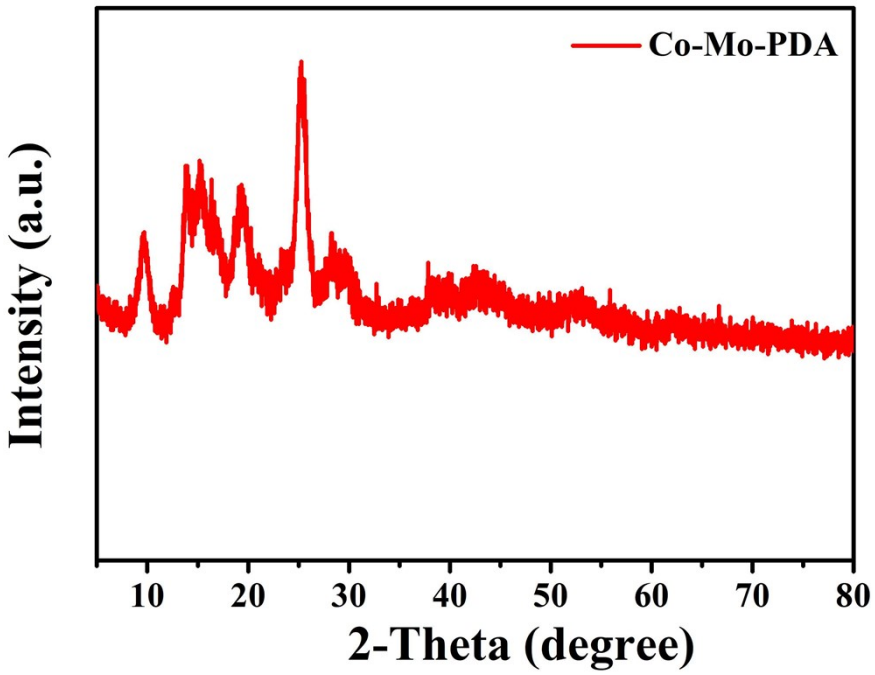

Figure S3. XRD pattern of Co-Mo-PDA precursor.

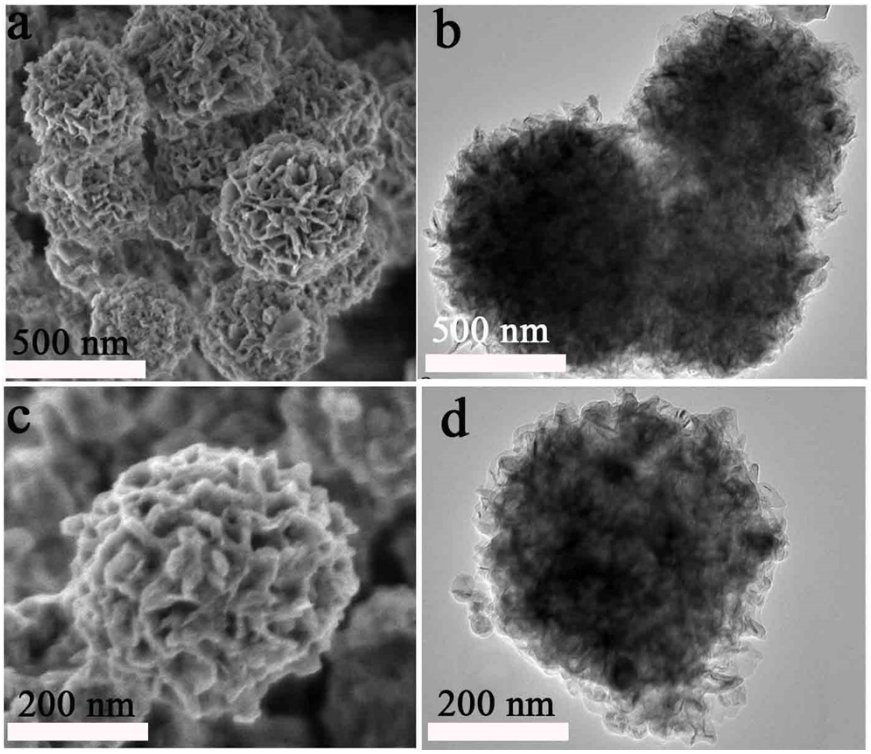

Figure S4. (a, c) SEM image of Co-Mo-PDA precursor. (b, d) TEM image of Co-Mo-PDA precursor.

