Electronic Supplementary Material (ESI) for Chemical Communications
This journal is © The Royal Society of Chemistry 2015

Electronic Supplementary Material (ESI) for Chemical Communications

Electronic Supporting Information (ESI)

Flexible and Mechanically-stable MIL-101(Cr)@PFs for Efficient Benzene Vapor and CO_2 Adsorption

Zhenyu Zhou [a], Baihua Cheng [a], Chen Ma [a], Feng Xu [b], Jing XIAO [b], Qinbin Xi[b], Zhong LI [a*]**

a. School of Chemistry and Chemical Engineering, South China University of Technology, Guangzhou, 510640, China

b. Key Laboratory of Enhanced Heat Transfer and Energy Conservation of the Ministry of Education, South China University of Technology, Guangzhou, 510640, China

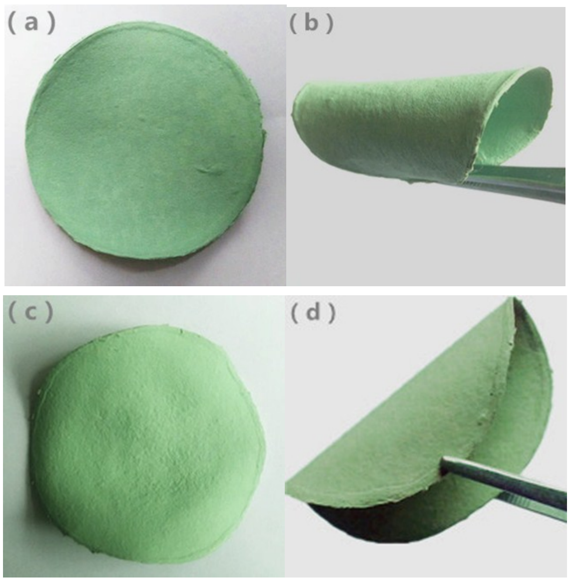

Fig. S1 Pictures of 50MIL-101(Cr)@PFs(a) and its flexibility performance(b);67MIL-101(Cr)@PFs(c) and its flexibility performance (d).

** Corresponding authors; E-mail addresses: cejingxiao@scut.edu.cn (Jing Xiao)
* Corresponding authors; E-mail addresses: cezhli@scut.edu.cn (Zhong Li);

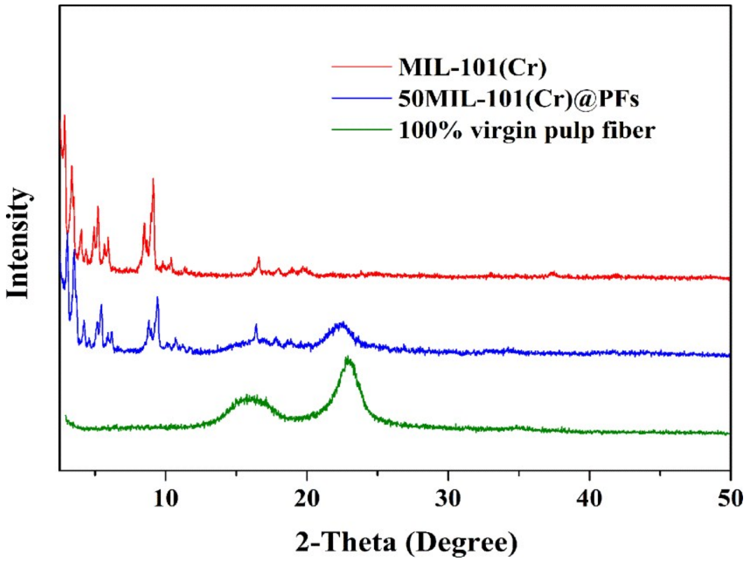

Fig. S2 PXRD pattern of MIL-101(Cr)@PFs

Table S1 Textural properties of MIL-101(Cr) and MIL-101(Cr)@PFs

Samples	BET surface area (m^2/g)	Langmuir surface area (m^2/g)
25MIL-101(Cr)@PFs	812	1188
40 MIL-101(Cr)@PFs	1256	1703
50 MIL-101(Cr)@PFs	1630	2318
67 MIL-101(Cr)@PFs	2174	2974
MIL-101(Cr)	3347	4687

