Electronic Supplementary Material (ESI) for RSC Advances.

Supporting Information

Synthesis of nanoporous hypercrosslinked polyaniline (HCPANI) for gas sorption and electrochemical supercapacitor applications

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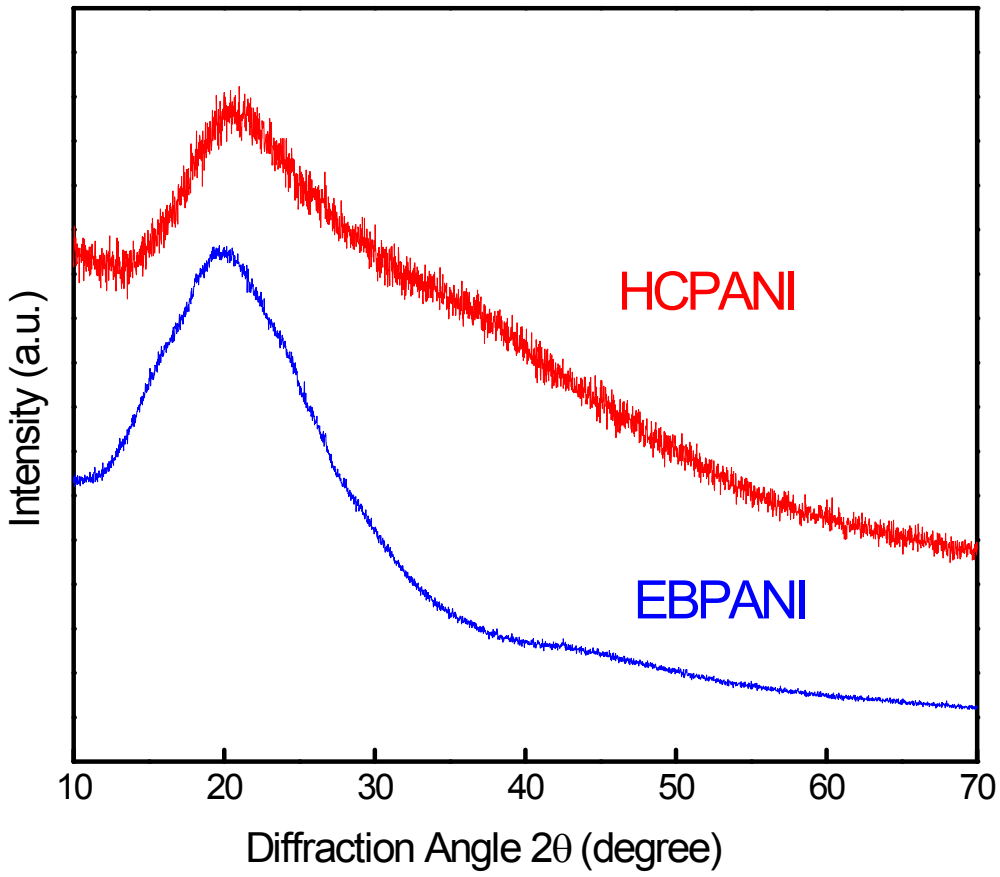

Fig. S1 XRD pattern of EBPANI and HCPANI.

