

Electronic Supplementary Information

Synthesis of Activated carbon/polyaniline nanocomposites for enhanced CO₂ Adsorption

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Table S1 Parameters of Langmuir, Freundlich and Sips isotherm models.

Adsorbent	Temperature (K)	Langmuir			Freundlich			Sips			
		$q_m(\text{mmol/g})$	b	R^2	K	n	R^2	$q_m(\text{mmol/g})$	b	n	R^2
AC	298	9.464	0.258	0.999	2.325	2.260	0.978	9.751	0.247	1.039	1.000
	308	8.641	0.196	0.999	1.826	2.106	0.982	9.105	0.184	1.033	1.000
	318	8.218	0.157	0.998	1.444	1.922	0.984	8.508	0.148	1.006	0.999
CO ₂ AC-PANI-F	298	14.520	0.178	0.993	2.957	2.089	0.998	28.473	0.1070	1.565	0.999
	308	14.418	0.128	0.997	2.250	1.859	0.998	22.356	0.0976	1.330	1.000
	318	14.216	0.100	0.997	1.692	1.661	0.996	19.121	0.0826	1.185	0.999
AC-PANI-S	298	19.758	0.152	0.996	3.478	1.932	0.996	30.256	0.114	1.345	0.999
	308	19.672	0.102	0.994	2.557	1.747	0.997	26.424	0.087	1.203	0.999
	318	18.980	0.075	0.993	1.849	1.600	0.997	23.968	0.066	1.135	1.000

Table S2 Sips parameters to represent pure nitrogen isotherm data at 298 K for AC and nanocomposites.

Adsorbent	n	b	$q_m(\text{mmol/g})$	R^2
AC	1.752	0.159	6.130	0.999
AC-PANI-F	1.465	0.111	4.686	0.999
AC-PANI-S	1.800	0.143	5.599	1.000

Table S3 Comparison of CO₂ adsorption capacity with other adsorbents.

Adsorbent	Amine	Adsorption Capacity(mmol.g ⁻¹)	Pressure(bar)	Temperature(K)	Refs.
β-zeolite	MEA	0.77	1	303	66
MWCNT	PEI	2.14	1	298	67
MWCNT	AEAPTS	2.59	0.5	293	68
MWCNT	mPDA	2.94	1	298	57
Zeolite 13X	MEA	1.11	1	348	69
Zeolite	AMP	0.62	1	298	70
Zeolite 13X	IPA	0.52	1	298	71
Silica (MCM-41)	APTES	1.63	1	298	72
Silica (SBA-15)	PEI	1.72	1	298	73
Silica (SBA-15)	TEPA	2.22	1	298	73
Silica (PE-MCM-41)	DAEAPTS	2.62	0.05	298	74
MOF	PEI	4.2	0.15	298	75
Activated carbon	AMP	1.5	1	298	76
Activated carbon	MEA	1.02	1	298	69
Activated carbon	TEA	0.32	1	298	69
Activated carbon	PEI	2.28	1	298	77
Graphene	PANI nanosphere	2.20	1	298	78
Activated carbon	PANI nanofiber	2.69	1	298	This study
Activated carbon	PANI nanosphere	3.16	1	298	This study