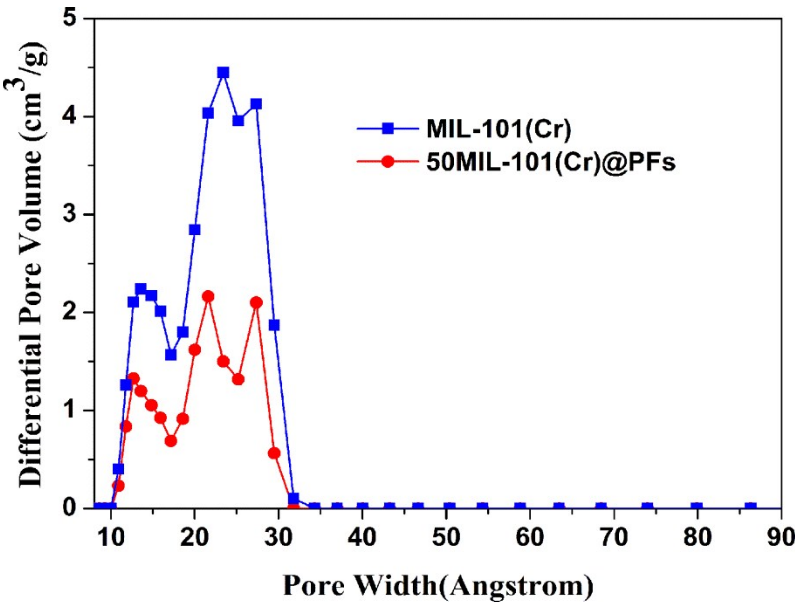

Fig. S3 Pore size distribution of MIL-101(Cr) and 50MIL-101(Cr)@PFs

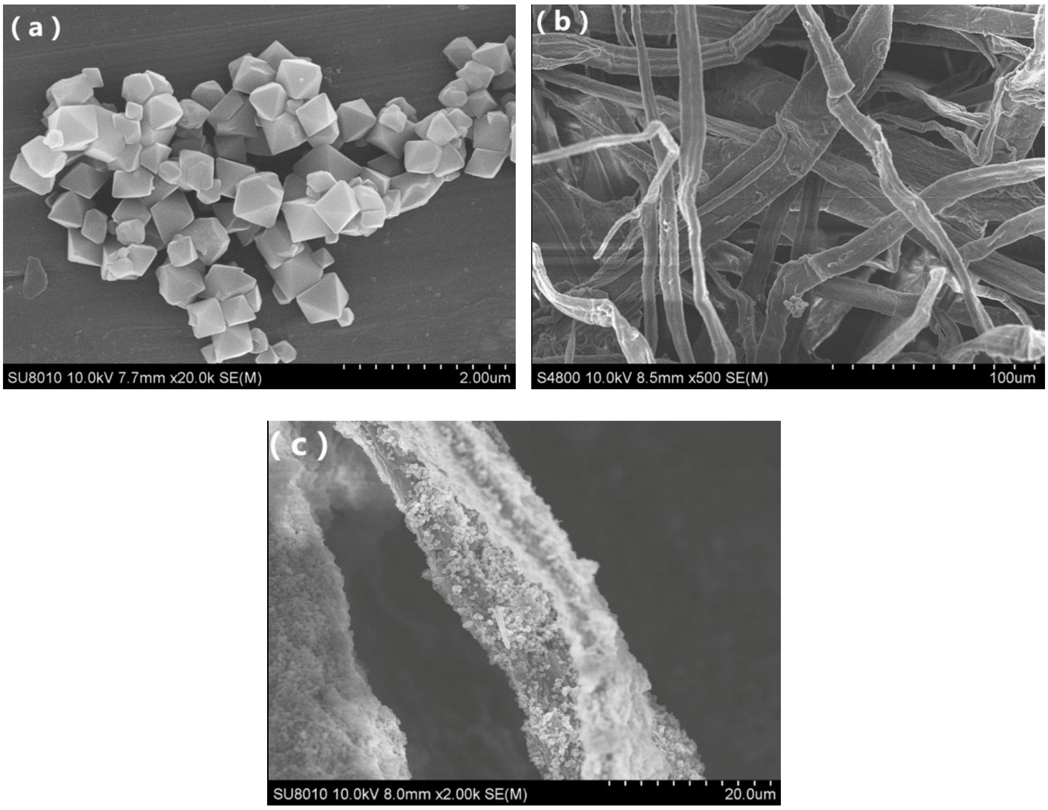

Fig. S4 SEM pictures of (a) MIL-101(Cr), (b) virgin pulp fibers, (c) 50MIL-101(Cr)@PFs