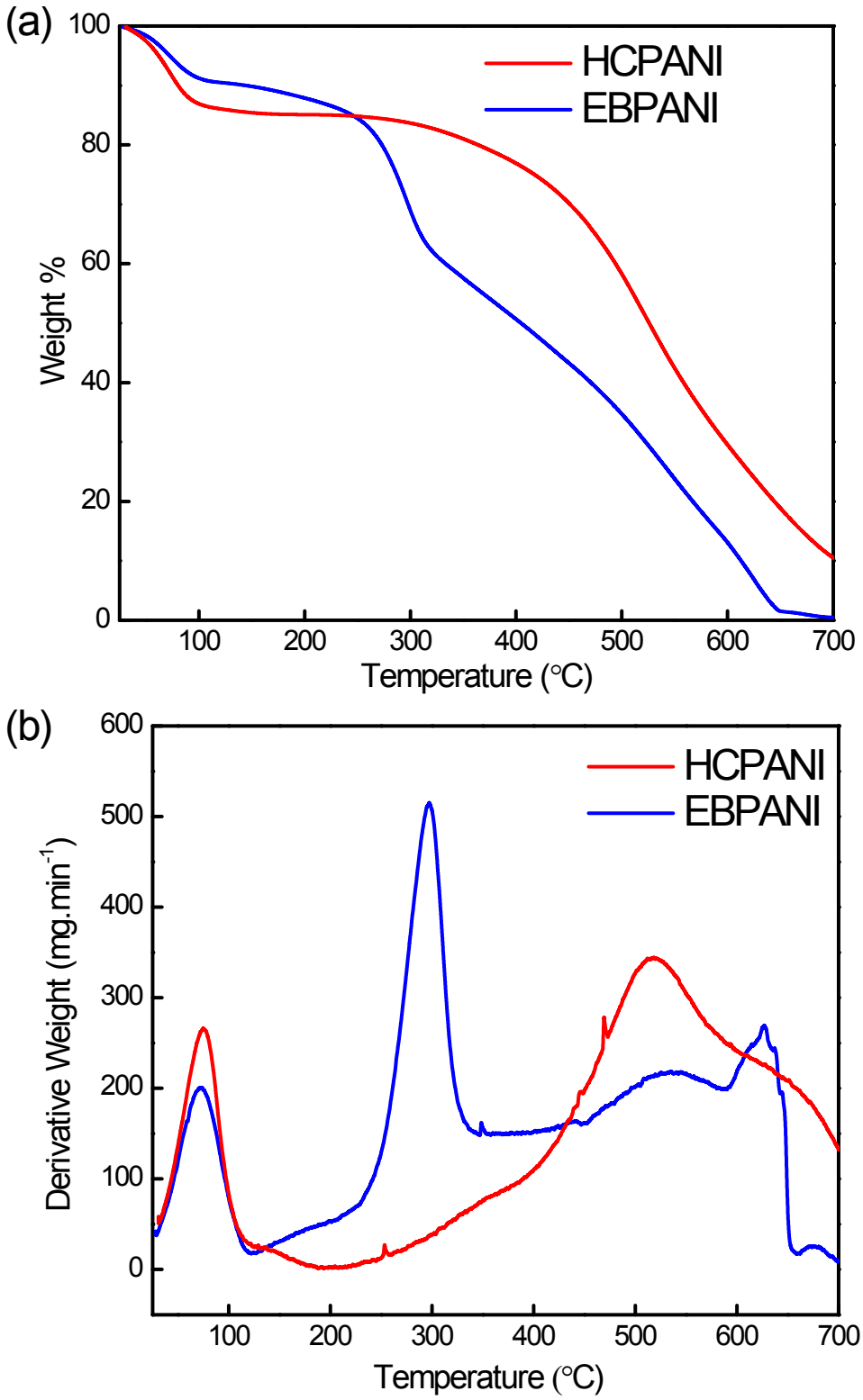

Fig. S2 TGA and DTG thermograms of (a) EBPANI and (b) HCPANI in nitrogen atmosphere with a heating rate of 10°C min^{-1}.

