RSC Advances Supporting Information

Metal-organic framework MIL-101 doped with metal nanoparticles (Ni & Cu) and its effect on CO_2 adsorption properties

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Table. S1 Structural properties and CO_2 adsorption capacity of MIL-101, a comparison between reported values in literature.

Adsorbent	Reference	Surface area (m^2g^{-1})	Pore volume (cm^3g^{-1})	Adsorption Capacity ($mmolg^{-1}$)	Pressure (bar)	Temperature (K)
MIL-101	Zhang et al.[29]	3360	1.75	9.8	7	298
MIL-101	Chowdhury et al.[26,27]	2674	1.38	8	7	295
MIL-101	Anbia & Hoseini[28]	1312	1.56	0.7	7	298
MIL-101	Llewellyn et al.[25]	3780	1.74	33	7	303
MIL-101	Ye et al.[1]	2549	1.30	5.3	7	303
MIL-101	This study	2730	1.36	9.72	7.1	298

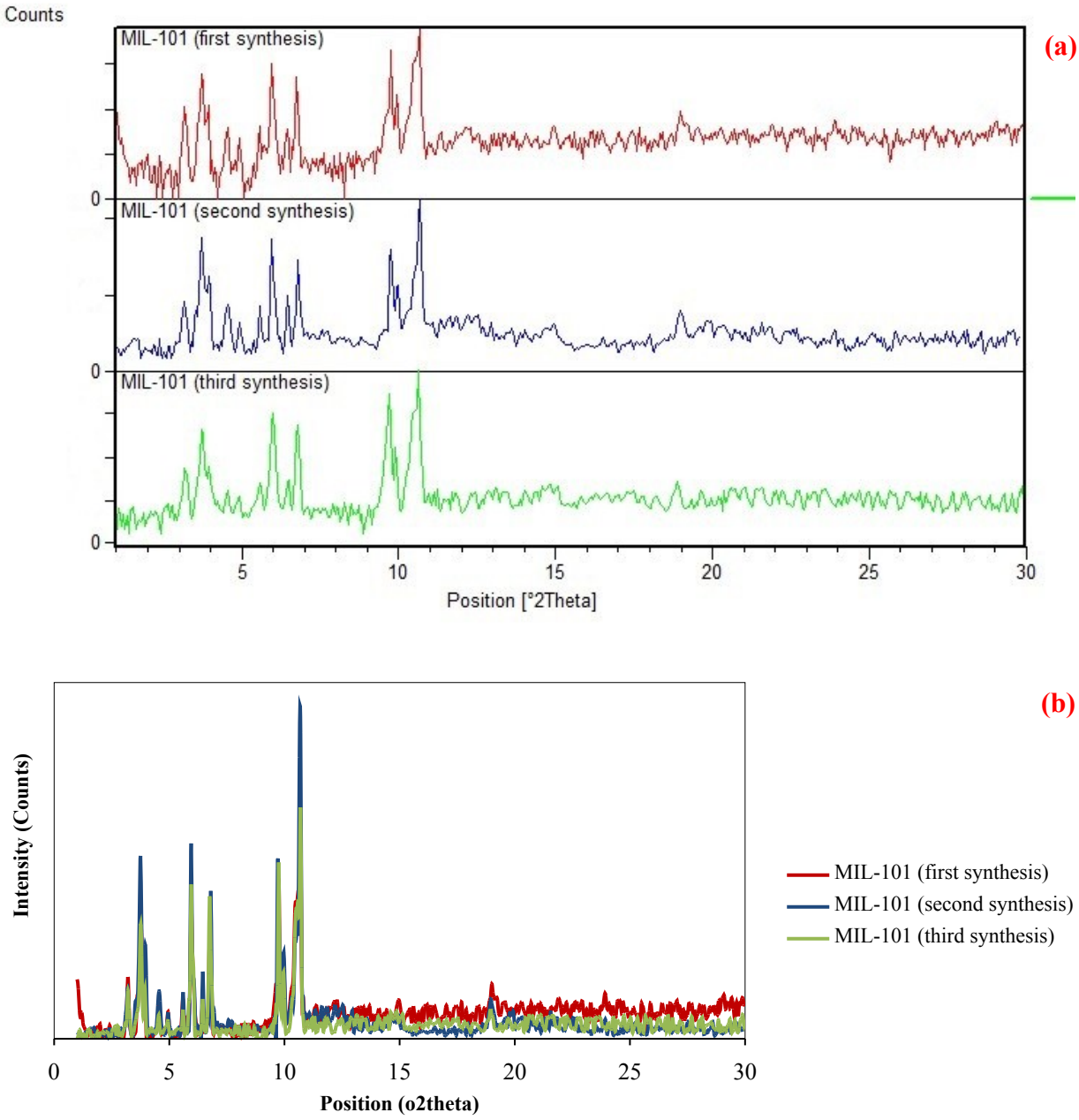


Fig. S1 (a) X-ray diffraction patterns of synthesized MIL-101 at each batch synthesis, (b) overly XRD patterns.

