Supporting Information

Two-dimensional hybrid of SbO$_x$ nanoplates encapsulated by carbon flakes as a high performance sodium storage anode

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Composion calculations of SbO$_{x}$@CF, SbO$_{x}$@C and Sb@CF

Since the oxidation product of SbO$_{x}$@CF sample at 900°C is Sb$_2$O$_4$, as confirmed by the XRD result (Fig. S2a). According to the TG curve in Fig. S2b, the content of SbO$_{0.13}$ in SbO$_{0.13}$@CF can be calculated to be 67.7wt% based on the equation S1.

$$\text{SbO}_{0.13} (\text{wt}\%) = \frac{2 \times \text{molecular weight of Sb}}{\text{molecular weight of Sb}_2\text{O}_4} \times \frac{\text{final weight of Sb}_2\text{O}_4}{\text{initial weight of composite}} \times 100\%$$  \hspace{1cm} (1)

$$\text{O(\text{wt}\%, \text{in SbO}_{0.13})} = \frac{0.13 \times \text{molecular weight of O}}{\text{molecular weight of SbO}_{0.13}} \times 100\%$$ \hspace{1cm} (2)

$$\text{O(\text{wt}\%, \text{in Sb}_2\text{O}_3)} = \frac{3 \times \text{molecular weight of O}}{\text{molecular weight of Sb}_2\text{O}_3} \times 100\%$$ \hspace{1cm} (3)

Based on the Equation S2 and S3, the O content in SbO$_{0.13}$ and Sb$_2$O$_3$ can be calculated to be 1.7 and 16.1wt%, respectively. Thus, Sb$_2$O$_3$ in SbO$_{0.13}$ can be further calculated to be 10.6 wt% (1.7 wt% /16.1 =10.6 wt%). As a result, the content of Sb$_2$O$_3$ in SbO$_{0.13}$@CF hybrid can be calculated to be 7.2 wt% (10.6×67.7 wt%=7.2 wt%), and Sb in SbO$_{0.13}$@CF hybrid is 60.5 wt% (67.7 wt%-7.2 wt%=60.5 wt%). Similarly, contents of Sb oxides and carbon in SbO$_x$@C sample (x=0.34) are calculated to be 61.8 and 38.2 wt% based on the TG result, and contents of Sb$_2$O$_3$ and Sb in SbO$_{x}$@C sample are further calculated to be 16.4 and 45.4 wt%. In a same way, contents of Sb and carbon in Sb@CF sample also can be calculated to be 53.1 and 46.9 wt% based on the TG result, respectively.
Fig. S2. (a) XRD pattern of SbO₅@CF treated in air at 900°C. (b) TG curves of as-prepares samples.

Table S1

Elemental analysis results of SbO₅@CF and SbO₅@C

<table>
<thead>
<tr>
<th>Samples</th>
<th>C (wt%)</th>
<th>H (wt%)</th>
<th>O (wt%)</th>
<th>Sb (wt%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>SbO₅@CF</td>
<td>27.5</td>
<td>0.9</td>
<td>3.6</td>
<td>68.0</td>
</tr>
<tr>
<td>SbO₅@C</td>
<td>29.8</td>
<td>1.1</td>
<td>5.4</td>
<td>63.7</td>
</tr>
</tbody>
</table>

Fig. S3. (a) SEM image and (b) TEM image of Sb@CF.

Fig. S4. EXD spectrum of SbO₅@CF.
Fig. S5. SEM images of products with different amount of NaCl. (a) 2g, (b) 3g, (c) 4g and (d) 5g.
Fig. S6. (a) Comparison of the 2nd CV curves of SbO_x@CF and carbon electrode. (b) The initial three charge and discharge profiles, and (c) cycling performance of carbon electrode at a current density of 100 mA g⁻¹. The initial three charge and discharge profiles of (d) Sb@CF electrode, and (e) SbO_x@C electrode at a current density of 100 mA g⁻¹. (f) Comparison of the 3rd charge and discharge profiles of SbO_x@C and SbO_x@CF electrodes at a current density of 100 mA g⁻¹.