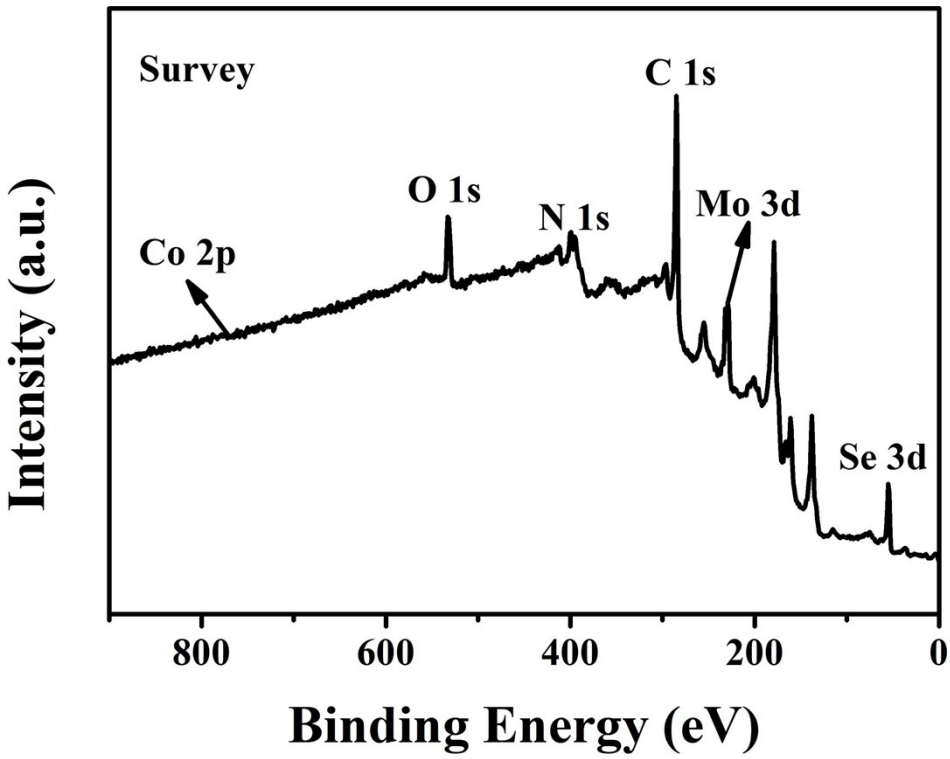

Figure S5. XPS spectra of Co-$MoSe_2$@CN.

