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

Solvothermal Synthesis of Microporous Superhydrophobic Carbon with Tunable Morphology from Natural Cotton for Carbon Dioxide and Organic Solvent Removal Applications

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Fig.S1: Photograh of cotton tree

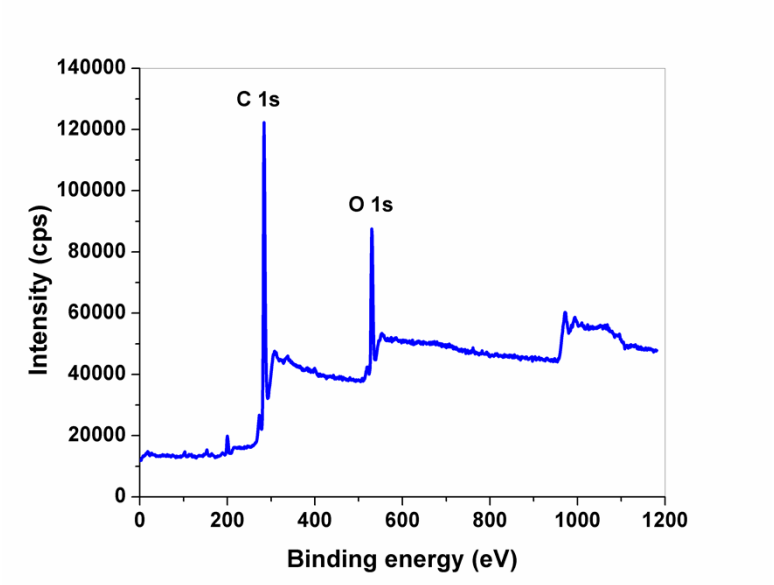


Fig.S2: XPS spectrum of STC-0.04

Calculation of CO_2:N_2 Selectivity

We calculated the initial slope of the gas uptake for both N_2 and CO_2. The ratio of the slopes was used for calculating the selectivity at 25 and 0 ^oC.

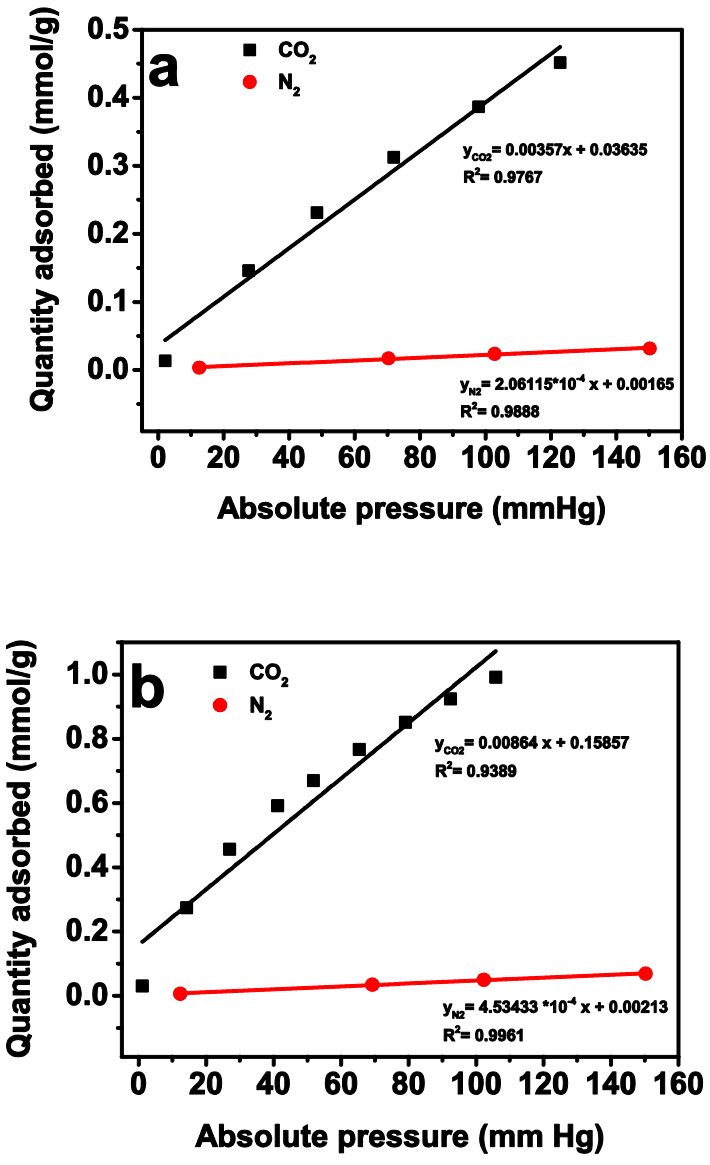
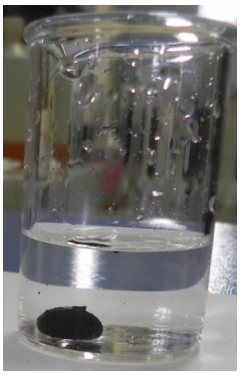