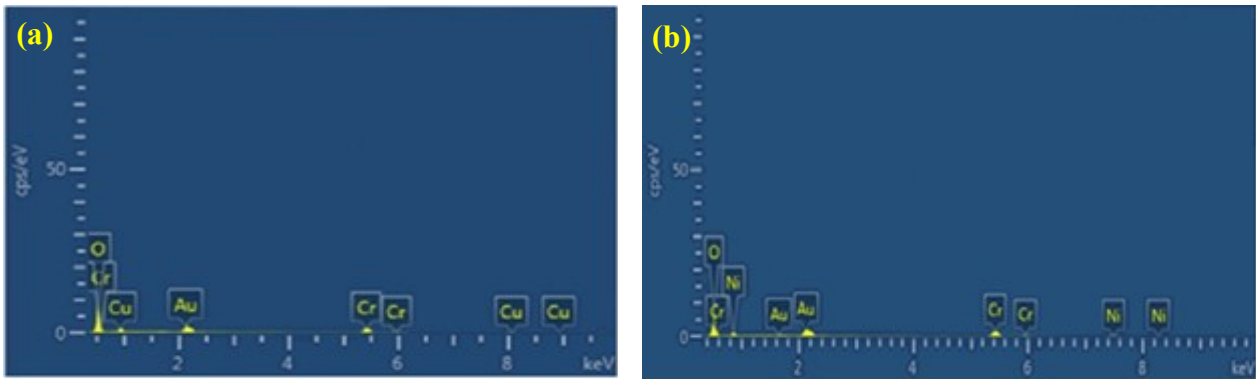
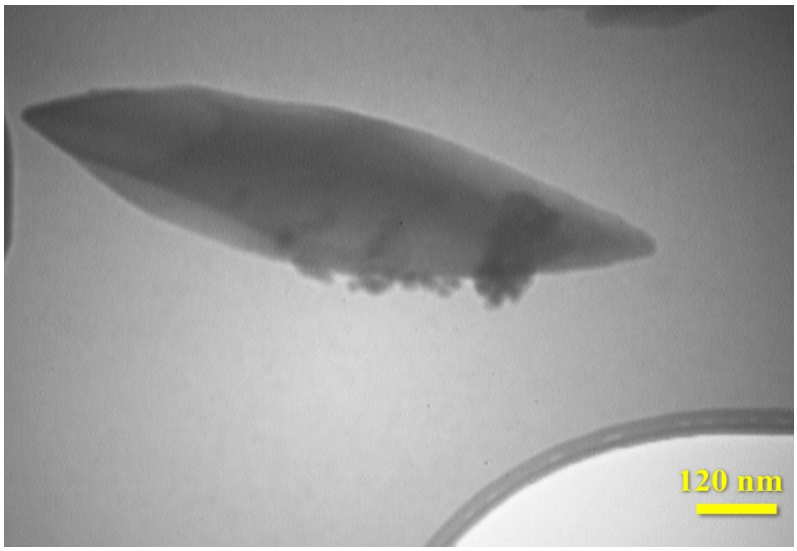
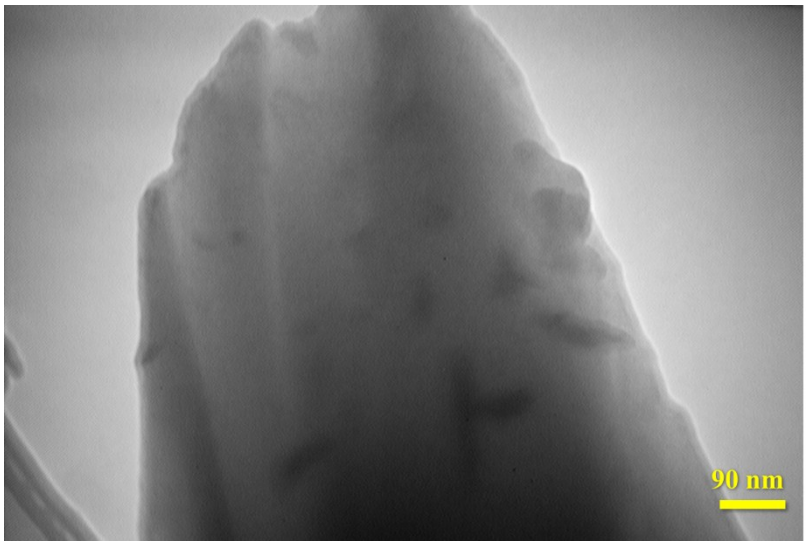
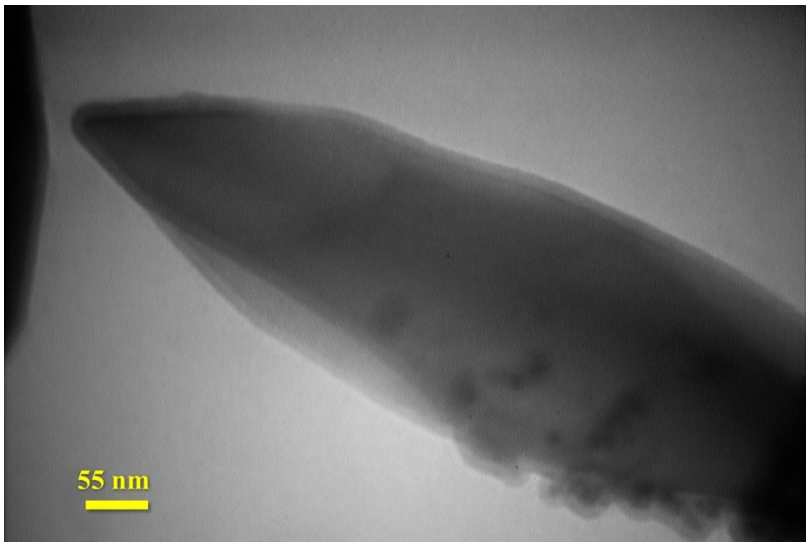


