

Supplementary information

Facile synthesis of LTA molecular sieve membranes on covalently functionalized supports by using diisocyanates as molecular linkers

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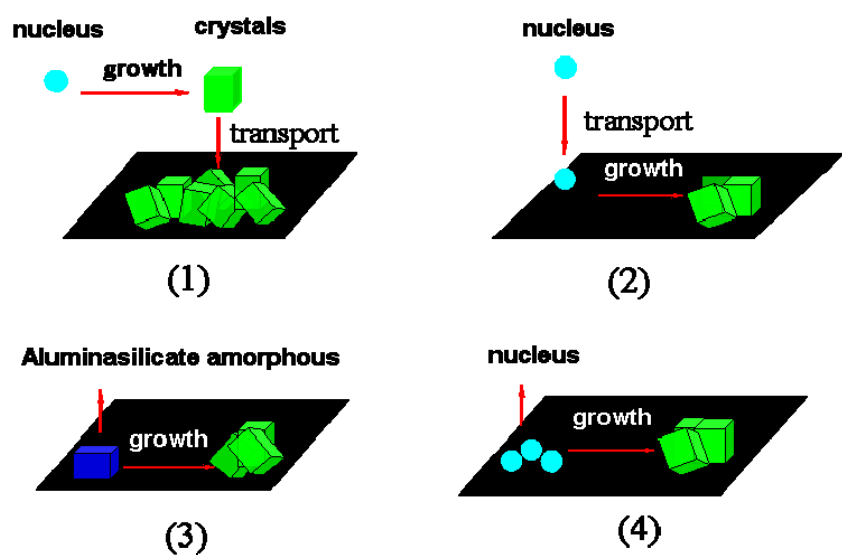


Fig. S1. Four possible growth mechanisms of zeolite membrane drawn according to Myatt proposition.

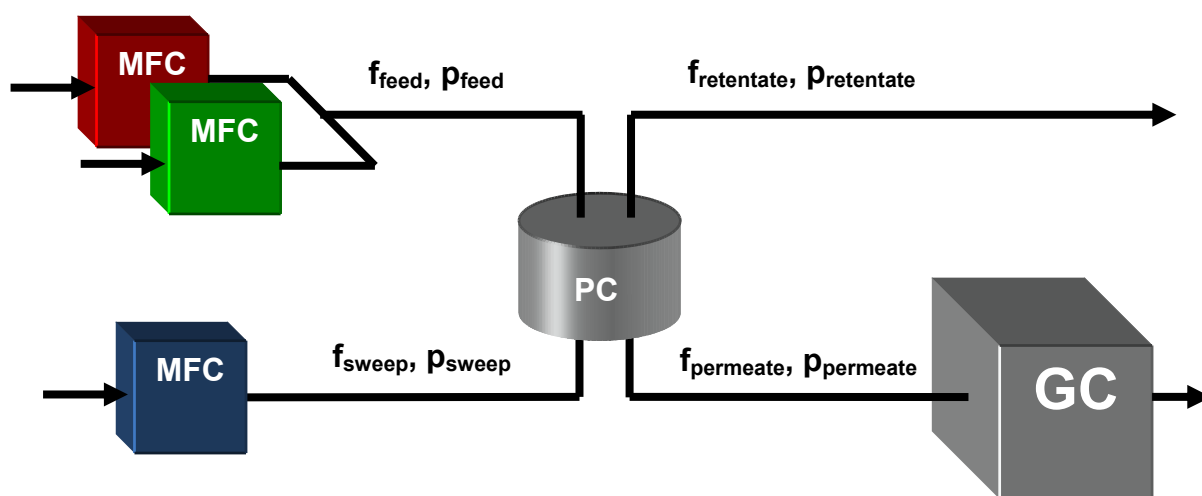


Fig. S2. Measurement equipment for both single and mixed gas permeation.

Legend:

MFC: Mass flow controller

PC: Permeation cell with mounted membrane

GC: Gas chromatograph

f: Volumetric flow rate

p: Pressure

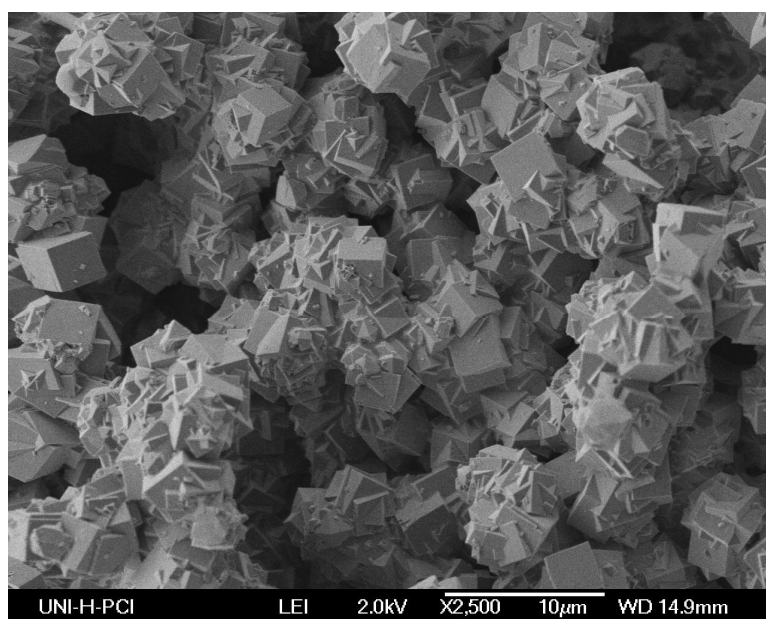


Fig. S3. Top view SEM image of the zeolite LTA layer prepared on the non-functionalized α - Al_2O_3 support at 60 °C for 24h.

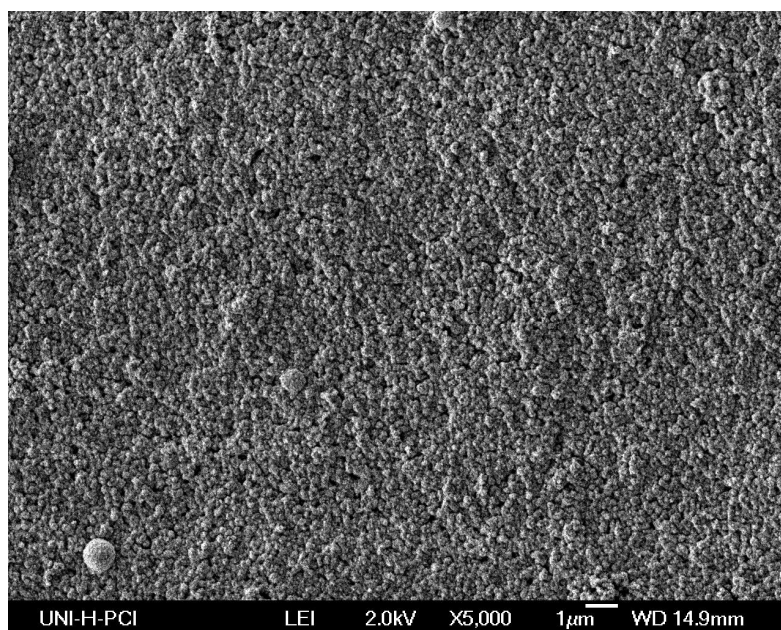


Fig. S4. Top view SEM image of the zeolite LTA layer prepared on the 1,4-diisocyanate functionalized α -Al₂O₃ support at 60 °C for 16 h.

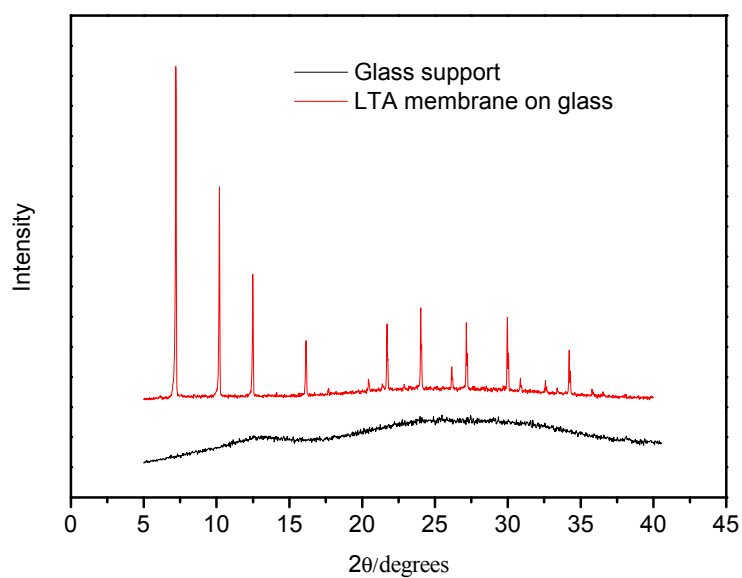


Fig. S5. XRD patterns of the DIC-4 modified glass support, and zeolite LTA film prepared on DIC-4 modified glass support.

