Electronic Supplementary Material (ESI) for Journal of Materials Chemistry A

Highly porous nitrogen-doped polyimine-based carbons with adjustable microstructures for CO_2 capture

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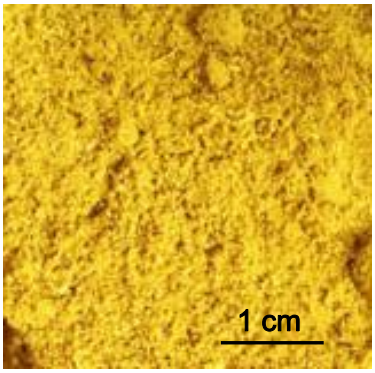

Fig. S1 The photograph of the as-prepared polyimine.

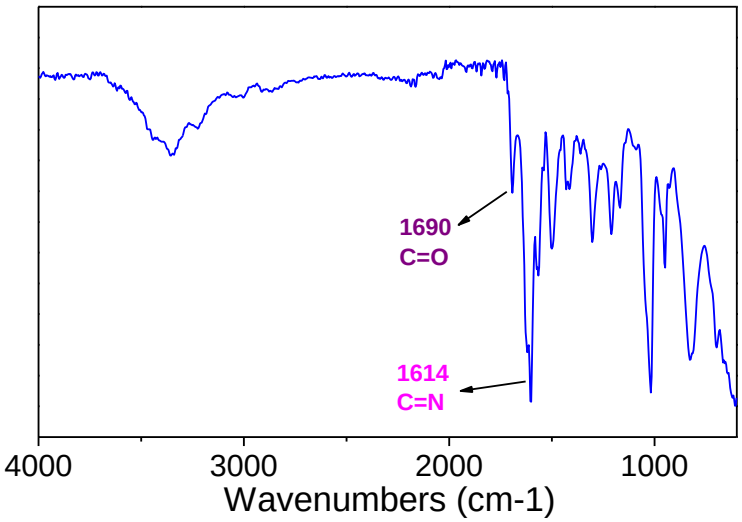

Fig. S2 FT-IR spectrum of polyimine.

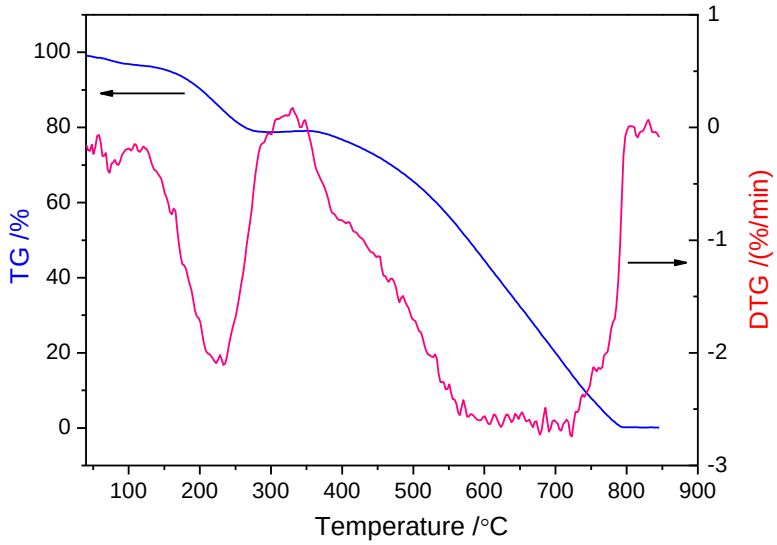

Fig. S3 TG-DTG curves of polyimine in an air flow (10 ºC/min). The mass loss of ~17.2 wt% between 140 ºC and 300 ºC should be ascribed to the evaporation of DMSO in polyimine. The mass of ~78.6 wt% between 380 ºC to 800 ºC should be due to the combustion of polyimine in air. The final residual mass is ~0.3 wt% at 850 ºC.