Fig. S2 EDS plot of (a) MIL-101-Cu, and (b) MIL-101-Ni.




90 nm


55 nm

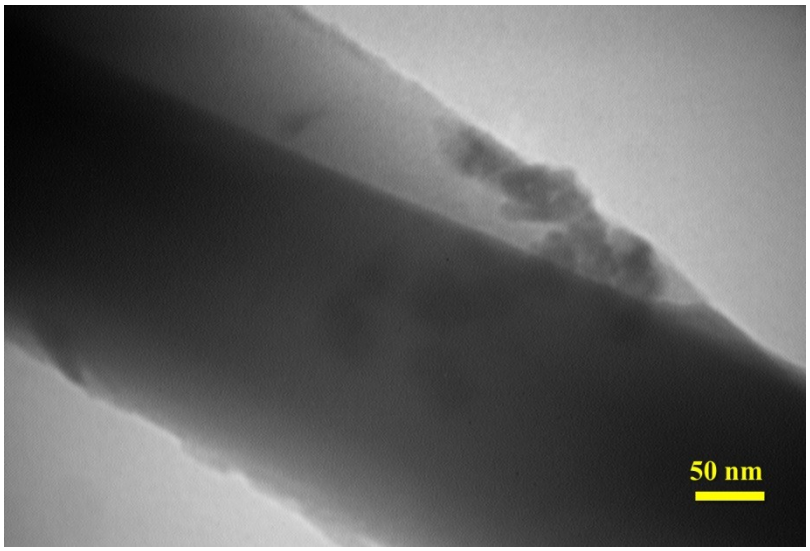
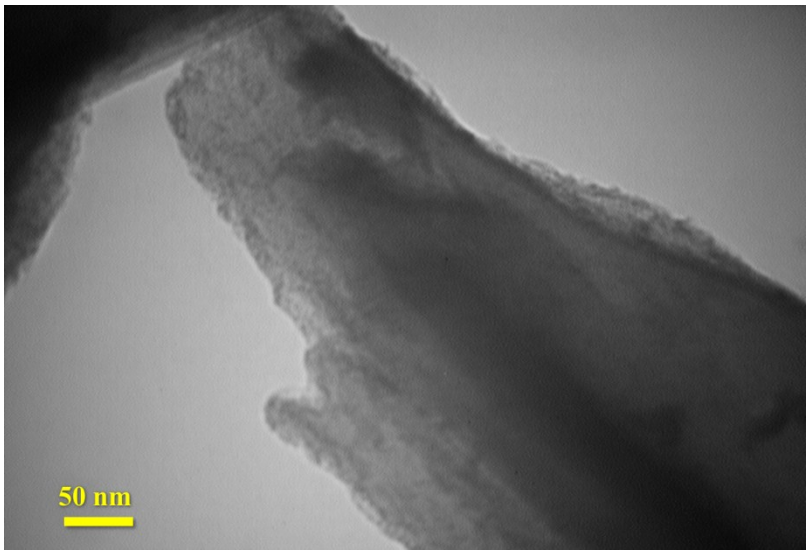
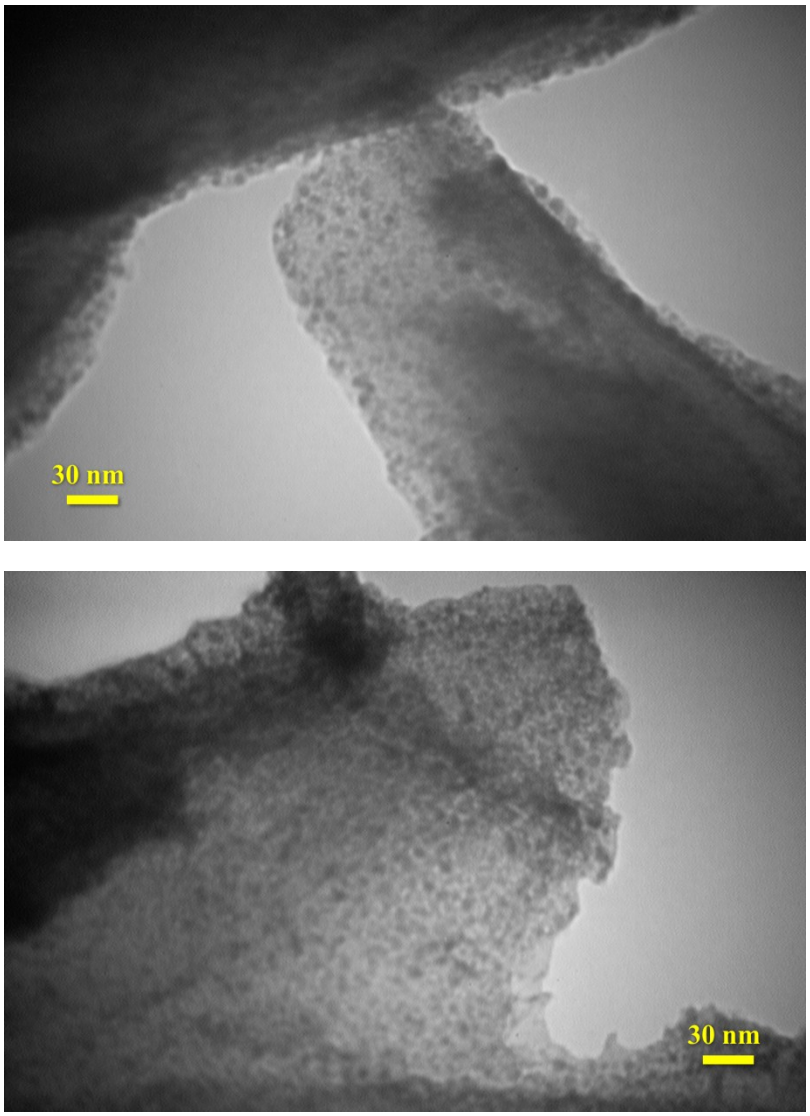

