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Supporting Information

Fabrication of MIL-120 membranes supported by a-Al_2O_3 Hollow ceramic fibers for H_2 separation

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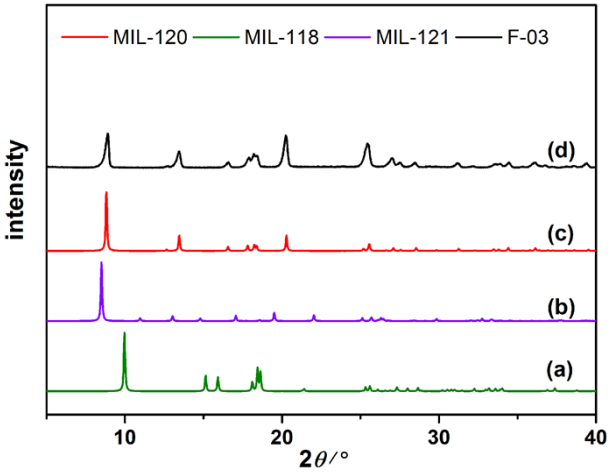

Fig.S1 XRD patterns of simulated (a) MIL-118; (b) MIL-121; (c) MIL-120; and (d) F-03.

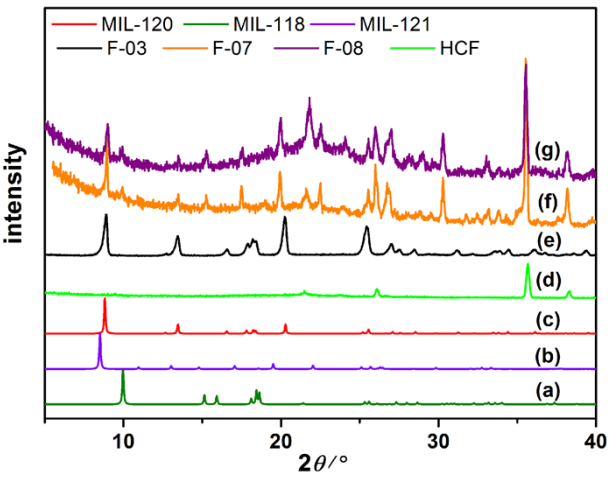

Fig.S2 XRD patterns of simulated (a) MIL-118; (b) MIL-121; (c) MIL-120; (d) HCF; (e) F-03; (f) F-07; (g) F-08.

Table.S1 Single and binary gas permeances (mol·m^{-2}·s^{-1}·Pa^{-1}) and separation factors for the MIL-120 membrane at 293K, 313K, 343K and 1 bar. The volume ratio for binary gas systems is 1:1.

Gas(H_2/j)	Knudsen constant	Temperature (K)	Single gas			Binary gas		
			Permeances (H_2)	Permeances (j)	Ideal separation factor	Permeances (H_2)	Permeances (j)	Separation factor
H_2/CH_4	2.8	293	3.80×10^{-7}	4.9×10^{-8}	7.7	3.50×10^{-7}	4.43×10^{-8}	7.9
		313	5.0×10^{-7}	7.9×10^{-8}	6.3	4.36×10^{-7}	7.30×10^{-8}	6.0
		343	5.86×10^{-7}	1.14×10^{-7}	5.1	5.0×10^{-7}	1.00×10^{-7}	5.0
H_2/N_2	3.7	293	3.80×10^{-7}	5.14×10^{-8}	7.4	3.47×10^{-7}	4.75×10^{-8}	7.3
		313	5.0×10^{-7}	8.33×10^{-8}	6.0	4.21×10^{-7}	6.90×10^{-8}	6.1
		343	5.86×10^{-7}	1.30×10^{-7}	4.5	4.74×10^{-7}	1.05×10^{-7}	4.5
H_2/CO_2	4.7	293	3.80×10^{-7}	4.13×10^{-8}	9.2	3.58×10^{-7}	3.8×10^{-8}	9.4
		313	5.0×10^{-7}	6.80×10^{-8}	7.3	4.27×10^{-7}	5.90×10^{-8}	7.2
		343	5.86×10^{-7}	9.16×10^{-8}	6.4	4.52×10^{-7}	7.00×10^{-8}	6.4

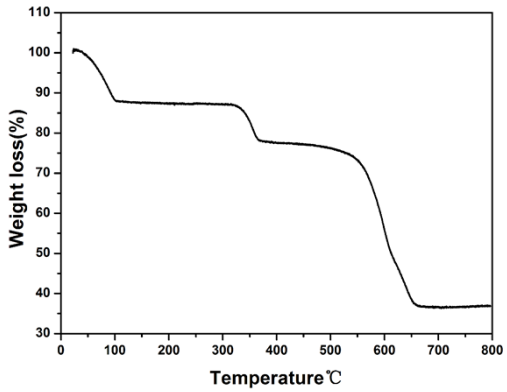

Fig.S3 TG curve of the MIL-120 membrane (F-07) (under air, heating rate: 1^{o}C·min^{-1}).