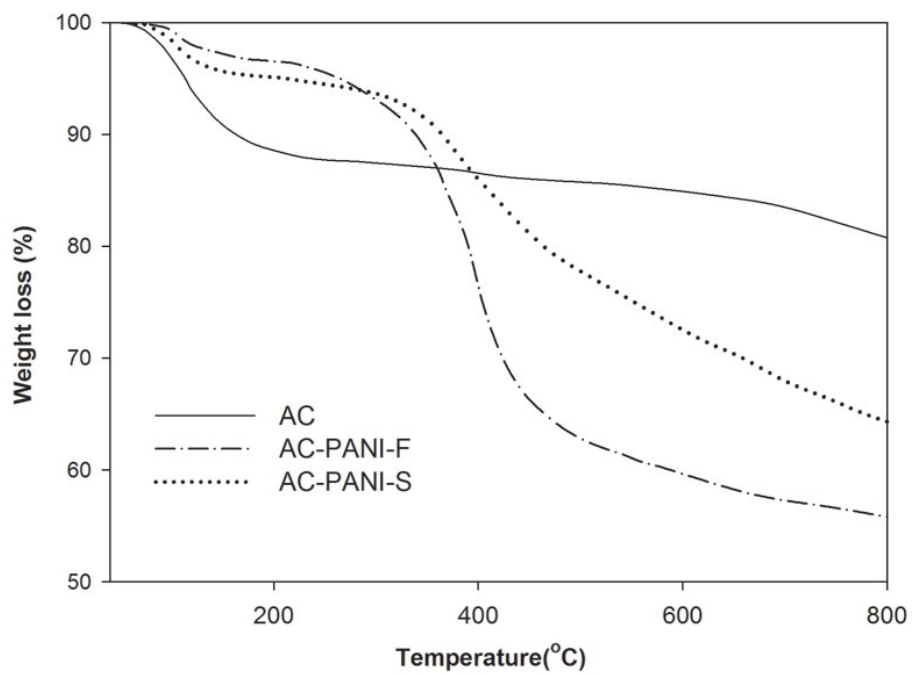


Fig. S1 TGA curves of AC before and after functionalization with PANI.

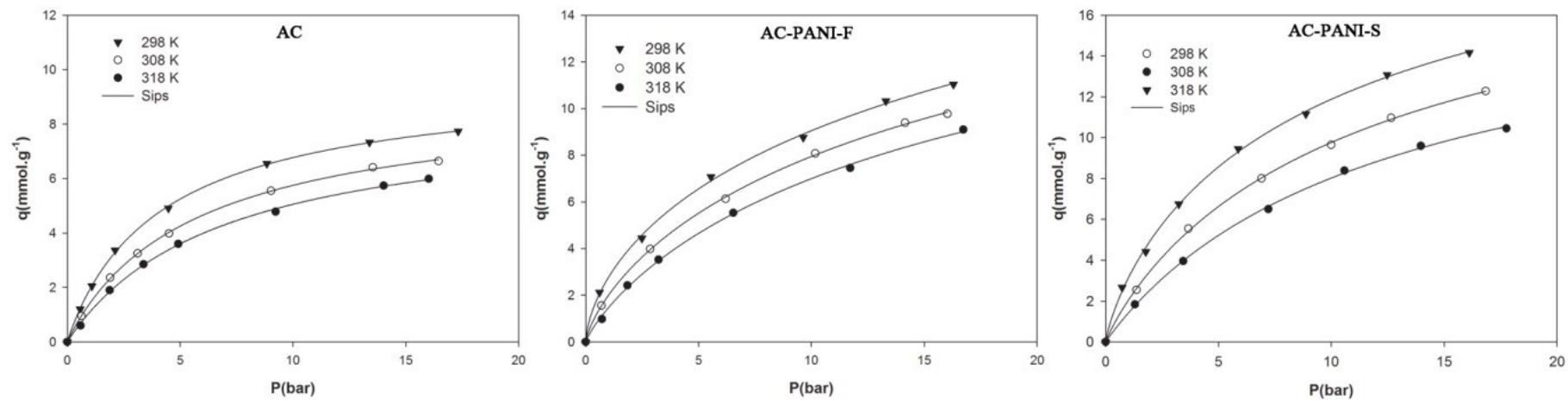


Fig.S2 Experimental CO₂ adsorption data of adsorbents at different temperatures along Sips model isotherm.