50 nm

Fig. S3 TEM images with different scale up for MIL-101-Cu.




30 nm
30 nm

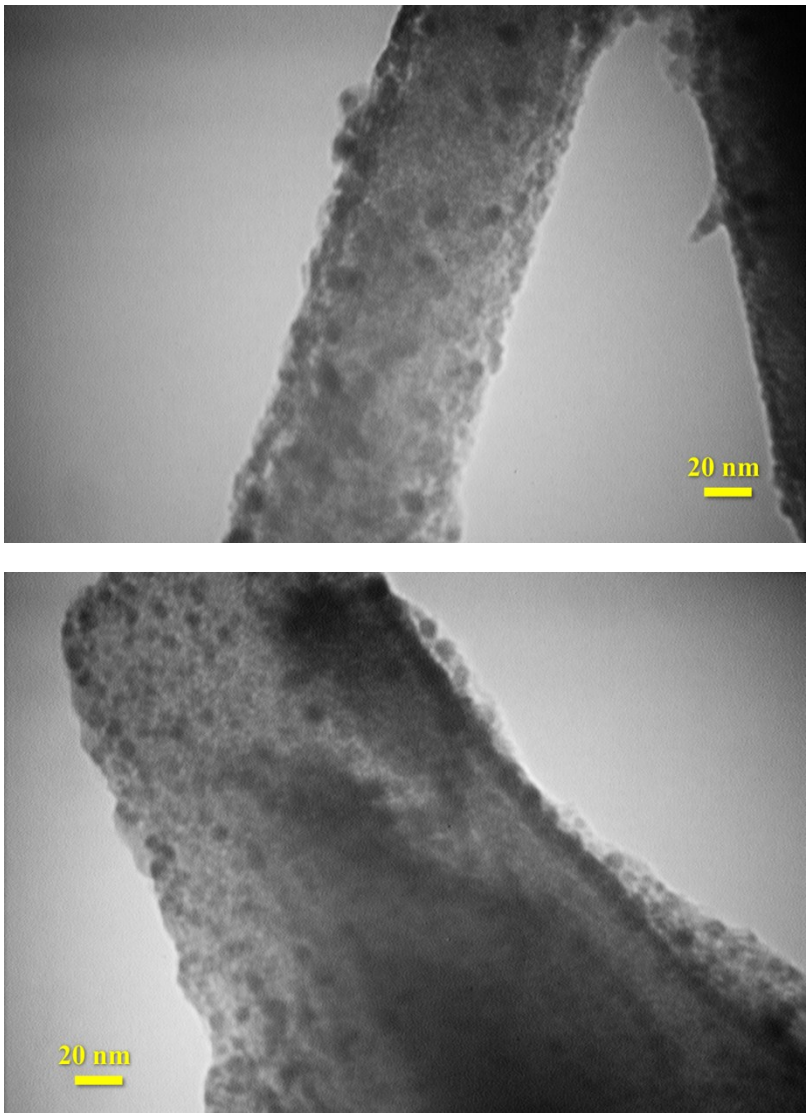


Fig. S4 TEM images with different scale up for MIL-101-Ni.

