Supplementary Information

Synthesis of N-doped hierarchical carbon spheres for CO_2 capture and supercapacitors

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Isosteric heat of CO_2 adsorption for NC-2-600

Based on the previous literature[1], the enthalpy of CO_2 adsorption for carbons was calculated from the Clausius-Clapeyron equation:

$$\ln(\frac{P_1}{P_2}) = \Delta H_{ads} \times \frac{T_2 - T_1}{R \times T_1 \times T_2} \quad (1)$$

(T_i = temperature for isotherm i; P_i = pressure for isotherm i; R = 8.314 J K^{-1} mol^{-1})

The pressure as a function of the amountof CO_2 adsorbed was determined using the Langmuir-Freundlich fit for the isotherms:

$$\frac{Q}{Q_m} = \frac{\mathrm{B} \times P^{(1/\mathrm{t})}}{1 + \mathrm{B} \times P^{(1/\mathrm{t})}} \quad (2)$$

(Q = moles adsorbed; Q_m= moles adsorbed at saturation; P = pressure; B and t = constants)

Equation (2) can be rearranged to $P = (\frac{Q}{\mathrm{B}(Q_m - Q)})^{\mathrm{t}}$. Heats of adsorption ($Q_{st}$) can be obtained by adding the P into equation (1).

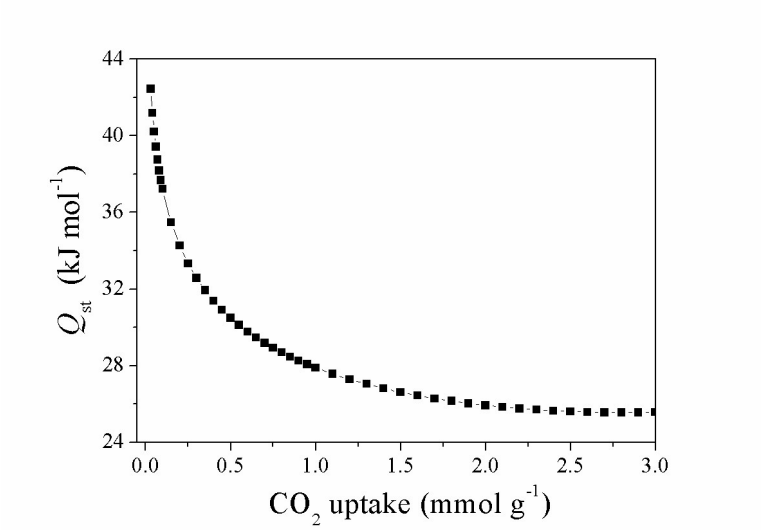

Fig. S1 The isosteric heat of adsorption for A-NHCS-2 at different CO_2 loadings.

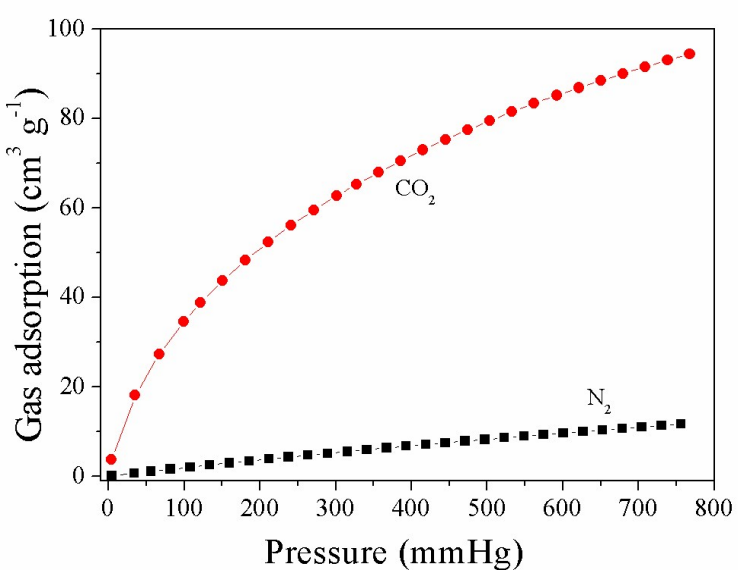

Fig. S2 Carbon dioxide and nitrogen adsorption isotherms of the A-NHCS-2 at 298 K.

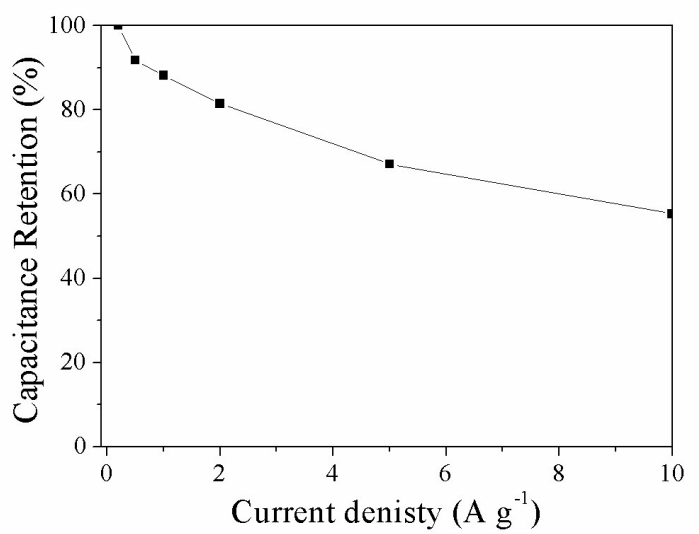

Fig. S3 Relationship between specific capacitance and the charge-discharge current densities of A-NHCS-2 in 6 M KOH.

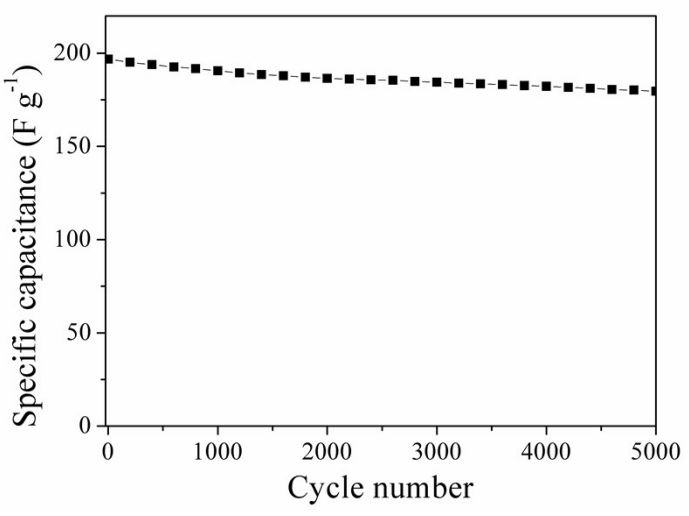

Fig. S4 Cycle life of A-NHCS-2 for 5000 cycles.

[1] Z. Wang, K. K. Tanabe and S. M. Cohen. *Chem. Eur. J.*, 2010; **16**: 212-217.