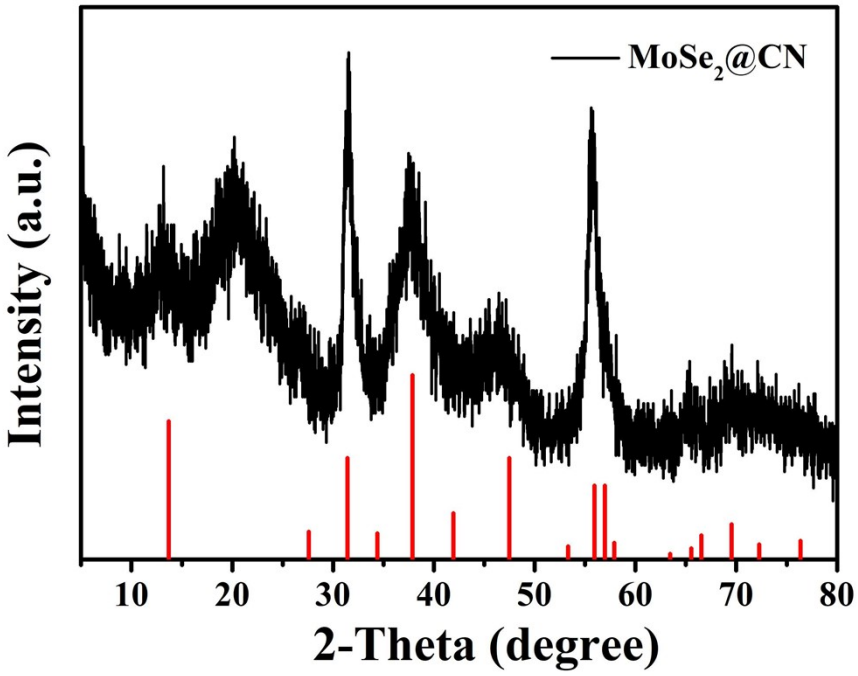

Figure S6. XRD pattern of $MoSe_2$@CN.

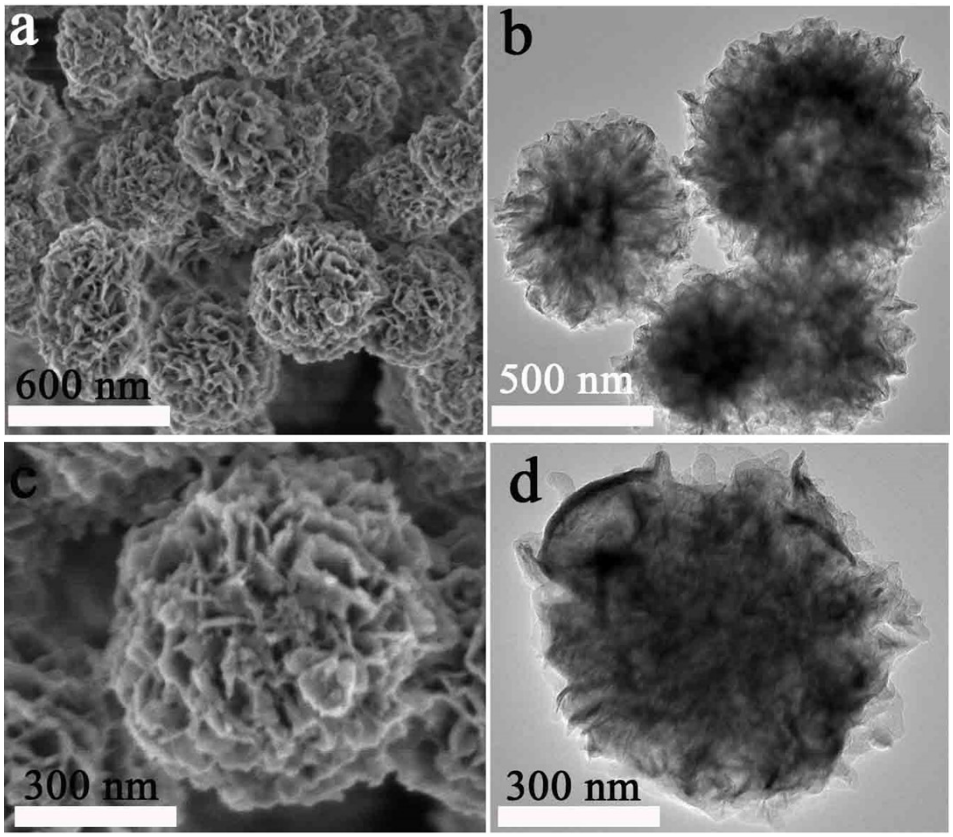

Figure S7. (a, c) SEM image of $MoSe_2$@CN. (b, d) TEM image of $MoSe_2$@CN.