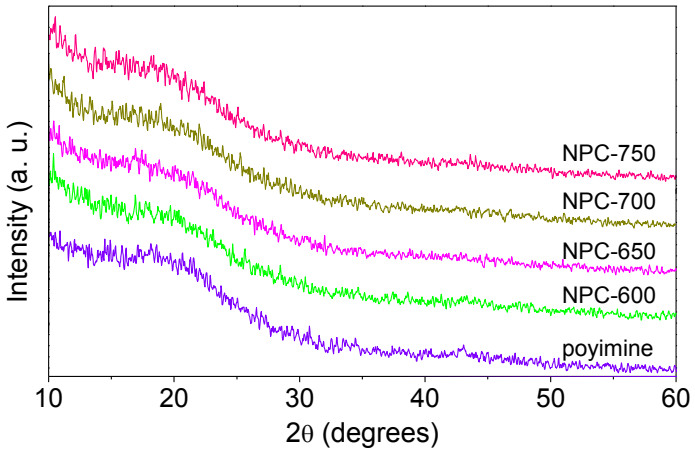

Fig. S4 XRD patterns of polyimine and NPCs.

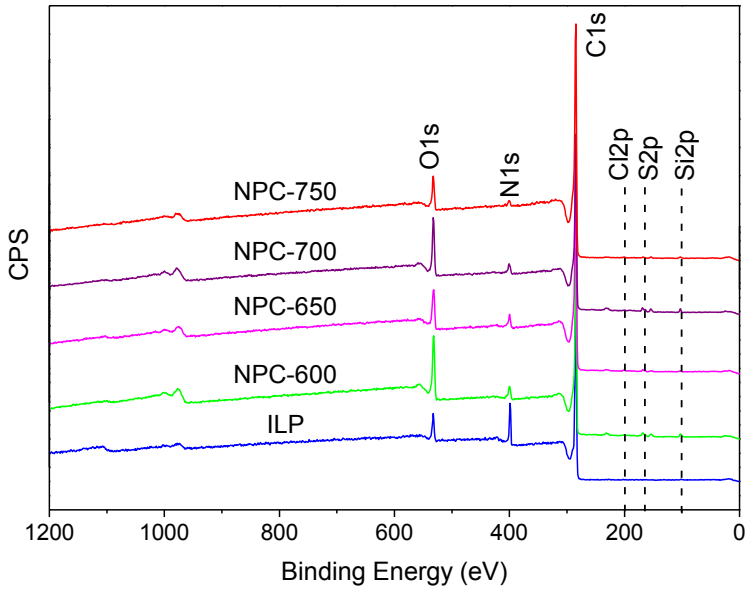

Fig. S5 XPS spectra of polyimine and various NPCs.

Table S1 Elemental analysis of polyimine and various NPCs determined by XPS analysis.

Sample	N [wt%]	C [wt%]	O [wt%]	S [wt%]	Si [wt%]	Cl [wt%]
polyimine	10.56	82.90	6.54	---	---	---
NPC-600	4.54	77.69	12.82	2.16	2.62	0.17
NPC-650	4.05	85.97	7.86	1.26	0.61	0.26
NPC-700	3.49	79.54	11.35	2.47	2.90	0.25
NPC-750	1.45	90.62	6.11	0.46	1.09	0.26

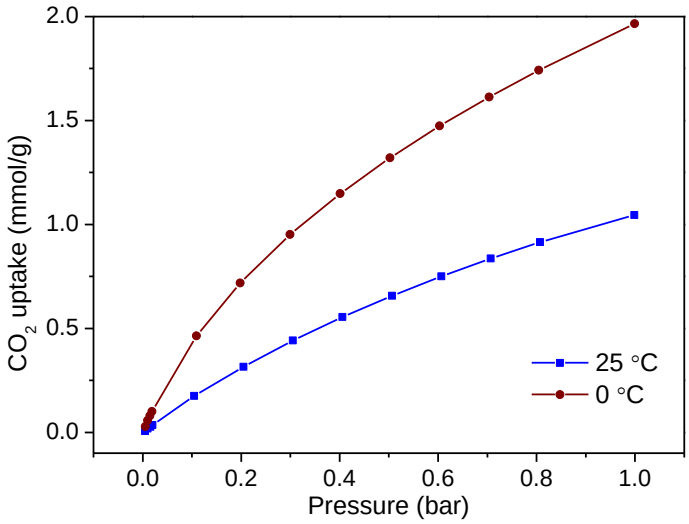

Fig. S6 CO_2 sorption isotherms of polyimine at 25 and 0 °C, respectively.