Figure S3. Calculation of selectivity of CO_2 adsorption over N_2 adsorption. (a) 25 ^oC and (b) 0 ^oC



10 ml water + 0.2 ml chloroform	50 mg Cotton-STC-0.04	Cotton-STC enclose chloroform droplet

Separation of chloroform droplet using forceps	Chloroform droplet with Cotton-STC

Fig. S4 Demonstrates the removal of trace quantity of chloroform from water, and the physical separation of chloroform using forceps. Thus, the difficulties associated with removal of trace amount of organic solvent from water can be solved using non-toxic carbon prepared from natural cotton.

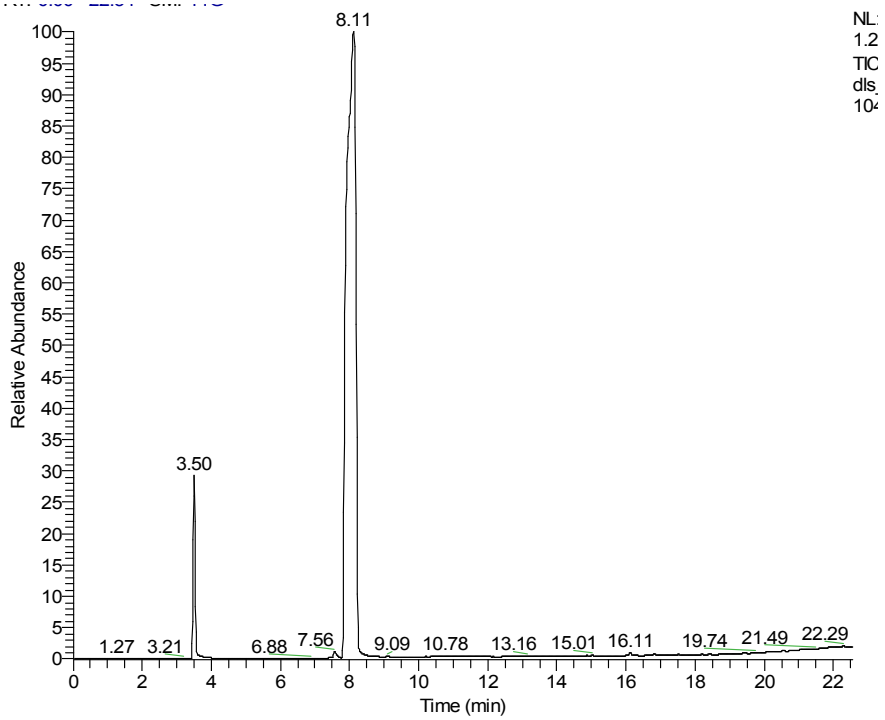
Comparison of the CO_2 adsorption performance

Table S1: Comparison of the CO_2 adsorption performance of the STC samples and other carbons with similar pore properties

	Surface area, m^2/g	**Micro pore volume**	**Total pore volume cm^3/g**	**CO_2 absorption capacity, (1 bar, 25°C) mmol/g**	**References**
Activated carbon	-	0.57	-	1.8	D. P. Bezerra, R. S. Oliveira, R. S. Vieira, C. L. Cavalcante Jr. and D. C. S. Azevedo, Adsorption, 2011, 17, 235–246.
Activated nano carbon fibre	567	0.27	0.708	1.1	Long-Yue Meng and Soo-Jin Park, Bull. Korean Chem. Soc. 2012, Vol. 33, No. 11, 3749- 3754.
Carbon sphere	390		0.17	1.4	N. P. Wickramaratne and M. Jaroniec, ACS Appl. Mater.Interfaces., 2013, 5, 1849–1855.
N-doped activated carbon from Melamine-formaldehyde resin	336	-	0.19	2.4	Ru-Ling Tseng *et al.* Separation and Purification Technology, 2015, 140, 53-60.
N-containing porous carbon	418	0.21	0.37	1.4	Zhanquan Zhang *et al*. Journal of Hazardous Materials, 2012, 229-230,