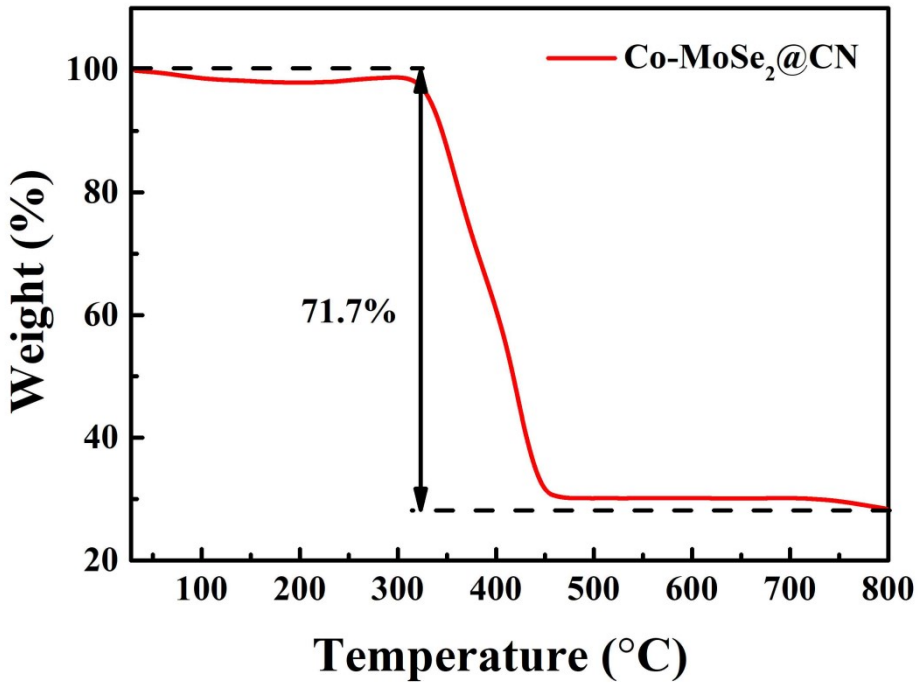

Figure S8. TGA curve of Co-$MoSe_2$@CN.

Through the TGA analysis, the carbon content can be obtained. And the calculating process is as following. We assume the mole ratio of C: Mo = n, and the Co content is ignored. During the TGA test in O_2 atmosphere, the corresponding oxidation reactions is as follows.

$$\text{Co-MoSe}_2\text{@CN} \subset \text{MoSe}_2 + \text{O}_2 \rightarrow \text{MoO}_3 + \text{CO}_2$$

$$254+12n \qquad\qquad 144 \quad 44n$$

From this reaction, the weight loss ratio after calcination in O_2 atmosphere is as follows.

$$71.7\% = \frac{254 + 12n - 144}{254 + 12n}$$

$$n = 21.236$$

$$\frac{12 * 21.236}{254 + 12 * 21.236} = 50.08\%$$

So the carbon content in Co-$MoSe_2$@CN is determined to be 50.08%.

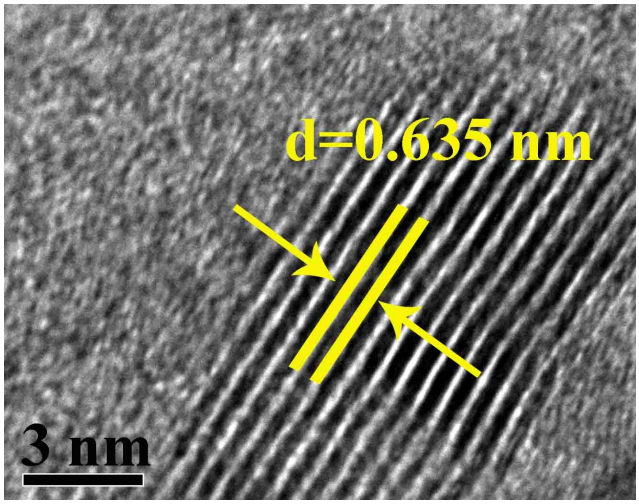

Figure S9. HRTEM image of $MoSe_2$@CN.