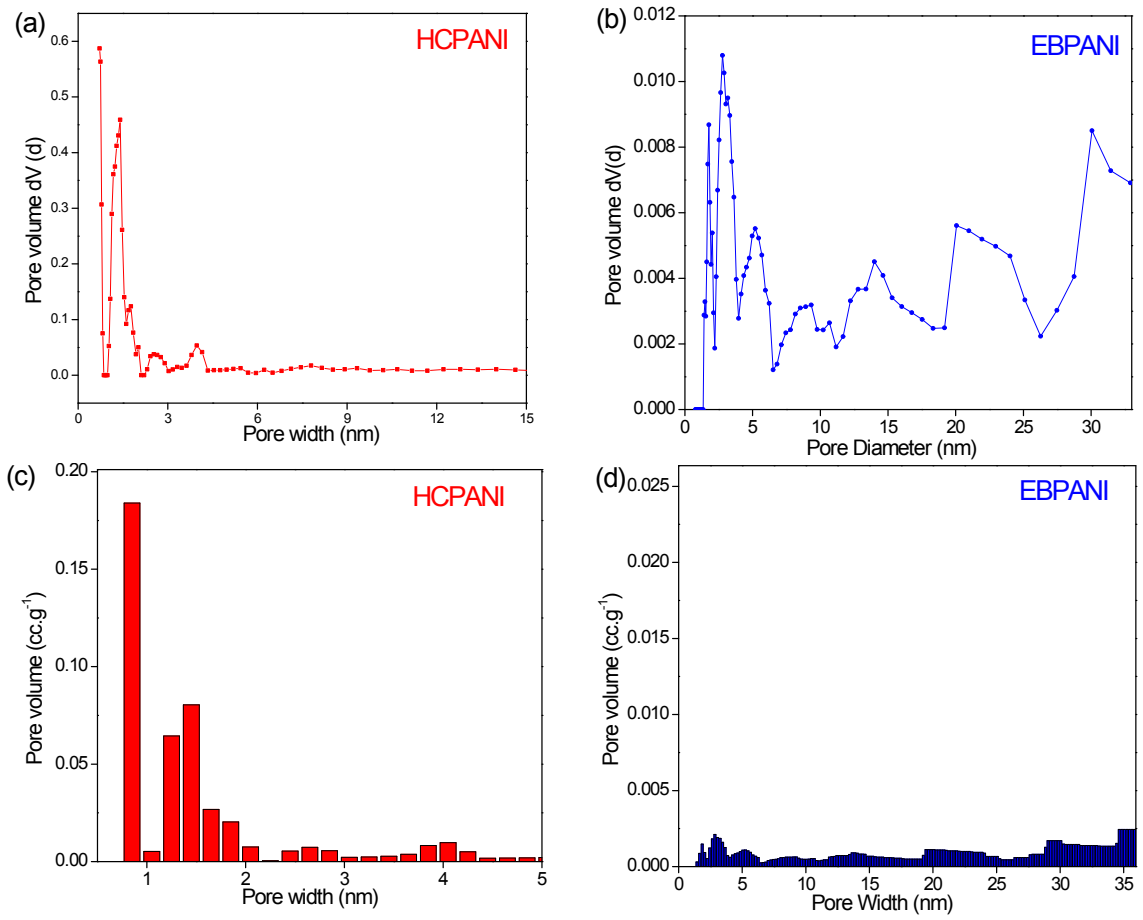

Fig. S3 Pore Size Distribution calculated from the N_2 sorption isotherms at 77 K using non-local functional theory (NLDFT) method.

