Supporting information

MOF-Derived Nitrogen-Doped ZnSe Polyhedrons Encapsulated by Reduced Graphene Oxide as Anode for Lithium and Sodium Storage

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Figure S1 The XRD pattern of simulated ZIF-8 and ZIF-8@GO.

Figure S2 TGA plots of N-ZnSe@rGO-L, N-ZnSe@rGO and N-ZnSe@rGO-H.
Figure S3 SEM images of (a) N-ZnSe@rGO-L, (b) N-ZnSe@rGO and (c) N-ZnSe@rGO-H.

Figure S4 The XPS survey spectrum of N-ZnSe@rGO.
Figure S5 Cyclic voltammetry curves scanned at a rate of 0.01 mV s\(^{-1}\) in the voltage window of 0.01-3.0 V.

Figure S6. Kinetic analysis of N-ZnSe@rGO electrode for SIBs. (a) CV curves at different scan rates ranging from 0.1 to 1.1 mV s\(^{-1}\), (b) Calculation of the b values by plotting log \(i\) vs. log \(v\) plots, (c) Capacitive and diffusion contribution to the charge storage process at the scan rate of 0.5 mV s\(^{-1}\), (d) The percentage of capacitive contributions with sweep rates from 0.1 to 1.1 mV s\(^{-1}\).
Table S1: Equivalent circuit parameters collected from fitting the impedance spectra of the N-ZnSe@rGO

<table>
<thead>
<tr>
<th>Sample</th>
<th>Battery type</th>
<th>$R_s$ (Ω)</th>
<th>$R_{ct}$ (Ω)</th>
</tr>
</thead>
<tbody>
<tr>
<td>N-ZnSe@rGO</td>
<td>Lithium</td>
<td>3.4</td>
<td>148.7</td>
</tr>
<tr>
<td></td>
<td>Sodium</td>
<td>6.2</td>
<td>239.9</td>
</tr>
</tbody>
</table>

$R_s$ is the combination of electrolyte resistance and ohmic resistance of cell components, $R_{ct}$ is represented for the charge-transfer resistance of electrochemical reactions.

Figure S7: Real parts of the impedance ($Z'$) versus the reciprocal square root of the angular frequency ($\omega^{-1/2}$) in low frequency region of the above N-ZnSe@rGO electrode.