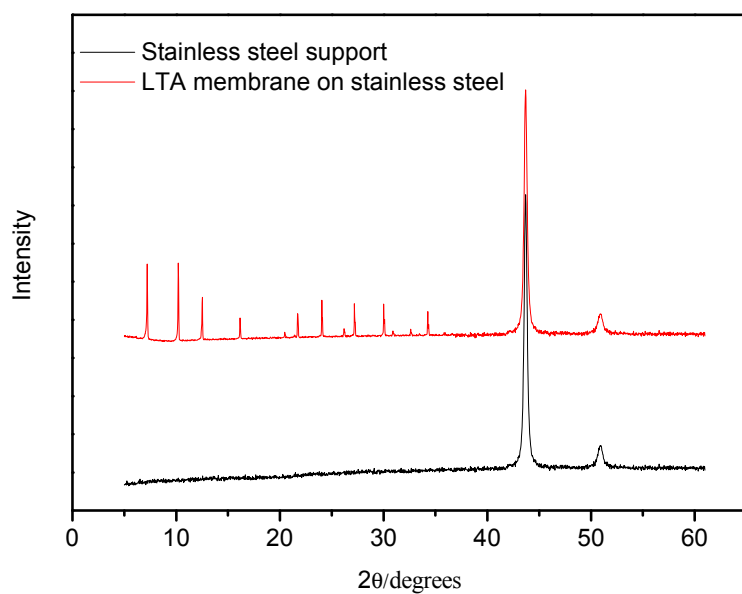


Fig. S6. XRD patterns of the DIC-4 modified stainless steel support, and zeolite LTA film prepared on DIC-4 modified stainless steel support.

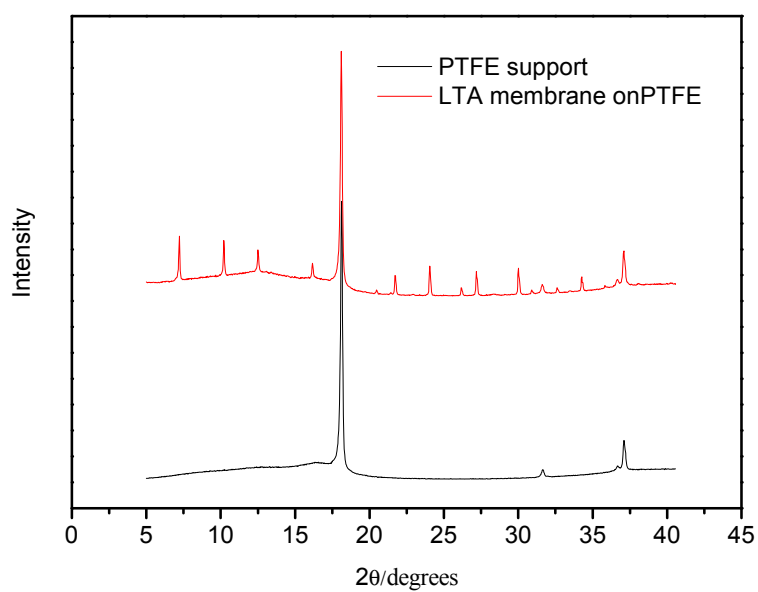


Fig. S7. XRD patterns of the DIC-4 modified PTFE support, and zeolite LTA film prepared on DIC-4 modified PTFE support.