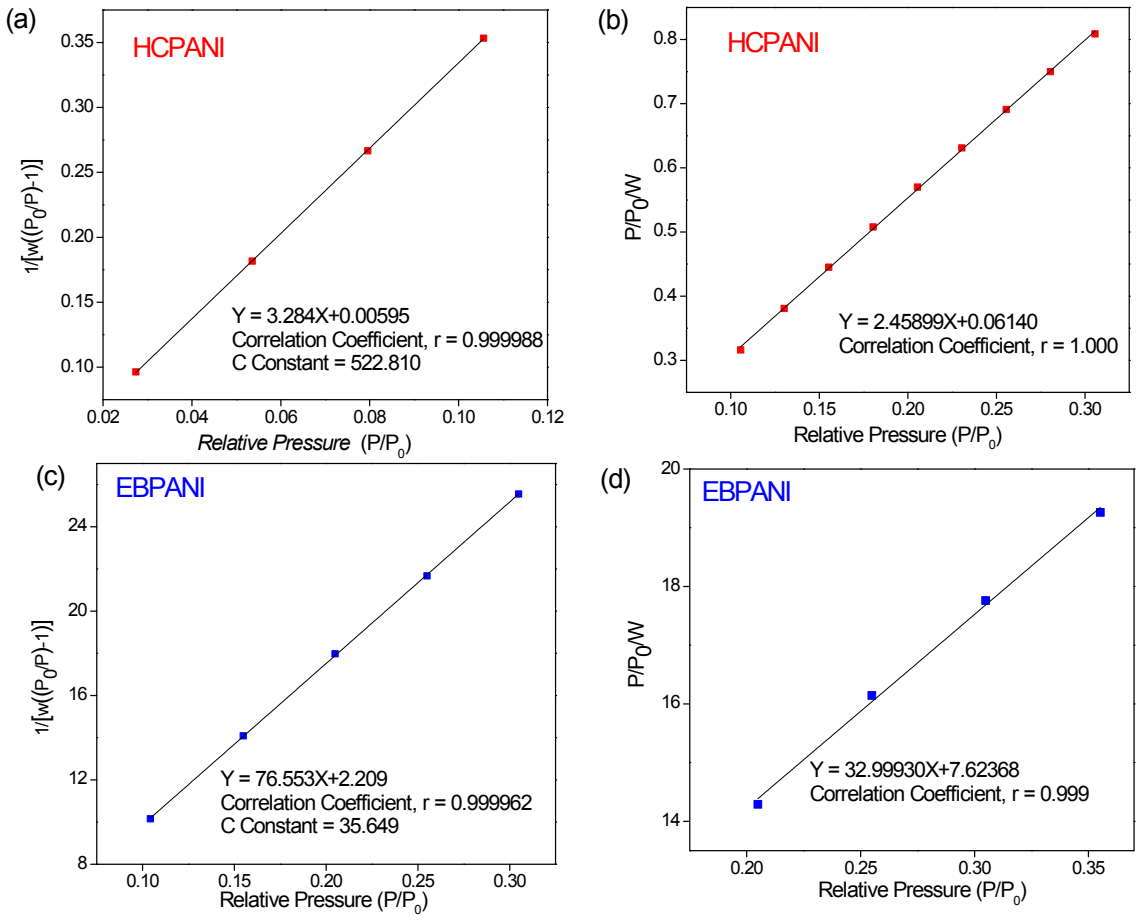

Fig. S4 (a) BET and (b) Langmuir plots of HCPANI, (c) BET and (d) Langmuir plots of EBPANI, from N_2 sorption analysis measured at 77K.

Table S1. Gas sorption properties of EBPANI and HCPANI.

Sample ID	SA_{BET} ($m^2.g^{-1}$)	$SA_{Lang.}$ ($m^2.g^{-1}$)	V_{Total} ($cc.g^{-1}$)	CO_2 Uptake ($mmol.g^{-1}$)			CH_4 Uptake ($mmol.g^{-1}$)			Selectivity			Hydrogen Storage (wt%)		
				273 K	298 K	Q_{st}	273 K	298 K	Q_{st}	CO_2:N_2	CO_2:CH_4	CH_4:N_2	77 K	268 K	Q_{st}
EBPANI	44	111	0.33	0.66	0.38	33.30	0.21	0.09	30.15	22.1	9.5	2.3	0.17	-	-
HCPANI	1059	1416	0.77	3.52	2.15	32.26	1.01	0.53	24.95	57	13	4.5	1.85	0.25	5.46