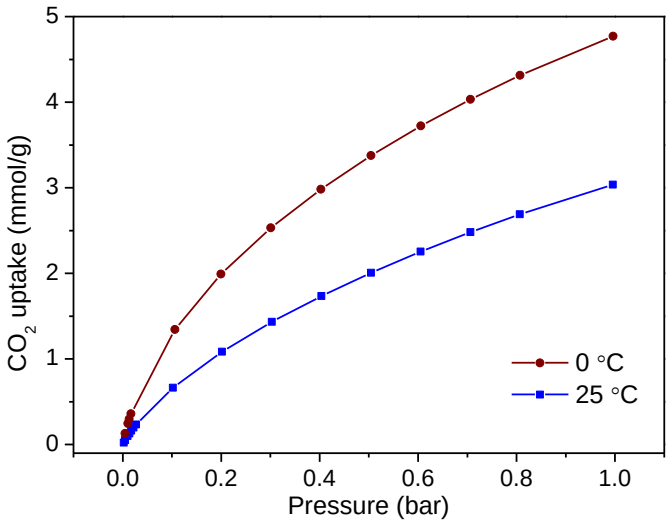

Fig. S7 CO_2 sorption isotherms of NPC-600 at 25 and 0 °C, respectively.

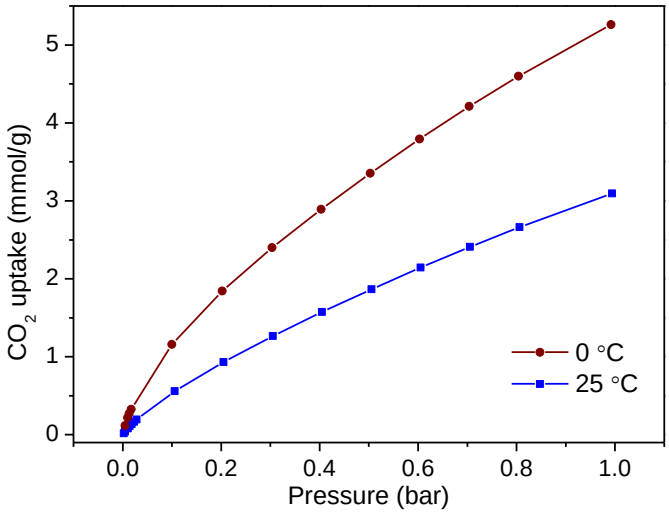

Fig. S8 CO_2 sorption isotherms of NPC-650 at 25 and 0 °C, respectively.

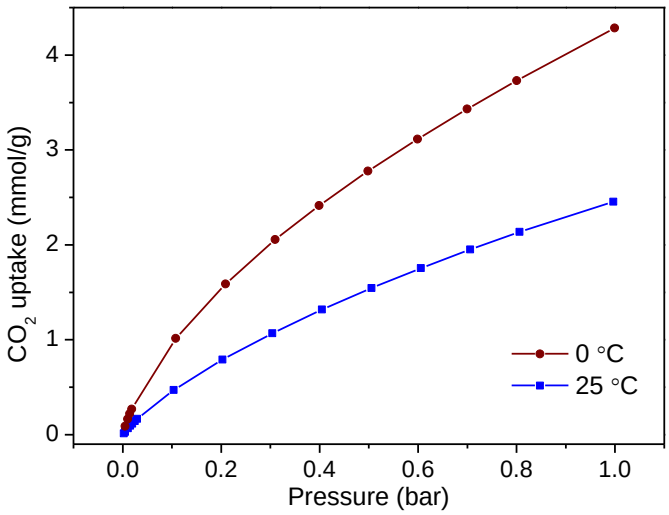

Fig. S9 CO_2 sorption isotherms of NPC-700 at 25 and 0 °C, respectively.

