Electronic Supplementary Information

Highly oriented improved SAPO 34 membrane on low cost support for hydrogen gas separation

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Fig. S1 SAPO 34 membrane layer prepared on the non-modified clay-Al\textsubscript{2}O\textsubscript{3} support surface at 170 °C for 120 h by hydrothermal process for comparison.
**Fig. S2** (a) FESEM micrograph of SAPO 34 membrane layer on silica modified clay-Al₂O₃ support, (b-e) consequent elemental mapping (O, Al, Si and P) of the membrane layer and, (f) corresponding EDAX spectra of the membrane layer and the inserted table show the quantitative analysis.
**Fig. S3** (a) Cross section with line scanning view of the synthesized membrane on modified substrate, (b) the corresponding spectra of O, Al, Si, and P during the elemental scan (distance in micron), (c) cross section with line scanning view of the synthesized membrane on non-modified substrate and, (d) the corresponding spectra of O, Al, Si, and P during the elemental scan. (The white dotted arrow mark shows the SAPO 34 membrane layer on the modified and non-modified support.) The zeolite penetration inside the non-modified support was indicated by the dotted circle.
Fig. S4 Schematic representation of permeation apparatus for the measurement of both single gas and mixed gas permeation.

Legend:

**GC:** gas chromatography

**TCD:** thermal conductivity detector

**f:** volumetric flow rate

**p:** pressure
Fig. S5 Single gas permeation through SAPO 34 membrane at room temperature as a function of different feed pressures and separation selectivity of H₂/CO₂. The inset shows the comparison of separation selectivity of H₂/CO₂ by using SAPO 34 zeolite membrane prepared on the modified and non-modified support surface.