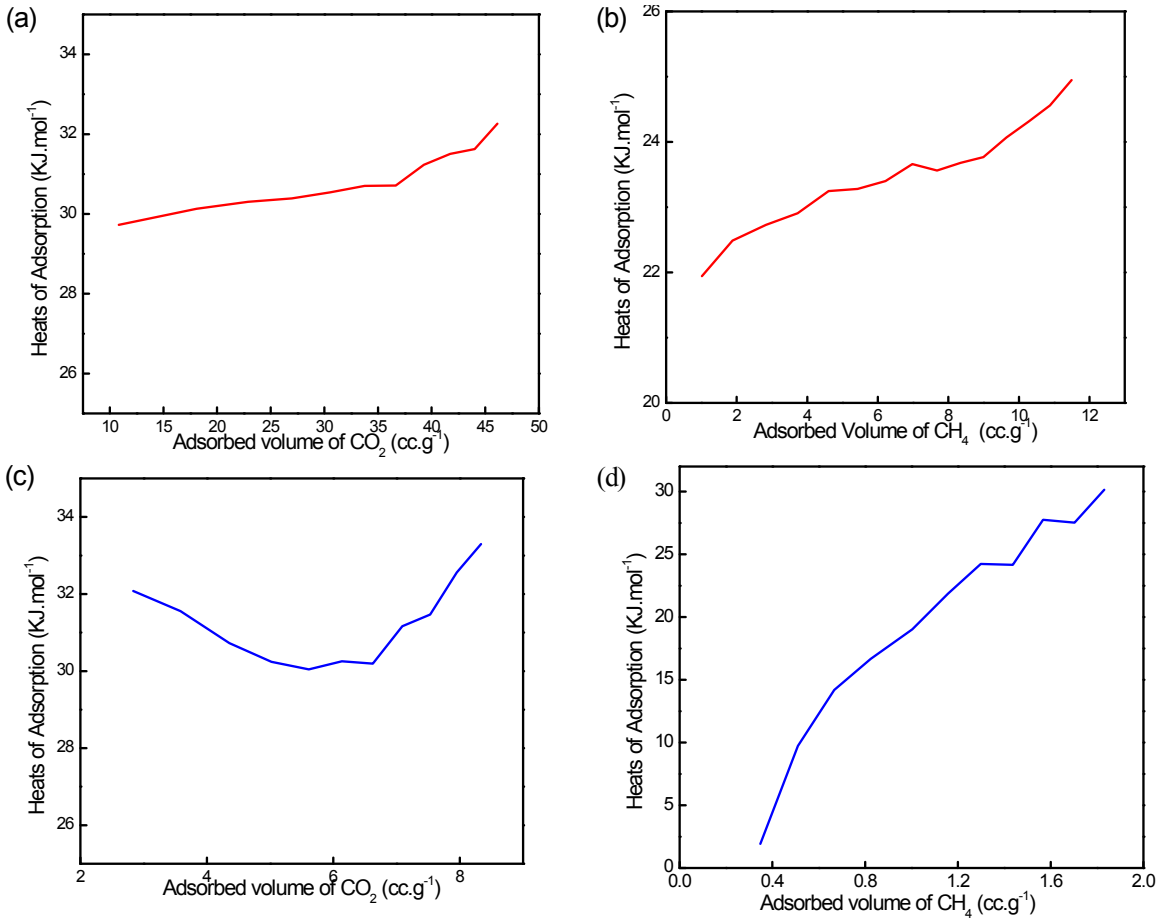

Fig. S5 Isosteric heats of adsorption for (a) CO_2 sorption of HCPANI, (b) CH_4 sorption of HCPANI, (c) CO_2 sorption of EBPANI, and (d) CH_4 sorption of EBPANI calculated at 273 and 298 K.

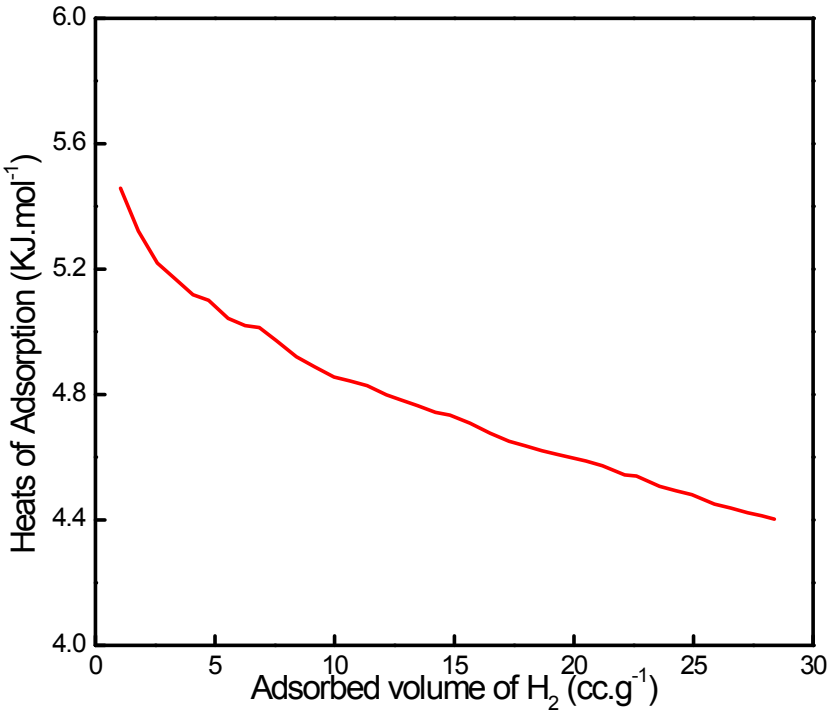

Fig. S6 Isosteric heats of adsorption for H_2 sorption of HCPANI calculated at 77 and 268 K.

Table S2. Hydrogen storage capacities reported so far for organic framework polymers.