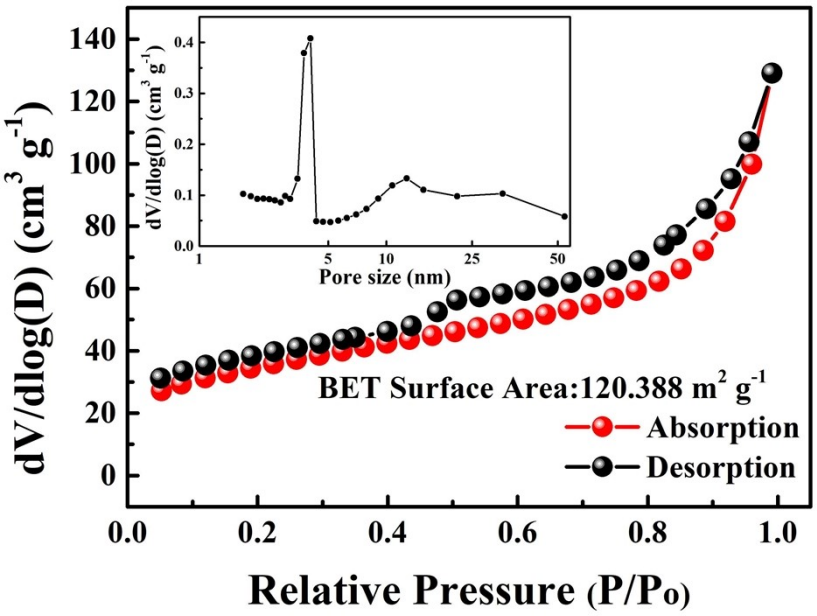

Figure S10. N_2 adsorption–desorption curves (the inset is BJH pore size distribution).

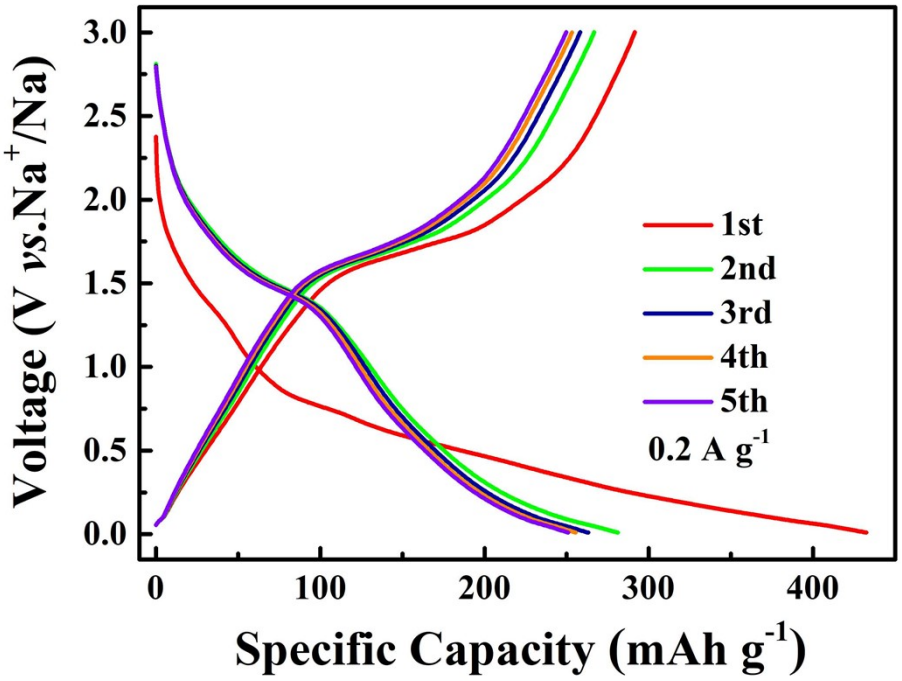

Figure S11. The discharge-charge curves at current densities of 0.2 A g^{-1} of $MoSe_2$@CN.