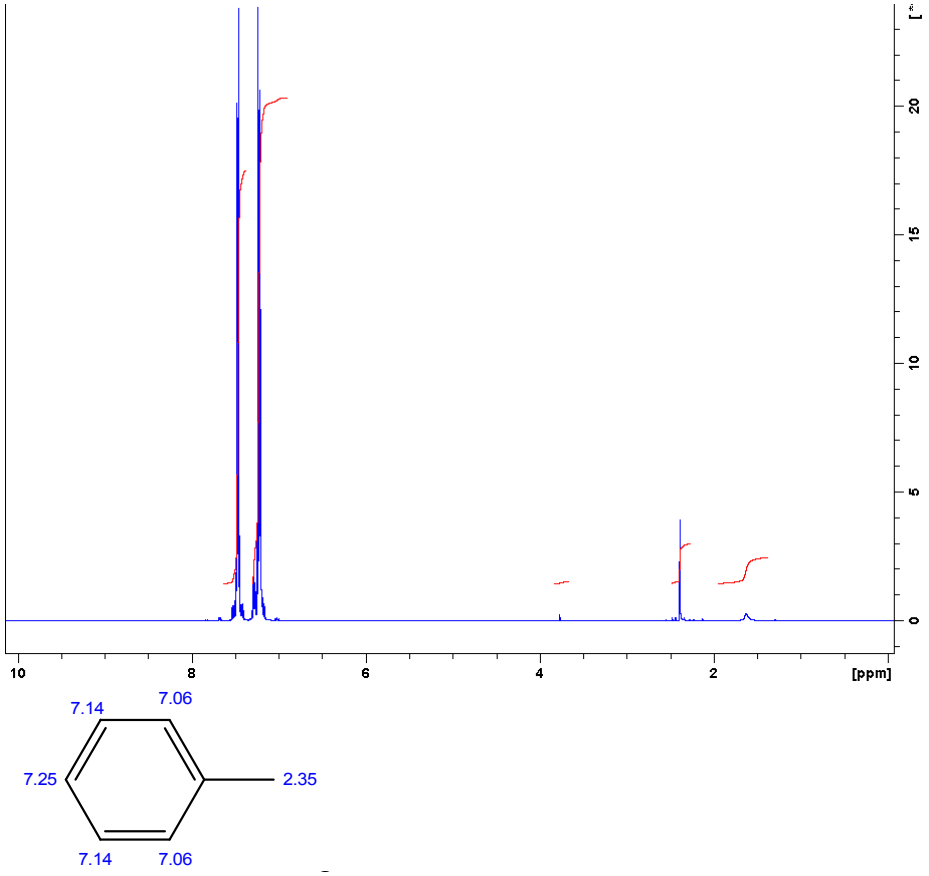
					183-191.
Activated carbon from anthracite	540	-	-	1.49 (30 ^{o}C)	M. Mercedes Maroto-Valer *et al.* Fuel Processing Technology, 2005, 14-15, 1487-1502.
NaA zeolite/carbon nanocomposite thin films	-	-	-	1.4	Zhihui Zhou *et al.* Separation and Purification Technology, 2007, 55, 392-395.
Cotton-STC	376	0.104	0.27	1.3	Present work

GCMS analysis of spent solvent recovered from autoclave (STC-10)