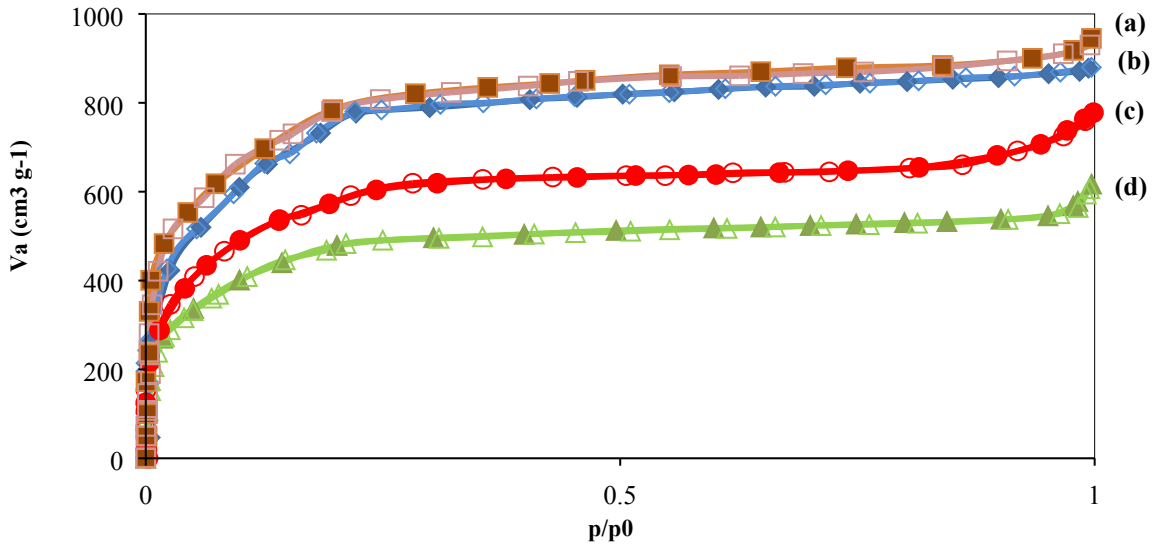


Fig. S5 Nitrogen adsorption-desorption isotherms of (a) activated-MIL-101, (b) MIL-101, (c) MIL-101-Ni and (d) MIL-101-Cu.

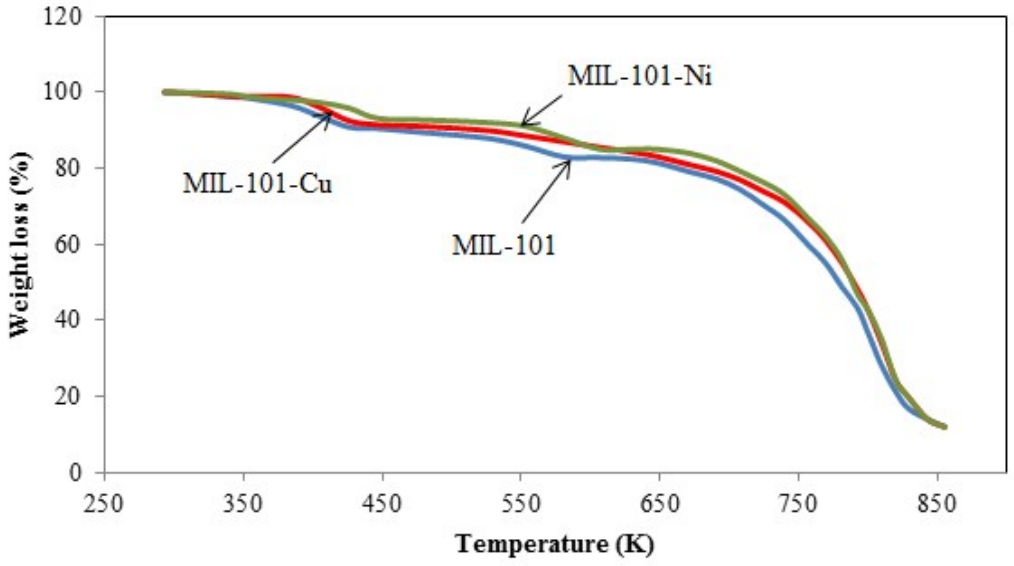


Fig. S6 TGA plot of MIL-101, MIL-101-Cu and MIL-101-Ni.