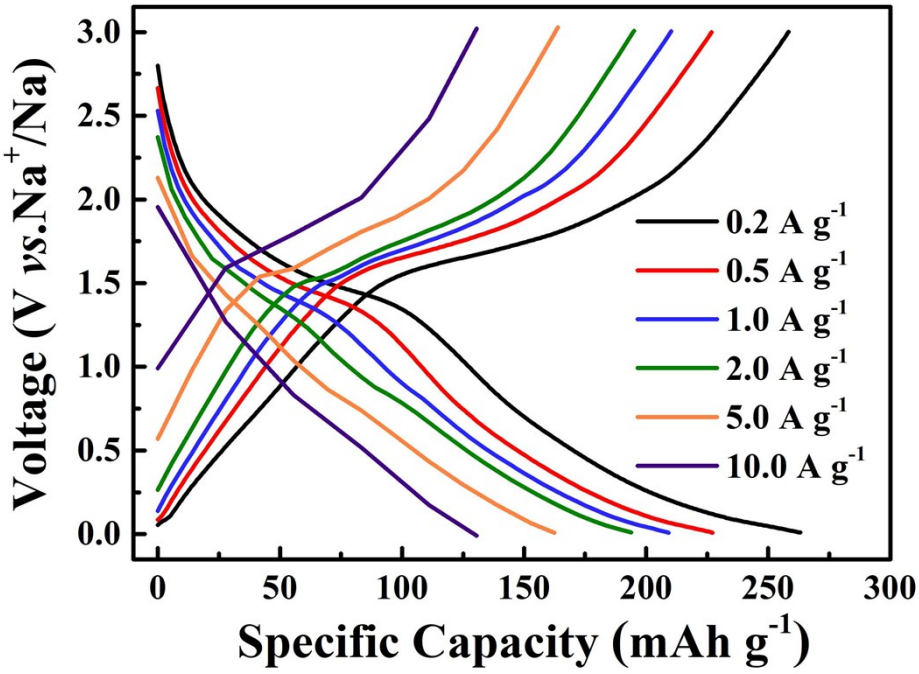

Figure S12. The discharge-charge curves at various current densities from 0.2 to 10 A $g^{-1}$of $MoSe_2$@CN.

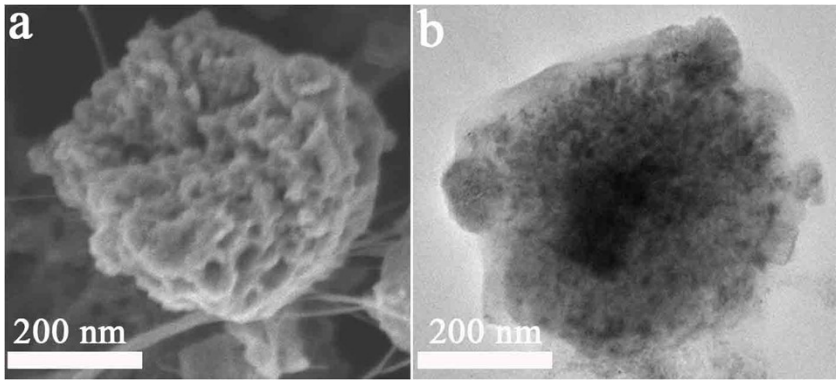

Figure S13. (a) SEM images and (b) TEM images of Co-$MoSe_2$@CN after 50 cycles.