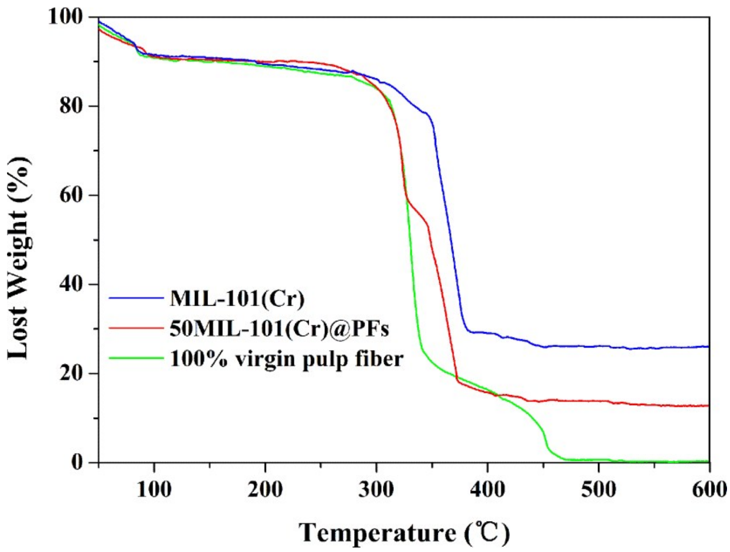

Fig.S5 TGA Curves of MIL-101(Cr)@PFs, MIL-101(Cr) and virgin pulp fiber

Table S2 Benzene and CO_2 adsorption capacities of MIL-101(Cr) and MIL-101(Cr)@PFs at 298 K

Samples	Benzene vapor uptake when P ≈ 25 mbar (mmol/g)	The percentages of benzene vapor uptake on MIL-101(Cr)@PFs to MIL-101(Cr)	CO_2 uptake at 1 bar (mmol/g)	The percentages of CO_2 uptake on MIL-101(Cr)@PFs to MIL-101(Cr)
25MIL-101(Cr)@PFs	4.1	24.8%	0.80	24.7%
40MIL-101(Cr)@PFs	6.47	39.1%	1.25	38.6%
50MIL-101(Cr)@PFs	8.06	48.7%	1.56	48.1%
67MIL-101(Cr)@PFs	10.29	62.2%	2.13	65.7%
MIL-101(Cr)	16.54	100%	3.24	100%

Table S3 CO_2 uptakes of some MOFs and conventional adsorbents at 1 bar.

Adsorbent	Adsorption capacity (mmol/g)	Temperature (K)	Reference
MCM-41	0.67	298	[1]
Zeolite-13X	~1.70	298	[2]
ZSM-5	~1.50	303	[3]
Activated carbon	2.0	298	[4]
ZIF-68	1.69	298	[5]
UIO-66	1.79	298	[6]
MOF-5	2.10	296	[7]
MIL-100(Cr)	~2.23	298	[8]
67MIL-101(Cr)@Fs	2.13	298	This work
MIL-101(Cr)	3.24	298	This work

This journal is © The Royal Society of Chemistry 2015

Table S4 Fitting parameters of L-F model for benzene adsorption on MIL-101(Cr) and MIL-101(Cr)@PFs

	MIL-101(Cr)	67MIL-101(Cr)@PFs	50MIL-101(Cr)@PFs	40MIL-101(Cr)@PFs	25MIL-101(Cr)@PFs
q	17.296	10.404	8.518	7.056	5.091
b	0.0140	0.0347	0.0344	0.0434	0.0566
c	2.424	2.033	2.070	1.914	1.626
R^2	0.9826	0.9857	0.9865	0.9754	0.9747

Table S5 Fitting parameters of L-F model for CO_2 adsorption on MIL-101(Cr) and MIL-101(Cr)@PFs

	MIL-101(Cr)	67MIL-101(Cr)@PFs	50MIL-101(Cr)@PFs	40MIL-101(Cr)@PFs	25MIL-101(Cr)@PFs
q	16.798	15.684	6.738	4.556	5.270
b	0.237	0.157	0.304	0.377	0.180
c	0.613	0.773	0.836	0.953	0.865
R^2	0.9997	0.9999	0.9999	0.9999	0.9999