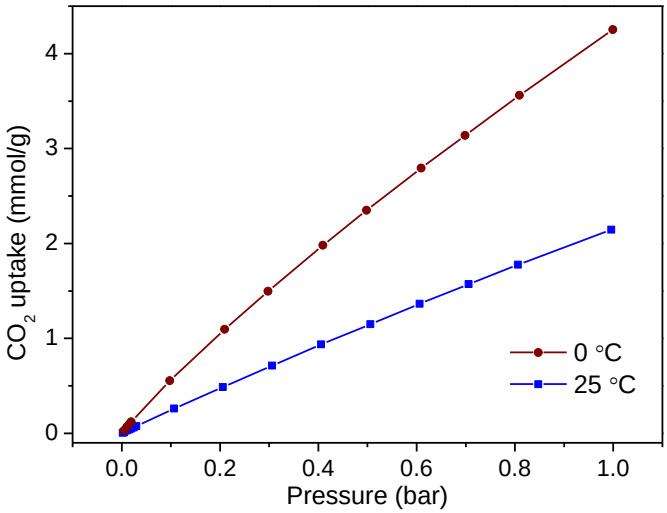

Fig. S10 CO_2 sorption isotherms of NPC-750 at 25 and 0 °C, respectively.

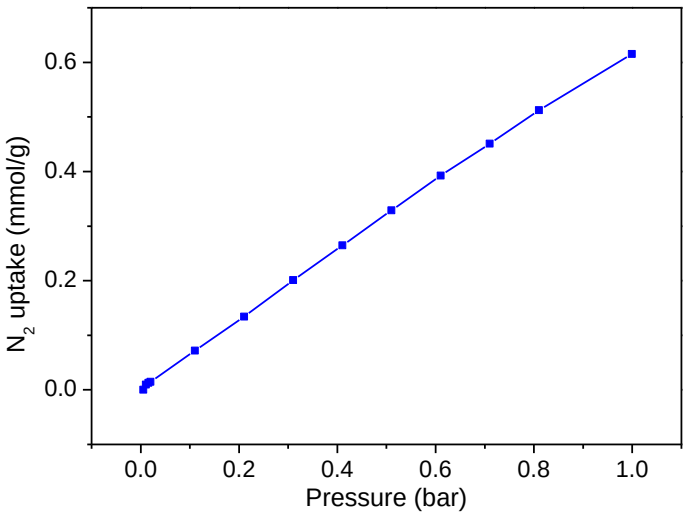

Fig. S11 N_2 adsorption isotherm of NPC-650 at 25 °C.

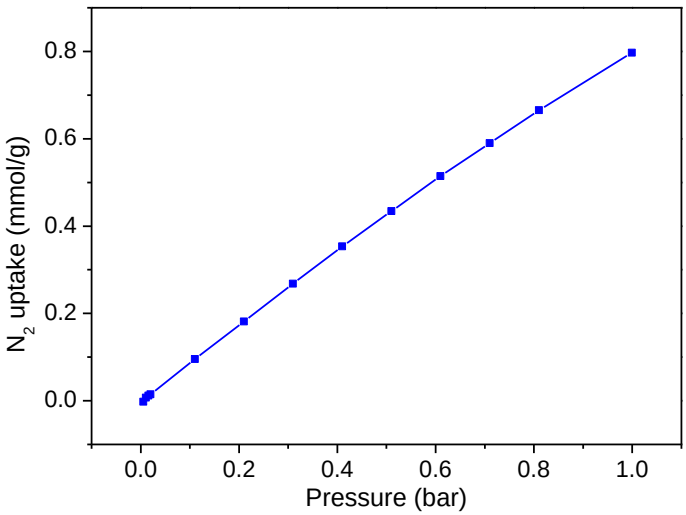

Fig. S12 N_2 sorption isotherm of NPC-650 at 0 °C.