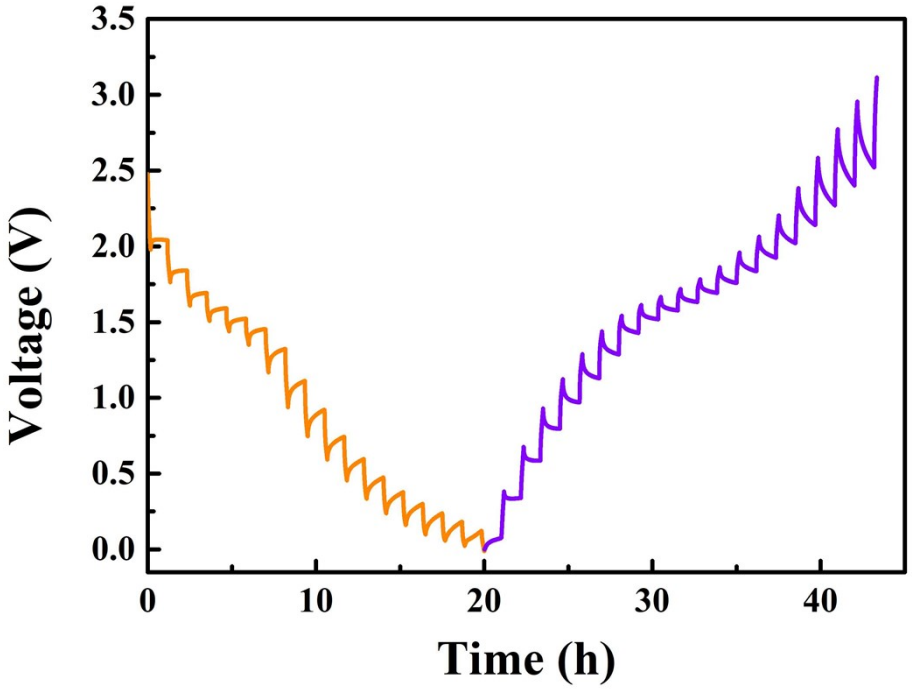

Figure S14. GITT curves of $MoSe_2$@CN.

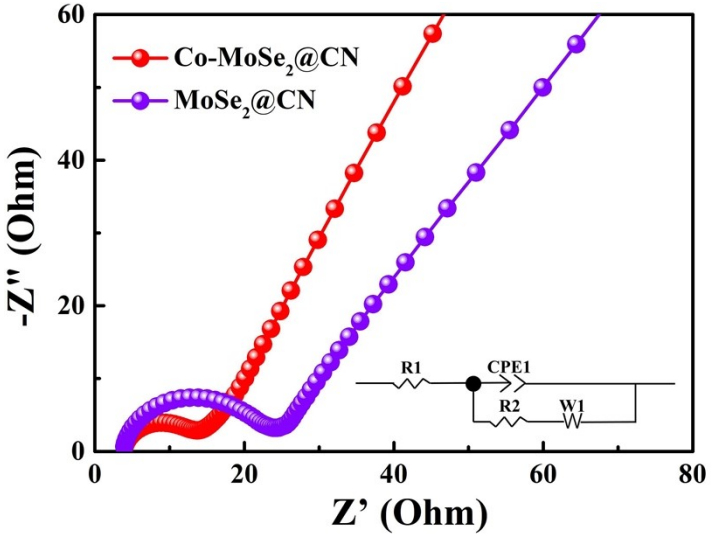

Figure S15. Nyquist plots of the Co-$MoSe_2$@CN and $MoSe_2$@CN.

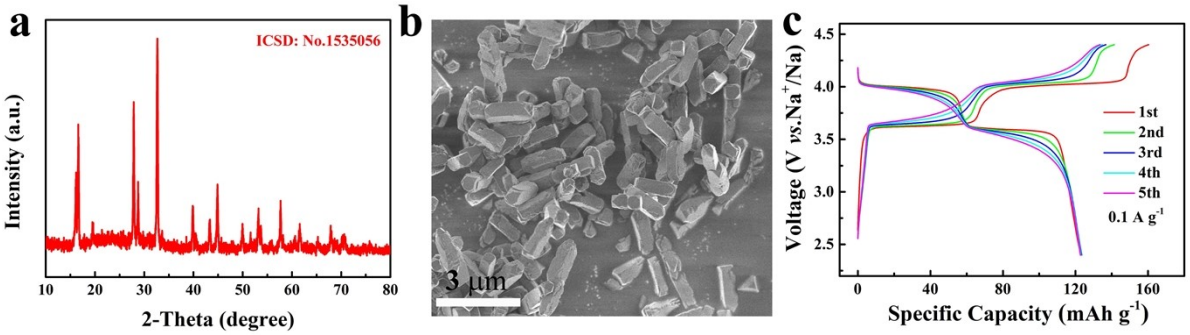

Figure S16. The XRD pattern, SEM image and electrochemical performance of NVPOF (It was prepared as previously reported in *Inorg. Chem. Front.*, 2019, 6, 988-995).