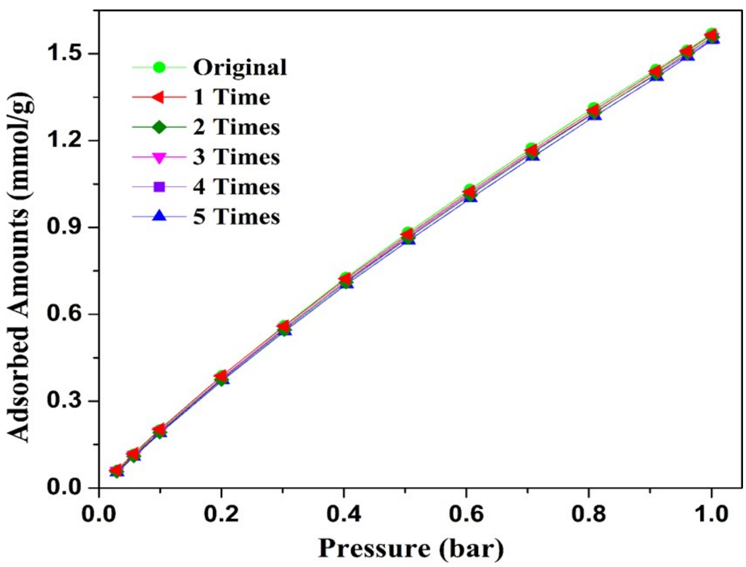

Fig.S6 CO_2 isotherms of 50MIL-101(Cr)@PFs at 298 K(regeneration for five times).

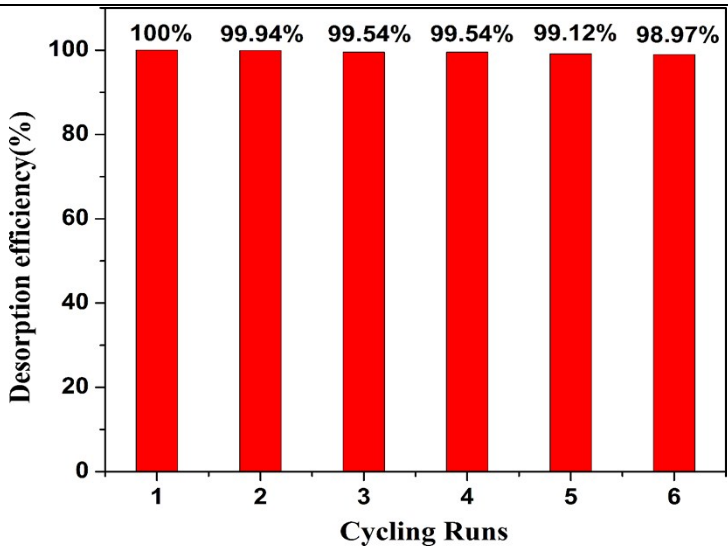

Fig.S7 Cycling adsorption/desorption runs of 50MIL-101(Cr)@PFs with the average value and standard error of desorption efficiency of 99.52% and 0.156%.

REFERENCE

1. J. Zhou, H. Zhao, J. Li, Y. Zhu, J. Hu, H. Liu and Y. Hu, *Solid State Sciences*, 2013, **24**, 107-114.
2. J. McEwen, J.-D. Hayman and A. O. Yazaydin, *Chemical Physics*, 2013, **412**, 72-76.
3. Y. Li, H. Yi, X. Tang, F. Li and Q. Yuan, *Chemical Engineering Journal*, 2013, **229**, 50-56.
4. R.-L. Tseng, F.-C. Wu and R.-S. Juang, *Separation and Purification Technology*, 2015, **140**, 53-60.
5. R. Banerjee, H. Furukawa, D. Britt, C. Knobler, M. O'Keeffe and O. M. Yaghi, *Journal of the American Chemical Society*, 2009, **131**, 3875-3877.
6. Z. Hu, M. Khurana, Y. H. Seah, M. Zhang, Z. Guo and D. Zhao, *Chem. Eng. Sci.*, 2015, **124**, 61-69.
7. Z. Zhao, Z. Li and Y. Lin, *Industrial & Engineering Chemistry Research*, 2009, **48**, 10015-10020.
8. L. Li, J. Yang, J. Li, Y. Chen and J. Li, *Microporous Mesoporous Mat.*, 2014, **198**, 236-246.