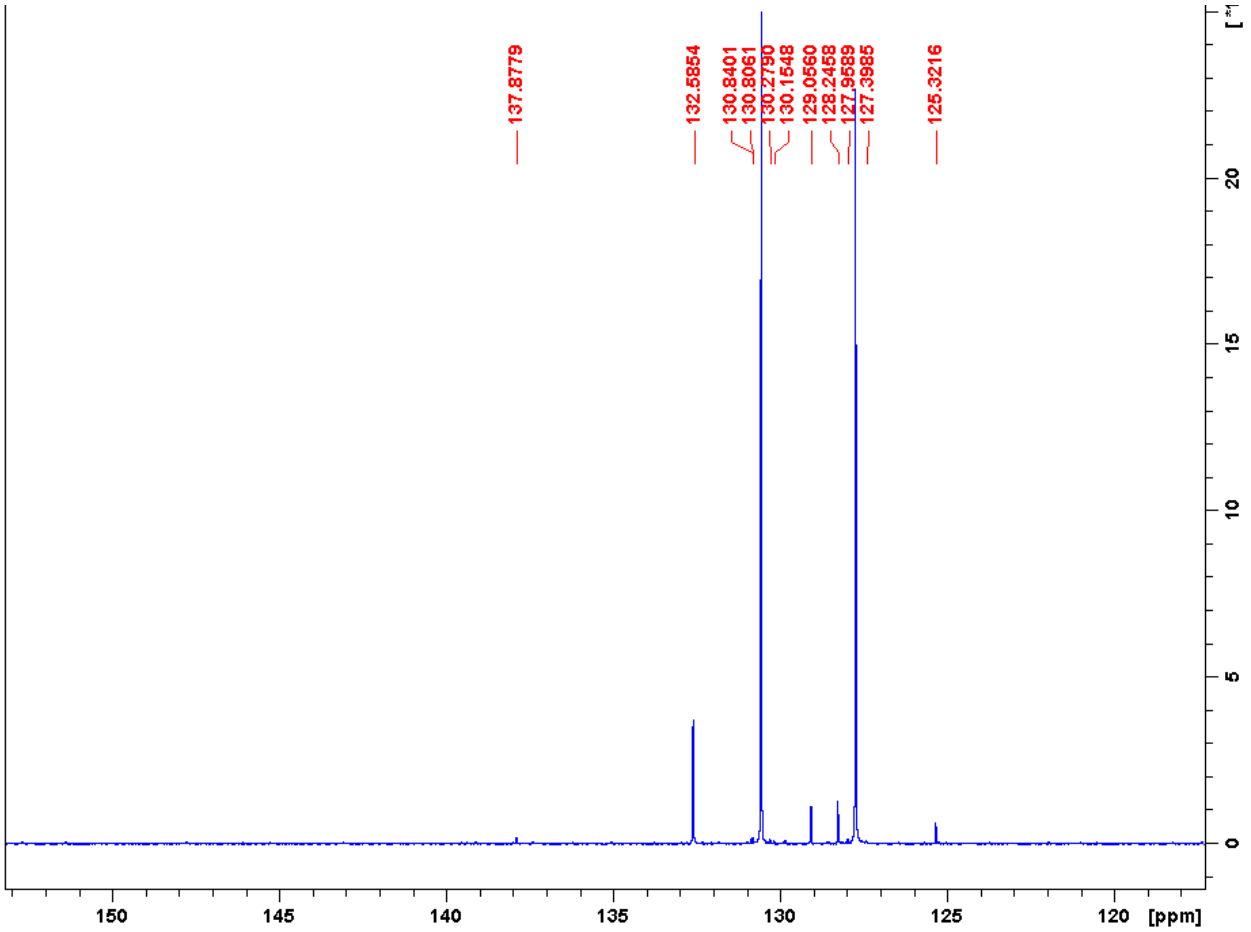


Retention time of 3.5 and 8.11 minutes corresponds to toluene and dichlorobenzene respectively, indicating that in addition to catalytic action, PTSA decompose to toluene and SO_2.

^{1}H NMR analysis of spent solvent recovered from autoclave after solvothermal reaction (STC-10)



^{13}C NMR analysis of spent solvent recovered from autoclave after solvothermal reaction (STC-10)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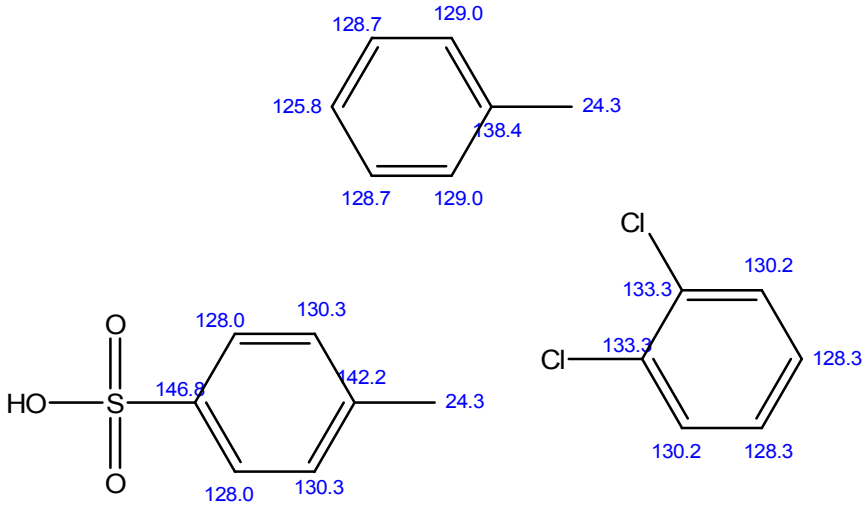
125.3216
150
145
140
135
130
125
120
[ppm]
0
5
10
15
20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129.0
125.8
24.3
138.4
128.7
129.0
HO
S
O
O
128.0
130.3
146.8
142.2
24.3
128.0
130.3
Cl
Cl
130.2
133.3
133.3
128.3
130.2
128.3