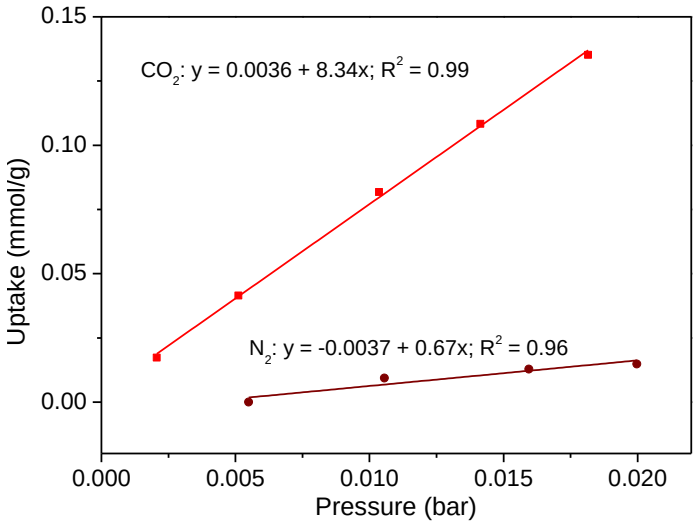

Fig. S13 Initial slopes from CO_2 and N_2 adsorption isotherms at 25 °C for NPC-650.

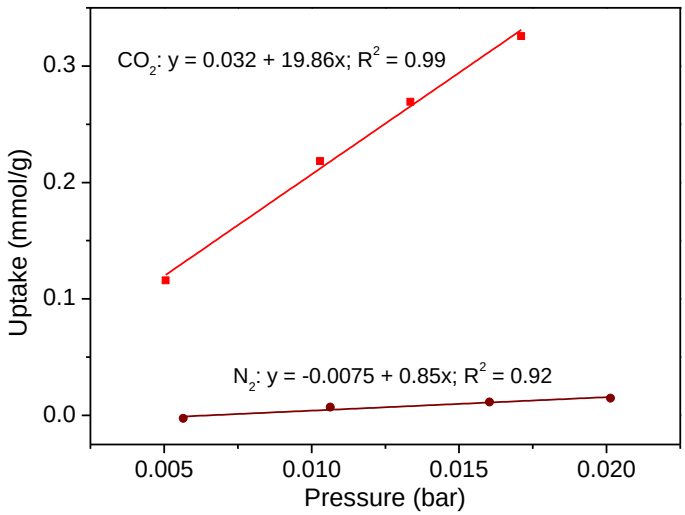

Fig. S14 Initial slopes from CO_2 and N_2 adsorption isotherms at 0 °C for NPC-650.

Table S2 Comparison of the NPCs and some recently reported adsorbents for CO_2 capture at 1 bar and 25 or 0 °C.

Sample	CO_2 uptake, mmol/g (mg/g)		Ref.
	25 °C	0 °C	
NPC-650	**3.1 (136)**	**5.26 (231)**	**This work**
Activated graphite nanofibers	1.3 (59)	---	[1]
Conjugated microporous polymers	1.45 (64)	---	[2]
Olive stones-based carbon activated by CO_2	2.0 (86)	---	[3]
Melamine-formaldehyde resin derived carbon	2.25 (99)	---	[4]
Hierarchical nanoporous melamine resin sponges	----	1.6 (70.4)	[5]
Urea-formaldehyde and melamine-formaldehyde resin -based carbons	1.86 (82)	---	[6]
Zeolitic imidazolate frameworks	2.7 (119)	---	[7]
CMK-3	2.2 (96)	3.8 (166)	[8]
CMK-8	2.1 (90)	---	[8]
Nitrogen-doped hierarchical carbons	2.2 (97)	---	[9]
Sulfur-doped microporous carbon	2.5 (110)	---	[10]
Nitrogen-doped porous carbon	1.39 (61)	2.39 (105)	[11]
N-doped zeolite Y template carbon	2.36 (104)	---	[12]
Nitrogen-doped hierarchical porous carbon	3.2 (141)	---	[13]
Nanostructured templated carbon	3.2 (141)	---	[14]
Mesoporous carbon supporting CaO	3.2 (141)	---	[15]
Triptycene-derived benzimidazole-linked polymers	3.3 (145)	5.1 (225)	[16]
Poly(benzoxazine-co-resol)-based porous carbon	3.3 (132)	4.9 (216)	[17]
Nitrogen-doped porous carbons	3.13 (137)	---	[18]
Nitrogen-doped ordered mesoporous carbon	3.3 (145)	---	[19]

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