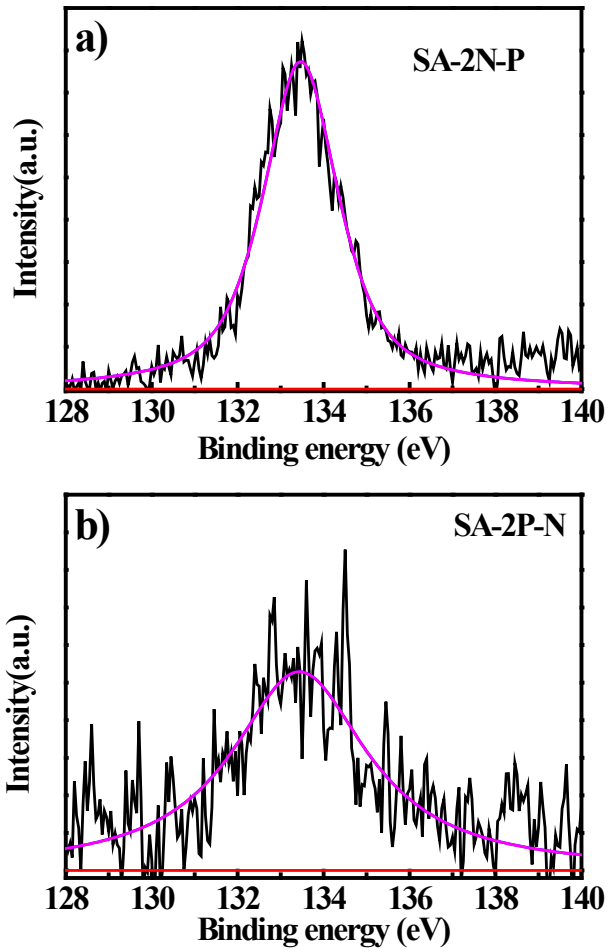
Electronic supplementary information (ESI)

A novel activating strategy to achieve highly porous carbon monolith for CO_2 capture

Xiaoyu Ma, Yao Li, Minhua Cao* and Changwen Hu*

Key Laboratory of Cluster Science, Ministry of Education of China, Beijing Key Laboratory of Photoelectronic/Electrophotonic Conversion Materials, Department of Chemistry, Beijing Institute of Technology, Beijing 100081, P. R. China.

Fig. S1 XPS P2p spectra of the samples (a) SA-2N-P and (b) SA-N-2P, respectively.



The high-resolution P2p XPS spectrua of the samples (a) SA-2N-P and (b) SA-N-2P are shown in Figure S1. Two samples both display only one peak of P2p at 133.3 eV, which can be assigned to P-O bonding. However, the peak of P2p of P-C centered at 130.6 eV cannot be found, indicating that the P species exhibit in the form of PO_4^{3-}.[S1-S3]

The Ideal Adsorption Solution Theory (IAST) calculations.

1. Pure component isotherm fitting

The pure component adsorption isotherms of CO_2 and N_2 on the SA-2N-P at 298 K and pressure up to 1atm are given in Fig. 6a.

The experimental adsorption isotherms were fitted with a dual-site Langmuir model as follows: [S4-S7]

$$q = q_A + q_B = \frac{q_{sat,A} b_A p}{1 + b_A p} + \frac{q_{sat,B} b_B p}{1 + b_B p} \qquad (1)$$

where we have two distinct adsorption sites A and B; b_i dual-Langmuir constant (Pa^{-1}); q_i molar loading of species i, mmol g^{-1}; $q_{sat,i}$ saturation capacity of species i, mmol g^{-1}.

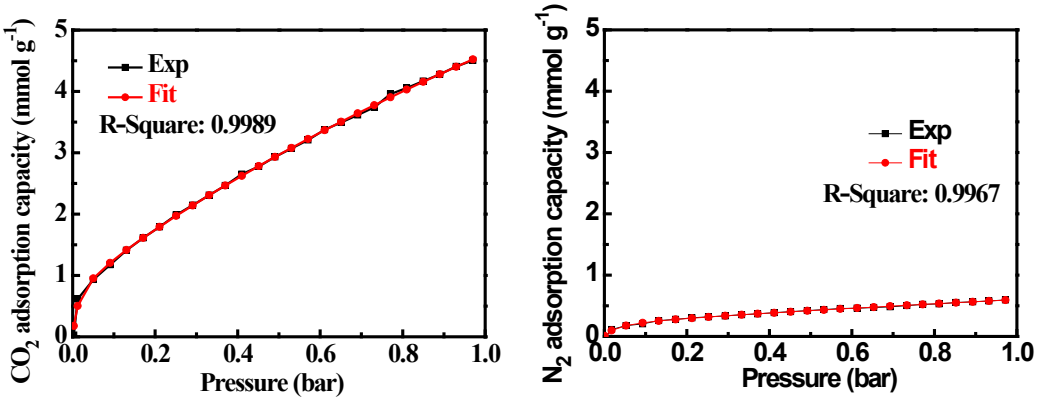


Fig. S2. CO_2 and N_2 gas adsorption isotherms for SA-2N-P at 298 K (black). The red lines correspond to dual-site Langmuir equation fit.

2. The adsorption selectivity, S_{ads}, for binary mixtures of **1** and **2**, is defined as follows:

$$S_{ads} = \frac{q_1 / q_2}{p_1 / p_2} \qquad (2)$$

where q_i is the amount of i adsorbed and p_i is the partial pressure of i in the mixture

for CO_2 over N_2 in flue-gas streams (typically 15% CO_2 and 85% N_2) was estimated from the experimental single-component isotherms. The SA-2N-P exhibits high adsorption selectivity of 29 for CO_2 over N_2 at 295 K and 1 bar.

References:

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