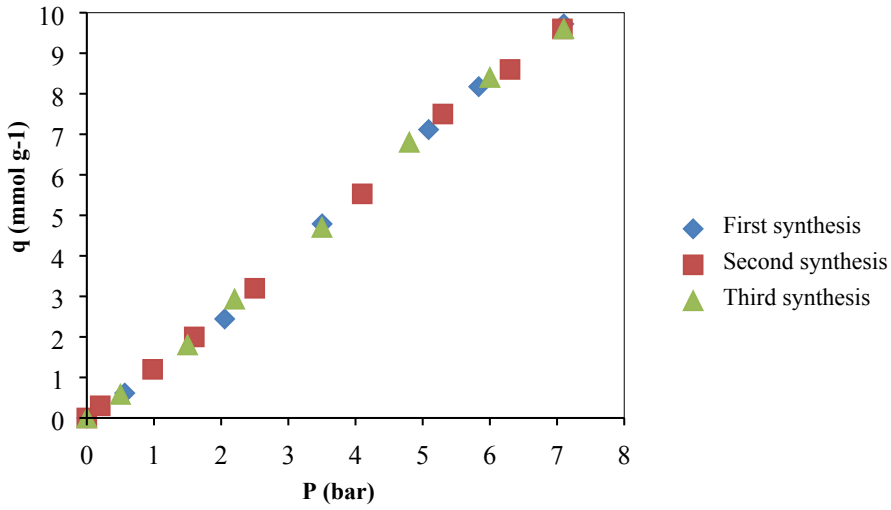


Fig. S7 The CO_2 adsorption isotherms of MIL-101 for first, second and third synthesis at 298.2 K.

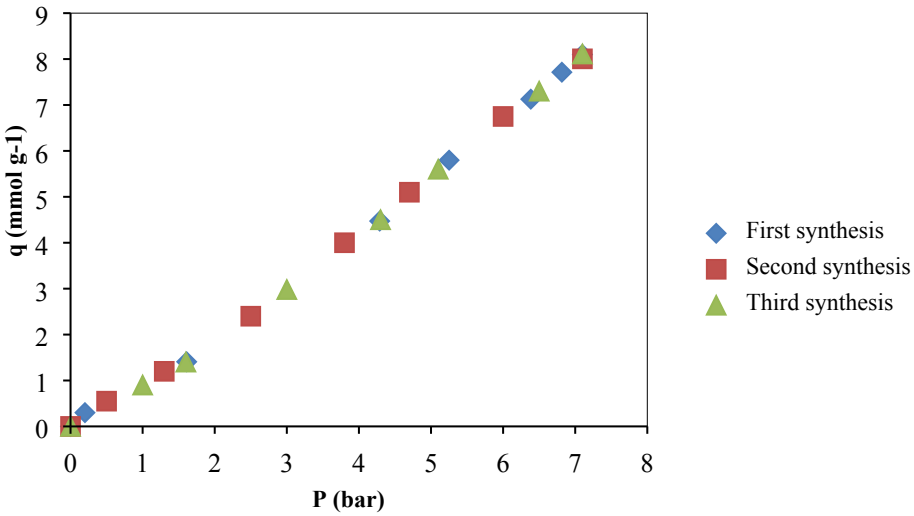


Fig. S8 The CO_2 adsorption isotherms of MIL-101 for first, second and third synthesis at 310.2 K.

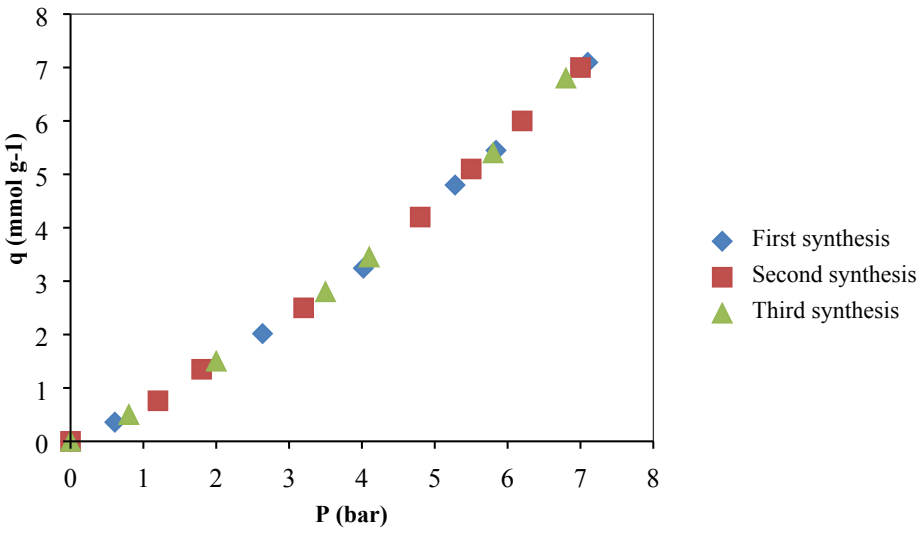


Fig. S9 The CO_2 adsorption isotherms of MIL-101 for first, second and third synthesis at 320.2 K.

