Supporting Information

Tailored CO\textsubscript{2}-philic Gas Separation Membranes via One-pot Thiol-ene Chemistry

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Table S1. Molar feed ratio of starting materials.

<table>
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<th>Sample code</th>
<th>Thiol-PDMS</th>
<th>EOPDMS/VTPDMS</th>
<th>PEGMEA/DEAEA</th>
<th>TPO</th>
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<td>20</td>
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<td>4</td>
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<td>PDMS- PEGMEA&lt;sub&gt;20&lt;/sub&gt;-EOPDMS&lt;sub&gt;10&lt;/sub&gt;</td>
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Scheme S1. Synthesis of VTPDMS-based elastomer membranes via thiol-ene click reaction.
Figure S1. (a) Proton and (b) Carbon NMR of N-(2-(diethylamino)ethyl) acrylamide (DEAEA).
Figure S2. Picture of (a) PDMS-PEGMEA-VTPDMS (b) PDMS-DEAEA-EOPDMS and (c) PDMS-PEGMEA-PEGDA membranes.
(b)

Absorbance [a.u.]

Wavenumber [cm\(^{-1}\)]

PDMS-PEO\(_{30}\) - VTPDMS\(_{10}\)

PDMS-PEGMEA\(_{0}\) - VTPDMS\(_{20}\)

VTPDMS

Thiol-PDMS

PEGMEA

PDMS-PEO\(_{30}\) - VTPDMS\(_{10}\)
Figure S3. Full FT-IR spectra of (a) PDMS-PEGMEA-EOPDMS membranes and starting materials (b) PDMS-PEGMEA-VTPDMS membranes and starting materials and (c) PDMS-DEAEA\textsubscript{30}-EOPDMS\textsubscript{10} membrane and starting materials.
Figure S4. TGA curves of synthesized membranes.
Figure S5. DSC curves for PDMS-PEGMEA-EOPDMS membranes. All curves have been shifted vertically to illustrate the systematic change of the peak shape and position.
Figure S6. SAXS profile of PDMS-DEAEA$_{30}$-EOPDMS$_{10}$ and PDMS-PEGMEA-VTPDMS membranes.
Figure S7. AFM height (top row) and phase (bottom row) images of PDMS-PEGMEA$_{0}$-EOPDMS$_{20}$, PDMS-PEGMEA$_{10}$-EOPDMS$_{15}$, and PDMS-PEGMEA$_{20}$-EOPDMS$_{10}$ membranes. All scale bars are 200 nm.
Figure S8. Tensile test results of the PDMS-PEGMEA-EOPDMS membranes.
Figure S9. Real part of shear modulus (G’) for synthesized membranes.
Figure S10. Pressure rise in the permeate chamber of PDMS-PEGMEA$_{30}$-EOPDMS$_{10}$.