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Electronic Supporting Information

Highly permeable and oriented AlPO-18 membranes prepared using directly-synthesized nanosheets for CO_2/CH_4 separation

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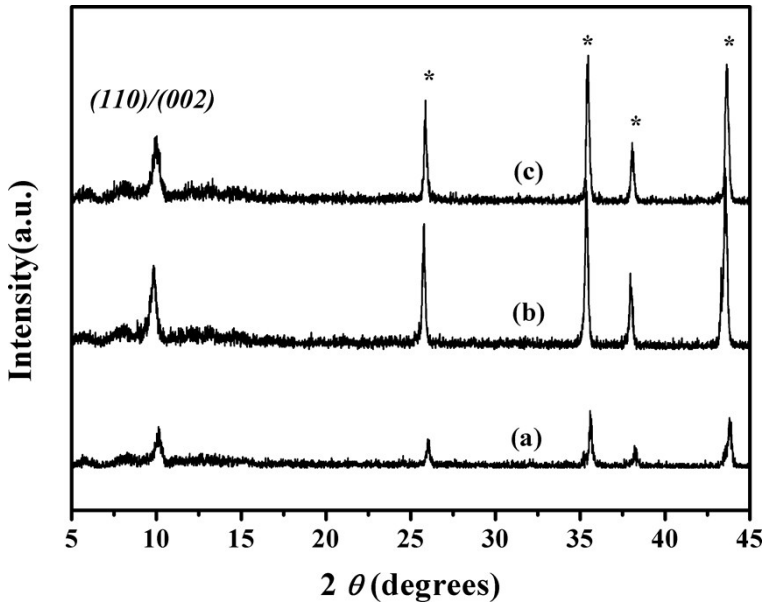

Fig. S1 XRD patterns of AlPO-18 membranes (a) M4, (b) M5, (c) M6. * indicates the peaks of alumina supports.

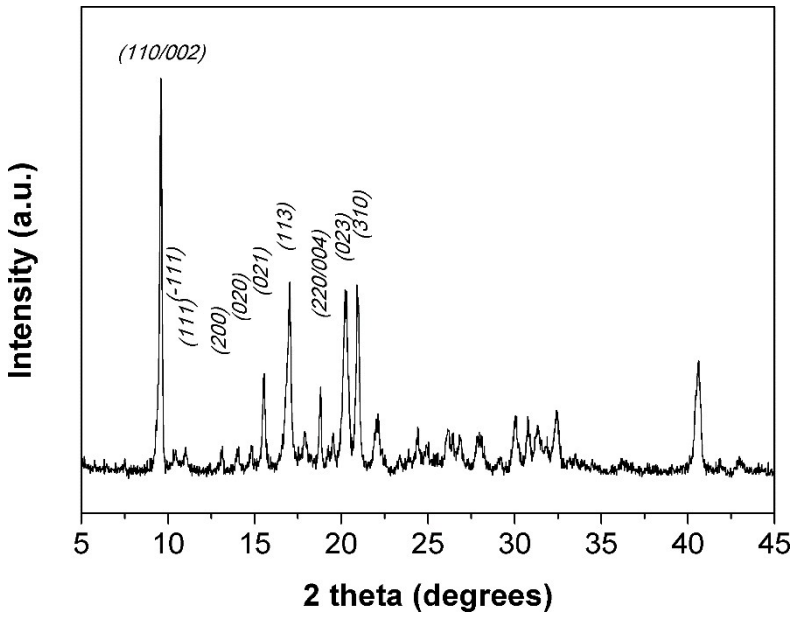

Fig. S2 XRD patterns of bottom powders form the membrane autoclave.

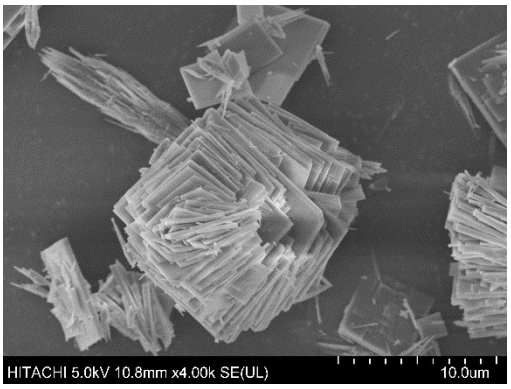

Fig. S3 SEM image of bottom powders form the membrane autoclave.