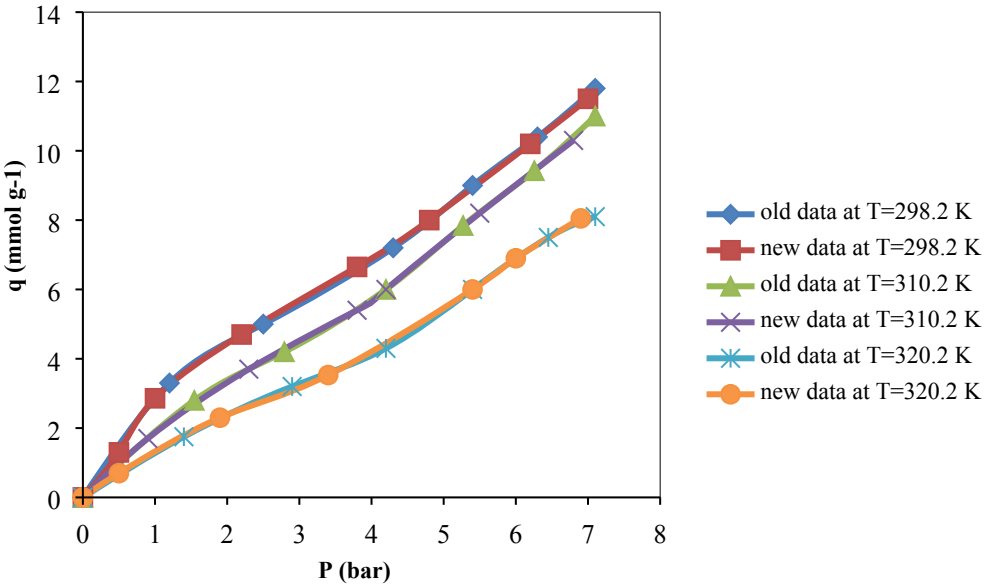


Fig. S10 A comparison between old and new experimental isotherm data for MIL-101-Cu.

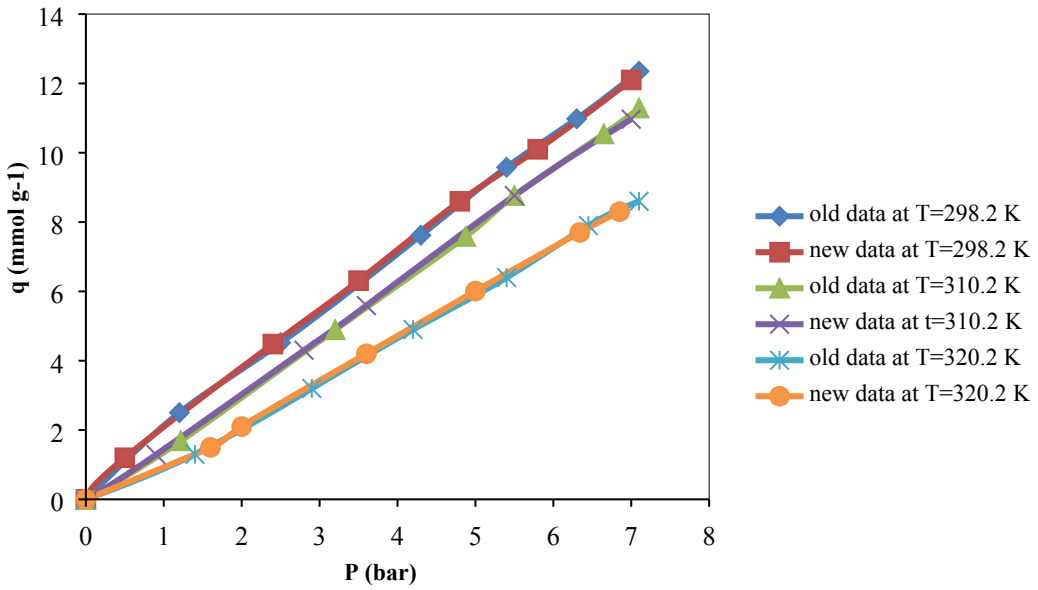
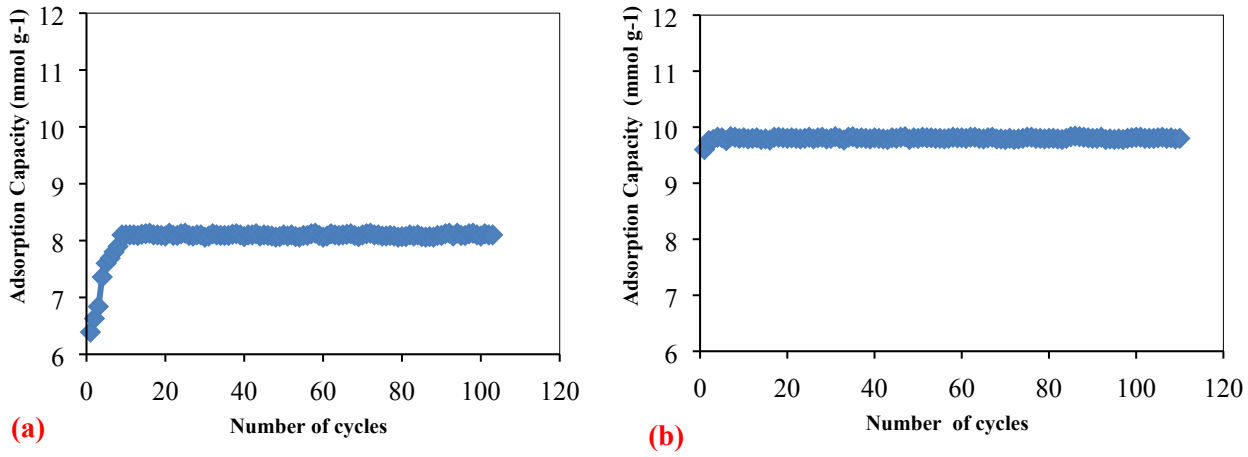