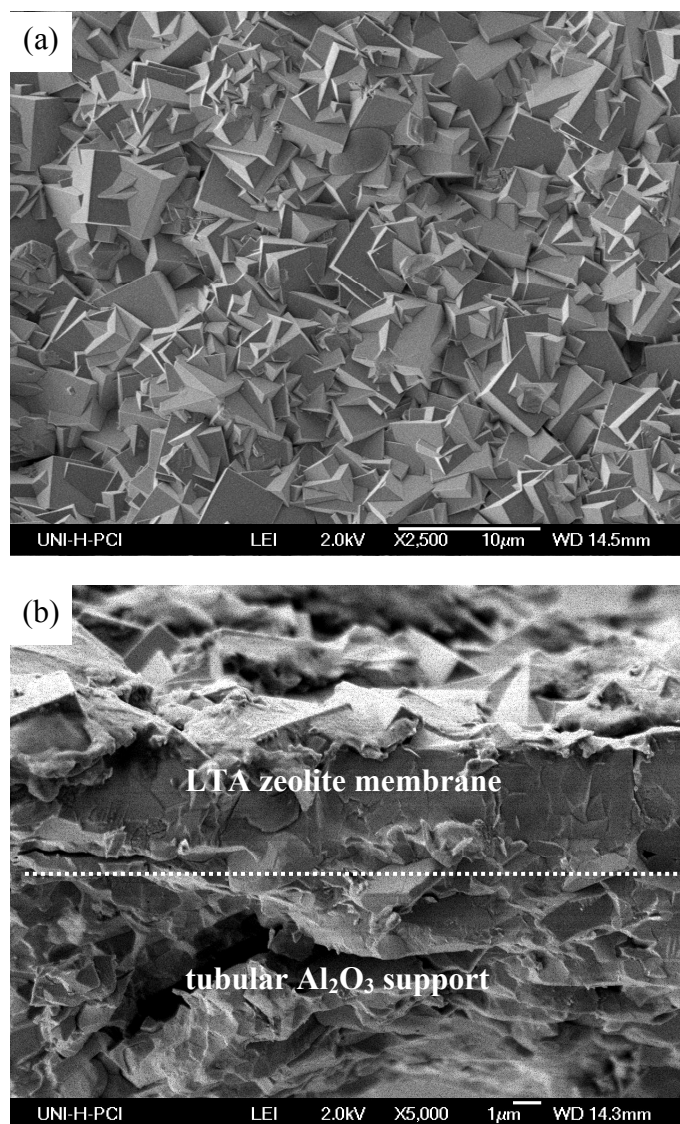


Fig. S8. Typical SEM images of the zeolite LTA membrane prepared on the 1,4-diisocyanate functionalized α -Al₂O₃ tubes, (a) top view and (b) cross section.

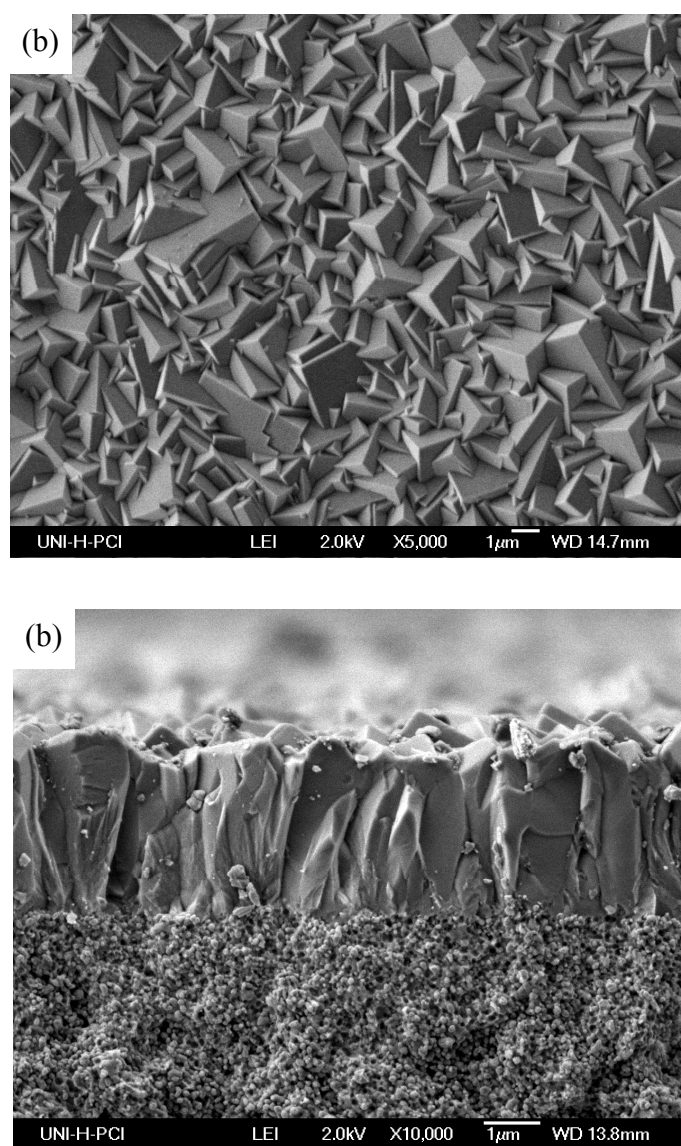


Fig. S9. Top view (a) and cross-section (d) SEM images of the zeolite LTA membrane prepared on the 1,6-diisocyanate functionalized α -Al₂O₃ disk.

Table S1. Separation performances of LTA zeolite membranes for H₂-C₃H₈ mixtures H₂-C₃H₈ mixtures at 20 °C and 1 bar.

Table S1

Membrane	H ₂ permeance (mol·m ⁻² ·s ⁻¹ ·Pa ⁻¹)	C ₃ H ₈ permeance (mol·m ⁻² ·s ⁻¹ ·Pa ⁻¹)	H ₂ /C ₃ H ₈ selectivity	Average selectivity	standard deviation of selectivity
M1	2.05 x 10 ⁻⁷	1.30 x 10 ⁻⁸	15.8	15.83	0.37
M2	2.08 x 10 ⁻⁷	1.28x 10 ⁻⁸	16.3		
M3	2.01 x 10 ⁻⁷	1.37 x 10 ⁻⁸	15.4		