Supplementary Information (SI) for CrystEngComm.


# Supplementary Materials

## Spider Web-Structured $Sb_2MoO_6$@C@CNFs Composites with Conductive-Stable Dual Carbon Skeletons Toward Durable Sodium-Ion Batteries

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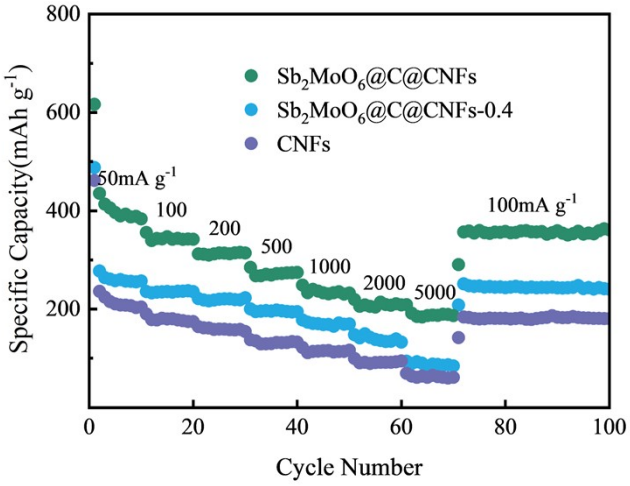


**Figure S1** Rate Performance Comparison between $Sb_2MoO_6$@C@CNFs、$Sb_2MoO_6$@C@CNFs-0.4、CNFs

We reduced the ratio of $Sb_2MoO_6$@PPY when preparing the spinning solution. Under the premise that the amount of the solvent N, N-dimethylformamide is 8 mL, the amount of $Sb_2MoO_6$@PPY added is reduced to 0.4 g, and the remaining preparation steps remain unchanged. Then $Sb_2MoO_6$@C@CNFs-0.4 is prepared. In addition, pure carbon materials CNFs were prepared as controls. Its rate performance is tested, as shown in the **Figure S1**. Compared to Figure 6b, there is a thicker carbon layer due to the decrease in the content of $Sb_2MoO_6$ and the decrease in the active material involved in the reaction. Therefore, the specific capacity of $Sb_2MoO_6$@C@CNFs-0.4 is relatively low. However, the toughness of the carbon material is leveraged due to the thicker carbon coating, thereby enabling the rate performance of $Sb_2MoO_6$@C@CNFs-0.4 to be closer to that of carbon-based materials. When the current density is 50, 100, 200, 500, 1000, 2000, and 5000 mA $g^{-1}$, the $Sb_2MoO_6$@C@CNFs-0.4 electrode delivers reversible capacities of 257, 235, 314, 196, 170, 142, and 90 mAh $g^{-1}$, respectively.

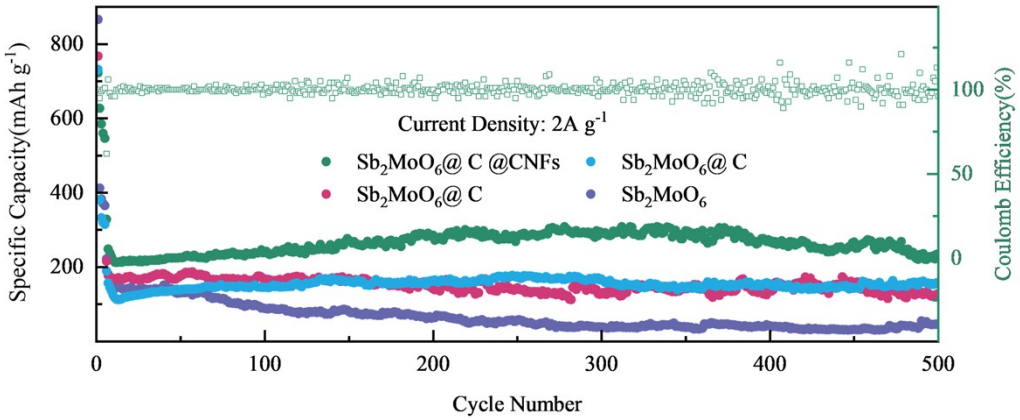


**Figure S2** Cycling performance of $Sb_2MoO_6$@C@CNFs，$Sb_2MoO_6$@CNFs，$Sb_2MoO_6$@C，$Sb_2MoO_6$ at a current density of 2A $g^{-1}$

The cycling performance of $Sb_2MoO_6$@CNFs anode materials was tested at a current density of 2A g-1. The results of the tests are shown in **Figure S2.** $Sb_2MoO_6$@C@CNFs、$Sb_2MoO_6$@C and $Sb_2MoO_6$ @CNFs showed a small increase during cycling at large current densities. Specifically compare the differences in electrochemical properties produced by different carbon coating methods. The $Sb_2MoO_6$@C formed by PPY encapsulation focuses on individual particles, so the active substances encapsulated therein do not react sufficiently, and the specific capacity is slightly lower than that of the material encapsulated by CNFs. And the CNFs constitute a three-dimensional network structure, which helps the electron transport. The combination of carbon shells and CNFs formed a unique spider web structure, which provided more channels and pathways for ion diffusion. Meanwhile, the synergistic effect of the two realizes the structural improvement from particles to networks. The multiple buffers more effectively limit the volume expansion and contraction of the material, resulting in good structural stability. And since the essence of both approaches is to inhibit the volume expansion during the electrochemical process through the constraint of carbon skeleton, the discharge specific capacity after 500 cycles is very close.

**Table S1** The cycling stability of $Sb_2MoO_6$@C@CNFs at high current densities is compared with that of other reported Sb-based anodes for sodium-ion batteries (SIBs).

| Materials | Current ($A\ g^{-1}$) | Cycles | Capacity ($mAh\ g^{-1}$) |
|---|---|---|---|
| $MoS_2$@$Sb_2S_3$/rGO[1] | 5 | 1100 | 162 |
| $Sb_2MoO_6$ microspheres[2] | 2 | 450 | 460.6 |
| Sb@CN spherical shell[3] | 0.66 | 5000 | 282 |
| $Sb_2Se_3$/Sb/CN-0.5T[4] | 1 | 600 | 181 |
| Sb@3D-Cu[5] | 1 | 200 | 289.6 |
| Sn/Sb@SSO@PCFs[6] | 0.05 | 450 | 440 |
| 3D Sb/C[7] | 1 | 200 | 257.9 |
| ZnS-Sb/C[8] | 1 | 300 | 210.3 |
| MXene-Sb/$Sb_2S_3$@C-1[9] | 1 | 2500 | 250 |
| **This work** | **5** | **5000** | **210** |

**References**


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