Fig. S11 A comparison between old and new experimental isotherm data for MIL-101-Ni.



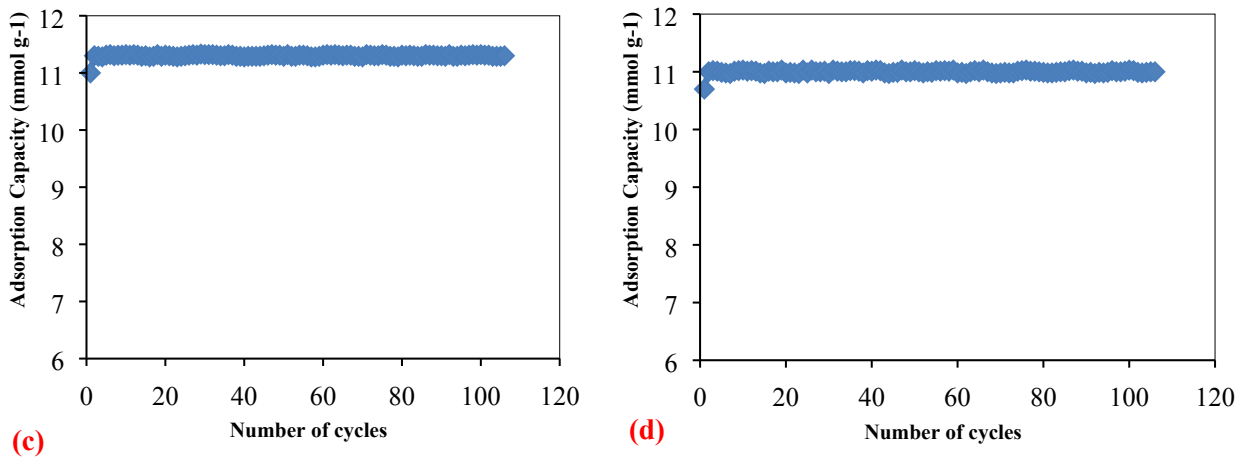


Fig. S12 The adsorbed amount of CO_2 as a function of number of cycles at 310.2 K for (a) MIL-101, (b) activated-MIL-101, (c) MIL-101-Ni, and (d) MIL-101-Cu.

References:

1 Sh. Ye, X. Jiang, L.W. Ruan, B. Liu, Y.M. Wang, J.F. Zhu, L.G. Qiu, *Microporous Mesoporous Mater.,* 2013, 179, 191.

25 Ph. L. Llewellyn, S. Bourrelly, Ch. Serre, A. Vimont, M. Daturi, L. Hamon, G.D. Weireld, J. S. Chang, D. Y. Hong, Y. K. Hwang, S. H. Jhung and G. Ferey, *Langmuir*, 2008, 24, 7245.

26 P. Chowdhury, Ch. Bikkina and S. Gumma, *J. Phys. Chem. C*, 2009, 113, 6616.

27 P. Chowdhury, S. Mekala, F. Dreisbach, S. Gumma, *Microporous Mesoporous Mater*., 2012, 152, 246.

28 M. Anbia, V. Hoseini, *J. Nat. Gas. Chem*., 2012, 21, 339.

29 Zh. Zhang, S. Huang, Sh. Xian, H. Xi and Zh. Li, *Energy Fuels*, 2011, 25, 835.