Supporting Information

Encapsulation of BiOCl nanoparticles in N-doped carbon nanotubes as highly efficient anode for potassium ion batteries

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**Fig. S1.** TEM image of Co@N-CNTs.

**Fig. S2.** SEM images of (a) Co@N-CNTs-750, (b) Co@N-CNTs-800, (c) Co@N-CNTs-850, (d) Co@NC, (e) Co@BC, and (f) N-CNTs, respectively.
**Fig. S3.** TEM images of (a) BiOCl@N-CNTs-1 and (b) BiOCl@N-CNTs-2. SEM images of (c) BiOCl, and (d) BiOCl@C.

**Fig. S4.** XRD patterns of synthesized (a) Co@C and BiOCl@C, (b) BiOCl, and (c) BiOCl@N-CNTs-1 and BiOCl@N-CNTs-2.
**Fig. S5.** (a) High-resolution XPS spectra of B 1s for BiOCl@N-CNTs, and (b) Bi 4f, (c) O 1s, and (d) Cl 2p for BiOCl@C.

**Fig. S6.** TG curves of BiOCl, BiOCl@C and BiOCl@N-CNTs.
**Fig. S7.** Nitrogen adsorption-desorption isotherm of BiOCl@C (the inset shows the pore size distributions).

**Fig. S8.** (a) CV curves of the BiOCl@C at a scan rate of 0.1 mV s\(^{-1}\) within a voltage range of 0.01–3.0 V. (b) Discharge and charge profiles of the BiOCl@C at 0.1 A g\(^{-1}\).
Fig. S9. (a) Cycling performance at 0.1 A g$^{-1}$, (b) Rate capability, and (c) Long-term cycling performance at 1.0 A g$^{-1}$ of BiOCl@N-CNTs, BiOCl and N-CNTs.

Fig. S10. (a) Cycling performance at 0.1 A g$^{-1}$, and (b) Long-term cycling performance at 1.0 A g$^{-1}$ of BiOCl@N-CNTs, BiOCl@N-CNTs-1 and BiOCl@N-CNTs-2.
Fig. S11. (a) The relationship of log i and log v of BiOCl@N-CNTs. (b) CV curves of the BiOCl@C at different scan rates, and (c) corresponding relationship of log i and log v. (d) Capacitive contribution in total CV curve of BiOCl@C.

Fig. S12. (a) EIS of BiOCl@N-CNTs and BiOCl@C before cycle. (b) EIS of BiOCl@N-CNTs in different cycles.
Fig. S13. GITT profiles of the BiOCl@C and BiOCl@N-CNTs during the discharge process after 20 cycles.

Table S1. The capacity and high-rate performance of the BiOCl@N-CNTs in this work are superior to most reported anode materials for Li/Na/K ion batteries.

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<th>Electrode</th>
<th>Current density (mA g(^{-1}))</th>
<th>Cycle number</th>
<th>Capacity (mA h g(^{-1}))</th>
<th>Batteries</th>
<th>Ref</th>
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<tr>
<td>BiOBr@C</td>
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<td>422</td>
<td>LIBs</td>
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<td>1050</td>
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### Table S2. The fitting values for the resistance of the electrodes in Fig. S12.

<table>
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<th>Electrode</th>
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<th>BiOCl@C</th>
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<td>Cycle number</td>
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<td>$R_s$ (Ω)</td>
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<td>$R_{ct}$ (Ω)</td>
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References