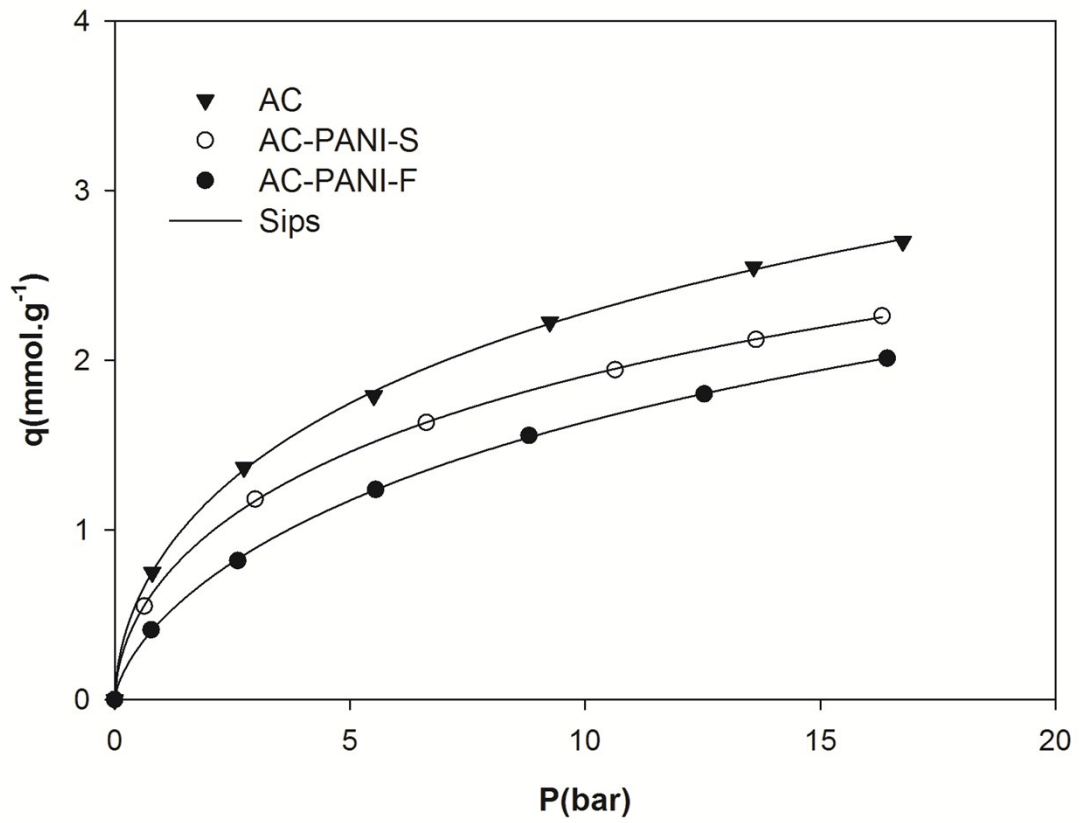


Fig. S3 Pure gas isotherms of N₂ on AC and nanocomposites at 298 K along with Sips model isotherm.

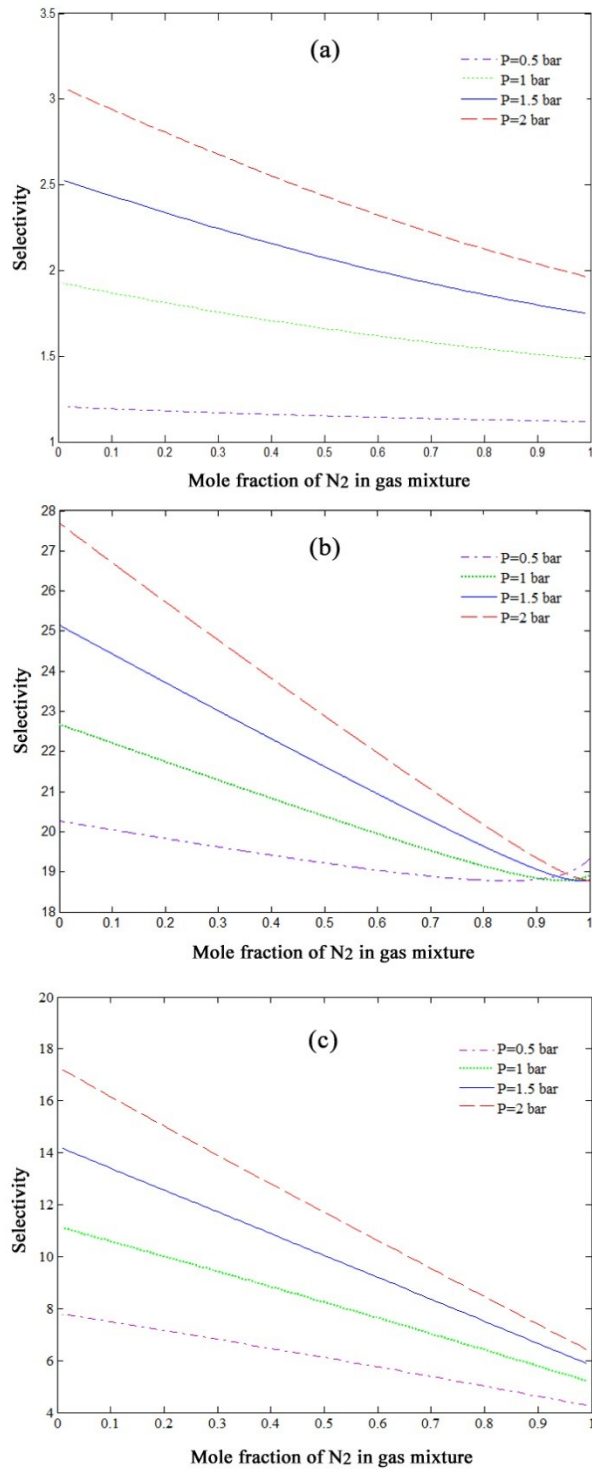


Fig. S4 Ideal selectivity for CO₂/N₂ system on AC (a), AC-PANI-F (b) and AC-PANI-S (c) at 298 K and different pressures.