Nanostructured Carbon Doped BN for CO_2 Capture Applications

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Equation S1: Clausius–Clapeyron

$$\Delta H_{ads} = R \left[\frac{\partial \ln P}{\partial \left(\frac{1}{T}\right)} \right]_q \quad (S1)$$

In this equation, $[\Delta H]_{ads}$ corresponds to the isosteric adsorption enthalpy (kJ.mol^{-1}), R to the ideal gas constant (8.314 J.mol^{-1}.K^{-1}) and q to the adsorbed quantity of CO_2 at a pressure P and temperature T.

Equation S2: Obtained by solving equation S1

$$\Delta H_{ads} = -\left(\frac{RT_1 T_2}{T_2 - T_1} \ln \frac{P_2}{P_1} \right) \ (S2)$$

Equation 3: Ideal Adsorption Solution Theory (IAST)

$$S_{CO_2/N_2} = \frac{q_1/q_2}{P_1/P_2} \quad (S3)$$

q_1 and q_2 are respectively the adsorbed quantity of CO_2 and N_2 at P_1 and P_2, P_1 = 0.15 bar and P_2 = 0.75 bar.

Equation S4: Recyclability calculation of CO_2 uptake after 5 cycles.

$$Recyclability \ (\%) = \frac{Qads_{Cycle\ 5}}{Qads_{Cycle\ 1}} * 100 \quad (S4)$$

Table S1. The synthesis conditions of the BN/C materials prepared from the AB@C16AB nanostructure.

Material	Varied conditions	Solvent	ACN / cyclohexane volume ratio	Polymerization T (°C)	Pyrolysis T (°C)	Heating rate (°C/min)
BN/C-1	**Pyrolysis temperature**	**Solvent-free**	-	**90**	600	10
BN/C-2		Solvent-free	-	90	800	10
BN/C-3		Solvent-free	-	90	1000	10
BN/C-4		Solvent-free	-	90	1100	10
BN/C-5	Pyrolysis heating rate	Solvent-free	-	90	1100	2
BN/C-6		Solvent-free	-	90	1100	5
BN/C-7		Solvent-free	-	90	1100	15
BN/C-8	Polymerization with solvent	ACN / cyclohexane	1/3	90	1100	10

Table S2. Textural properties of the BN/C materials prepared from the AB@C16AB nanostructure.

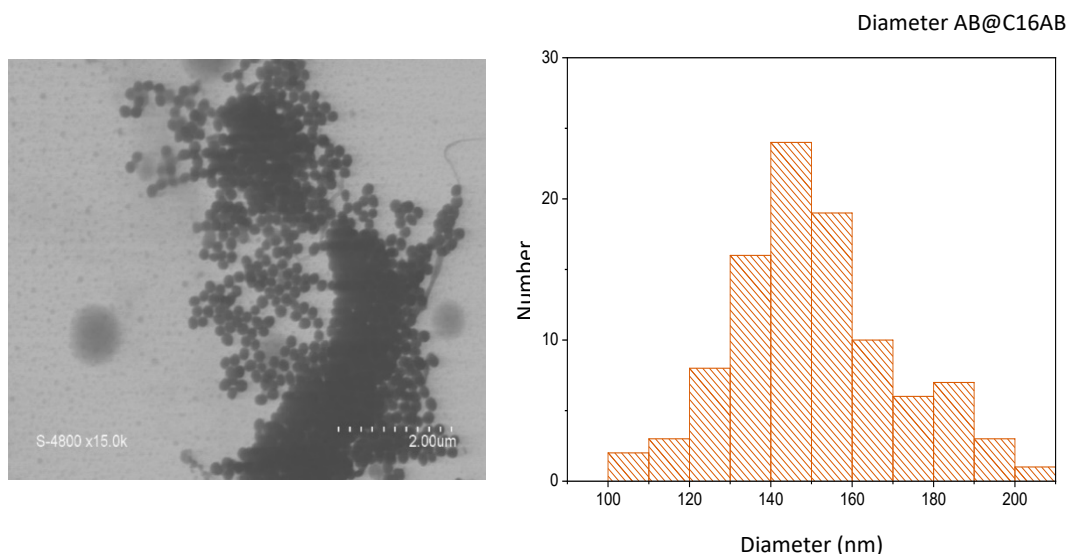| Material	BET SSA		Pore volume	
	Total SSA (m²/g)	t-plot SSA (%)	Total V (cm³/g)	t-plot V (%)
BN/C-1	172	63	0.13	50
BN/C-2	235	88	0.15	61
BN/C-3	322	94	0.21	66
BN/C-4	585	94	0.32	67
BN/C-5	11	-	0.09	-
BN/C-6	400	87	0.33	42
BN/C-7	378	82	0.30	47
BN/C-8	767	98	0.32	92

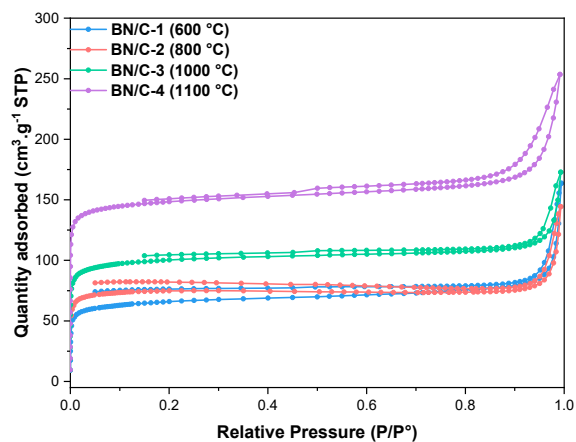**Figure S1.** Statistical histogram of AB@C16AB particle size from ImageJ software.

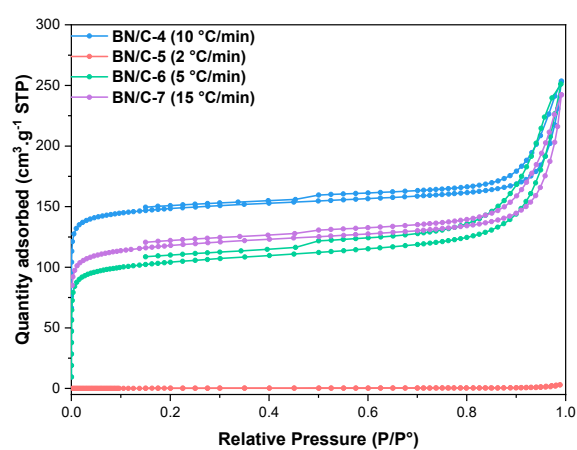**Figure S2.** Nitrogen adsorption-desorption isotherms at -196 °C of BN/C-1 to BN/C-4.

Figure S3. Nitrogen adsorption-desorption isotherms at -196 °C of BNC-4 to BN/C-7 using an ACN/cyclohexane mixture.