Supporting Information

Controllable Nitrogen-Doping of Nanoporous Carbons Enabled by Coordination Frameworks

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\textbf{Figure S1.} Illustration of pyrrolic-N, pyridinic-N and graphitic-N structures adsorbed by different K atoms. u means that K atoms are adsorbed above the structure, d means that K atoms are adsorbed below the structure. We defined the differential binding energy as $E_{\text{diff}}^{\text{bind}} = E_{nK/sub} - E_{(n-1)K/sub} - E_K$. Where, n is the number of K atoms, $E_{nK/sub}$ is the total energy of the N-doped carbon structure with adsorbed n K atoms, $E_{(n-1)K/sub}$ is the total energy of the N-doped carbon structure with adsorbed n-1 K atoms, and $E_K$ is the energy of a K atom in the bulk K.
Figure S2. Illustration of pyrrolic-N, pyridinic-N and graphitic-N structures at different N concentrations. (atomic ratio) (a) pyrrolic-N: 1.05%, 4.35% and 10.34%; (b) pyridinic-N: 4.23%, 9.68% and 17.65%; (c) graphitic-N: 1.39%, 2.78% and 4.17%; (d) Formation energies of different N doping structures.
**Figure S3.** The population probability of pyrrolic-N, pyridinic-N and graphitic-N with different nitrogen concentration versus to the increase of temperature.
Figure S4. PXRD pattern of the as-synthesized ZIF-8 particles.
Figure S5. SEM image of the as-synthesized ZIF-8 particles.
Figure S6. (a) N\textsubscript{2} adsorption-desorption isotherms and (b) the pore size distribution of ZIF-8 precursor.
Figure S7. SEM images of the samples obtained by annealing the ZIF-8 particles at various temperatures.
Figure S8. Raman spectra of (a) ZIF-8_{700}, (b) ZIF-8_{800}, (c) ZIF-8_{900} and (d) ZIF-8_{1000}.

The spectra were fitted based on the literature.\textsuperscript{2}
Figure S9. The N/C ratios of all the nanoporous carbons obtained at annealing temperature of 600 to 1000 °C.
Figure S10. Elemental mapping of the carbonized sample (ZIF-8_{800}).
**Figure S11.** N1s spectra of the sample obtained by annealing the ZIF-8 particles at 700 °C for 12 h.
Figure S12. C1s spectra of the samples obtained by annealing the ZIF-8 particles at various temperatures.
Figure S13. Cycling performance of ZIF-8 carbonized under temperatures ranging from 600 °C to 1000 °C with a current of 30 mA g⁻¹.
Figure S14. Rate performance of the ZIF-8 carbonized under various temperatures ranging from 600 °C to 1000 °C with various current density from 50 to 2000 mA g⁻¹.
Figure S15. PXRD pattern of the hard carbon.
Figure S16. (a) N₂ adsorption-desorption isotherms and (b) the pore size distribution of ZIF-8₈₀₀ and hard carbon.
<table>
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<th>Materials</th>
<th>Capacity Retention (mAh g(^{-1}))</th>
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<th>Current Density (mA g(^{-1}))</th>
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REFERENCES