Material	SA_{BET} ($m^2.g^{-1}$)	Hydrogen storage capacity (wt%)	Tem(K)/pressure(bar)	Ref.
Polyaniline	255	0.92	77/1.2	S1
Hypercrosslinked Polyaniline	630	0.96	77/1.2	S2
SMPs-5	1421	1.73	77/1.1	S3
CMP-0	1018	1.38	77/1.1	S4
OFP-3	1159	1.56	77/1.0	S5
PPN-3	2840	1.58	77/1.0	S6
MPN	1521	1.59	77/1.1	S7
Trip-PIM	1064	1.65	77/1.0	S8
P-2	1222	1.66	77/1.1	S9
BILPs	1261	2.20	77/1.0	S10
SPOP-3	965	2.22	77/1.0	S11
PPF-1	1740	2.75	77/1.0	S12
CPOP-1	2220	2.80	77/1.0	S13
HCPANI	**1059**	**1.85**	**77/1.0**	**This work**

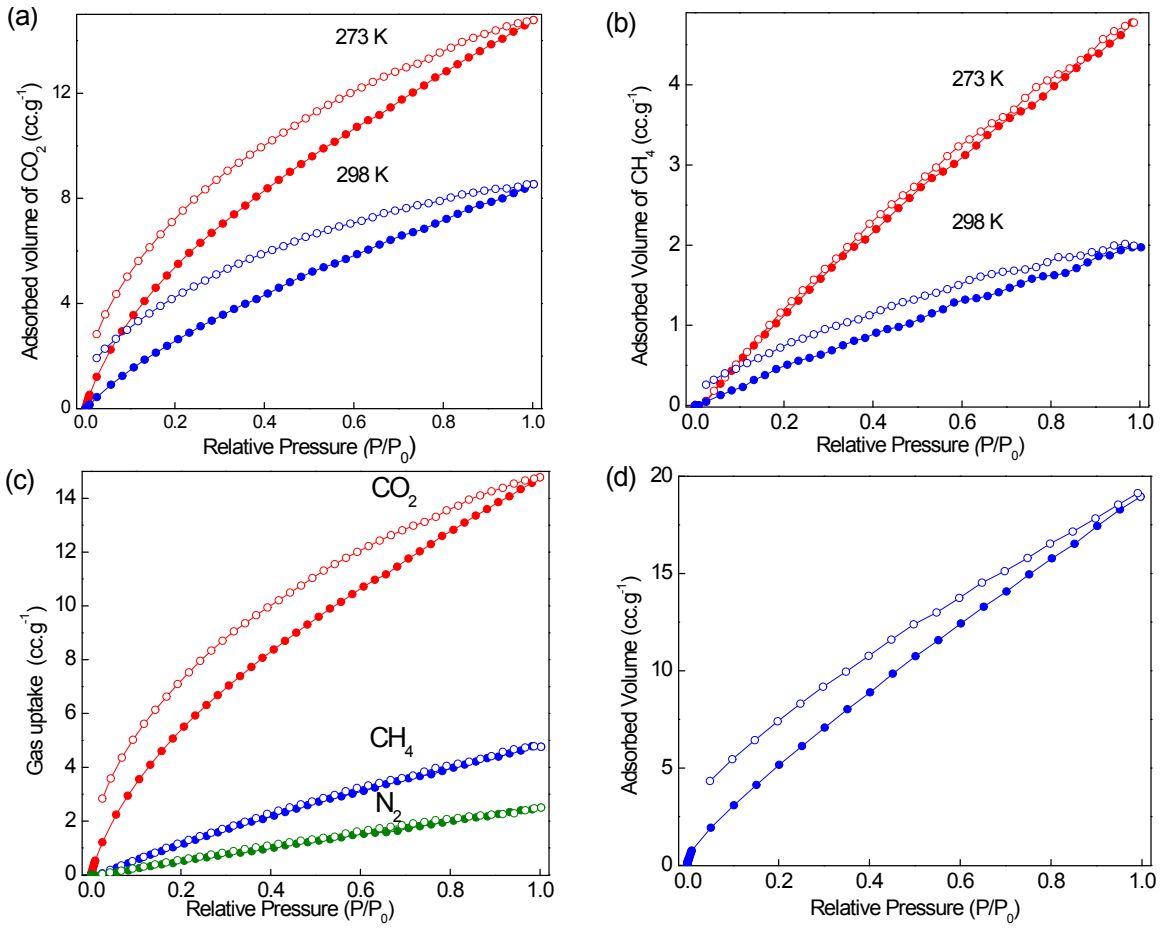

Fig. S7 (a) CO_2 and (b) CH_4 sorption isotherms of EBPANI measured at 273 and 298 K. (c) N_2, CO_2 and CH_4 sorption isotherms of EBPANI measured at 273 K and (d) H_2 sorption isotherm of EBPANI measured at 77 K.

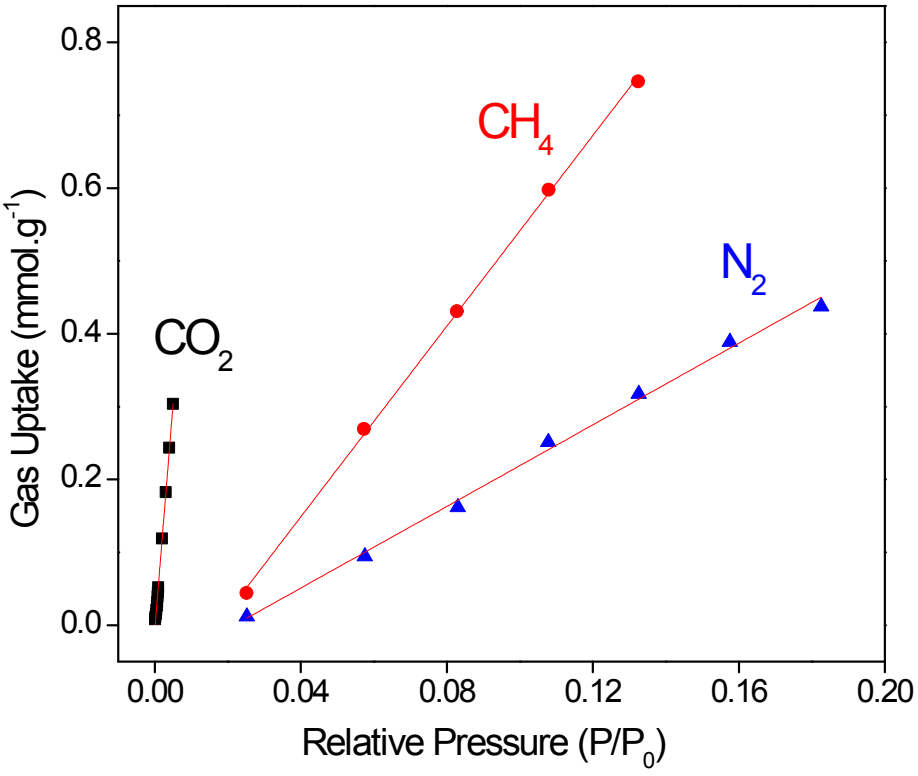

Fig. S8 Gas selectivity of EBPANI measured at 273 K.

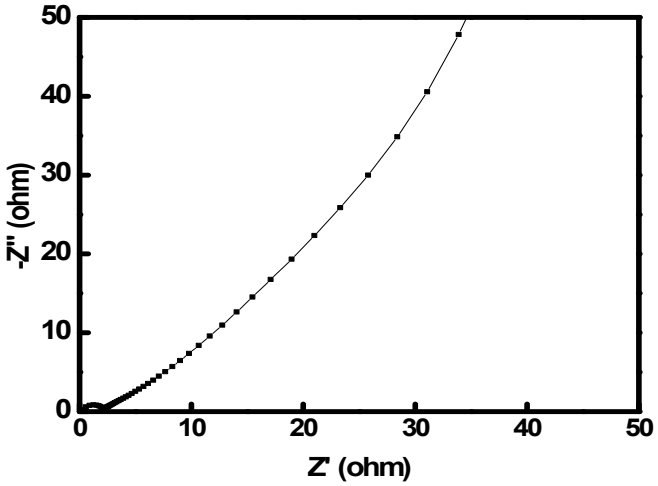

Fig. S9 Electrochemical impedance spectroscopy (Nyquist plot).

References

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