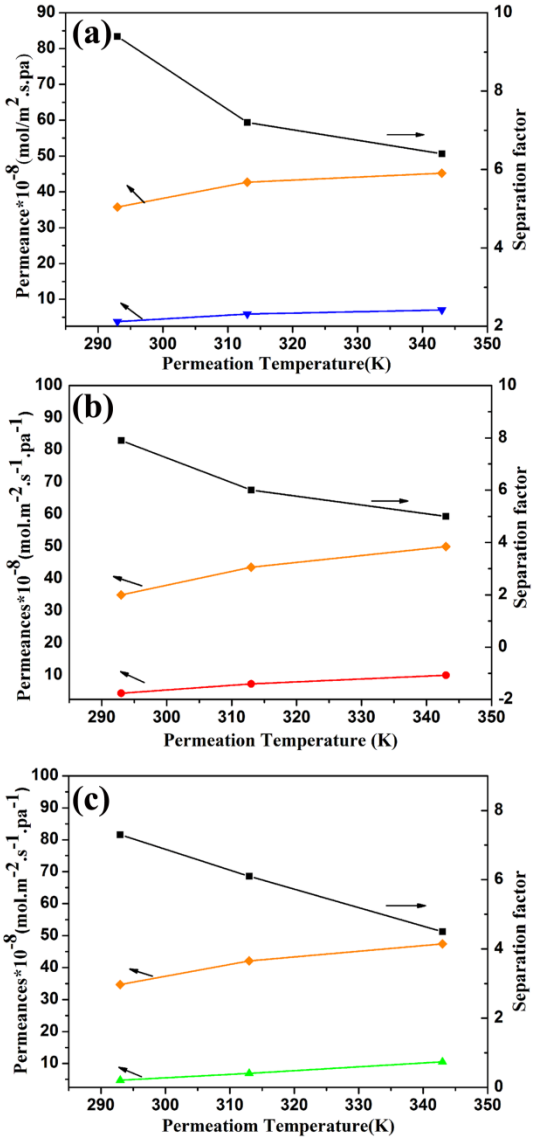

Fig.S4 (a) H_2/CO_2, (b) H_2/CH_4 and (c) H_2/N_2 permeances and separation factors of the MIL-120 membrane as a function of the permeation temperature at a pressure drop of 1bar (inverted triangles: CO_2, triangles: N_2, circles: CH_4, rhombuses: H_2, squares: separation factor).

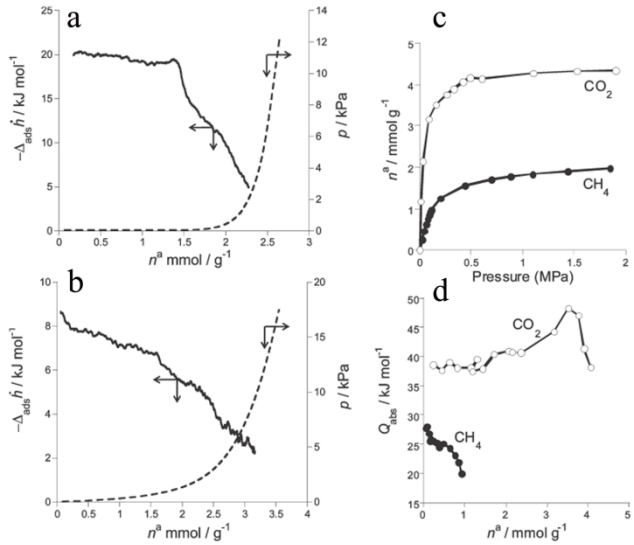

Fig.S5 Differential enthalpies of adsorption and isotherm obtained with (a) nitrogen at 77 K, (b) hydrogen at 77 K on MIL-120, (c) Isotherms and (d) differential enthalpies of adsorption at 303 K obtained with carbon dioxide and methane on MIL-120[1].

Reference

1. C. Volkringer, T. Loiseau, M. Haouas, F. Taulelle, D. Popov, M. Burghammer, C. Riekel, C. Zlotea, F. Cuevas and M. Latroche, *Chemistry of Materials*, 2009, **21**, 5783-5791.