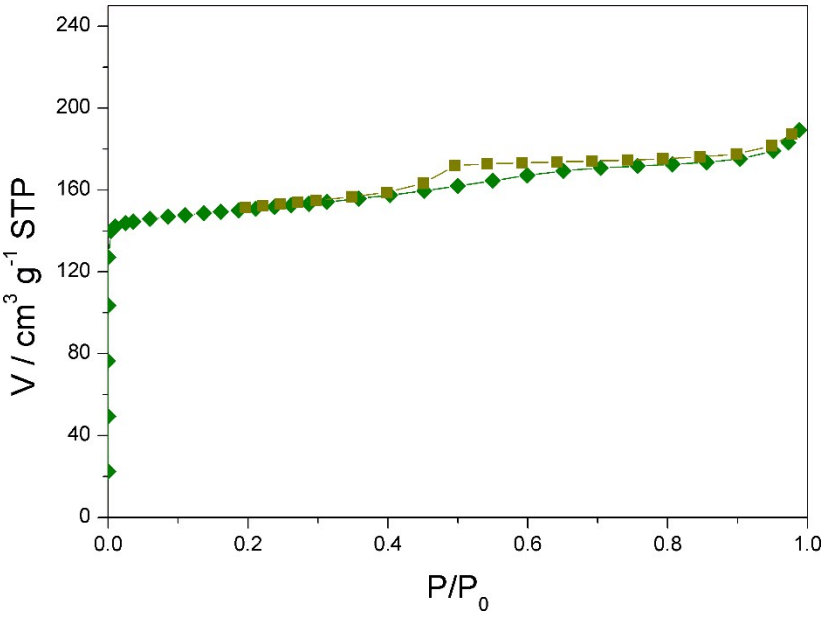

Fig. S4 N_2 adsorption/desorption isotherm of AlPO-18 bottom powders.

Table S1 Pore parameters and surface areas of AlPO-18 bottom powders along with membrane synthesis.

BET plot		*t* plot		
Total pore volume [cm^3/g]	Surface area [m^2/g]	Total pore volume [cm^3/g]	Surface area [m^2/g]	Micropore volume [cm^3/g]
0.2927	608.44	0.2927	645.77	0.2582

Table S2 Summary of test conditions, membrane thickness and CO_2/CH_4 separation performance of zeolite membranes as shown in **Fig. 11**.

Membr.	Membrane Thickness [μm]	Test pressure [MPa]	CO_2 permeance [$\times 10^7$ mol(m^2 s Pa)$^{-1}$]	Selectivity [-]	Separation index[a] [mol(m^2 s)$^{-1}$]	Ref.
SSZ-13	6	0.2	5.6	56.5	3.21	[1]
SSZ-13	10	0.2	2.0	300	6.18	[2]
SSZ-13	5	0.6	3.0	42	1.24	[3]
DDR	10	0.2	0.7	280	1.97	[4]
DDR	3	0.1	3.0	200	6.03	[5]
DDR	5	0.2	0.35	500	1.76	[6]
Si-CHA	5	0.1	11	54	[b]N/A	[7]
Si-CHA	1.3	0.9	78	32	24.18	[8]
SAPO-17	12	0.2	11	53	5.80	[9]
SAPO-34	3	4.6	12	70	12.67	[10]
SAPO-34	2.5	0.14	4	115	3.83	[11]
AlPO-18	8	0.2	6.5	220	14.42	[12]
AlPO-18	10	0.2	2.0	120	2.41	[13]
AlPO-18	10	0.138	0.66	60	0.39	[14]
AlPO-18	**4**	**0.2**	**36**	**91.5**	**33.01**	**This study**

[a]*Separation index* π = CO_2 permeance × (selectivity - 1) × permeate pressure

[b]Single-gas permeation data

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