

Supporting Information for

**Piperazinium-mediated crosslinked polyimide-polydimethylsiloxane
(PI-PDMS) copolymer membranes: the effect of PDMS content on
CO₂ separation**

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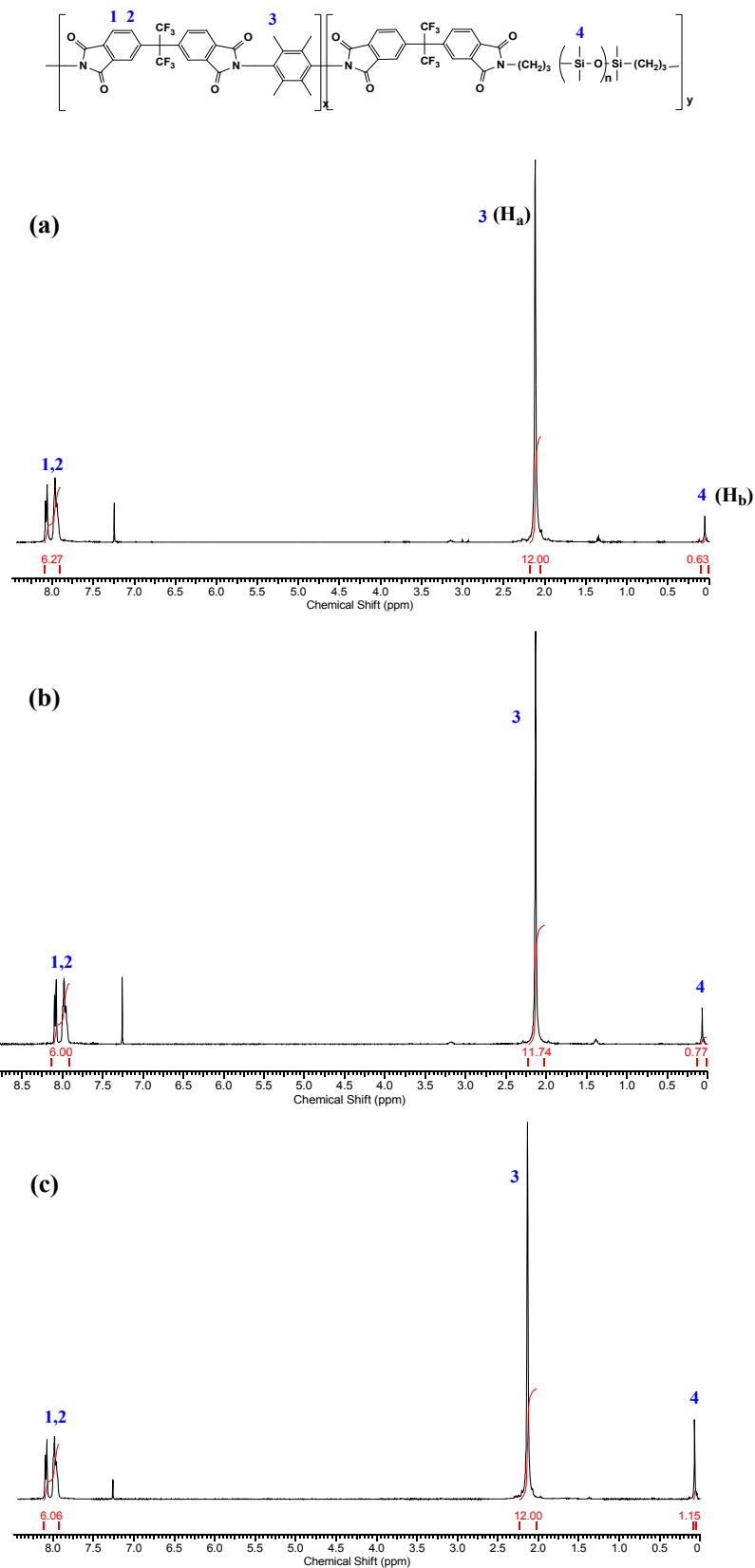


Figure S1. ¹H NMR spectra of PI-PDMS-0.05 (a), PI-PDMS-0.10 (b) and PI-PDMS-0.15 (c)

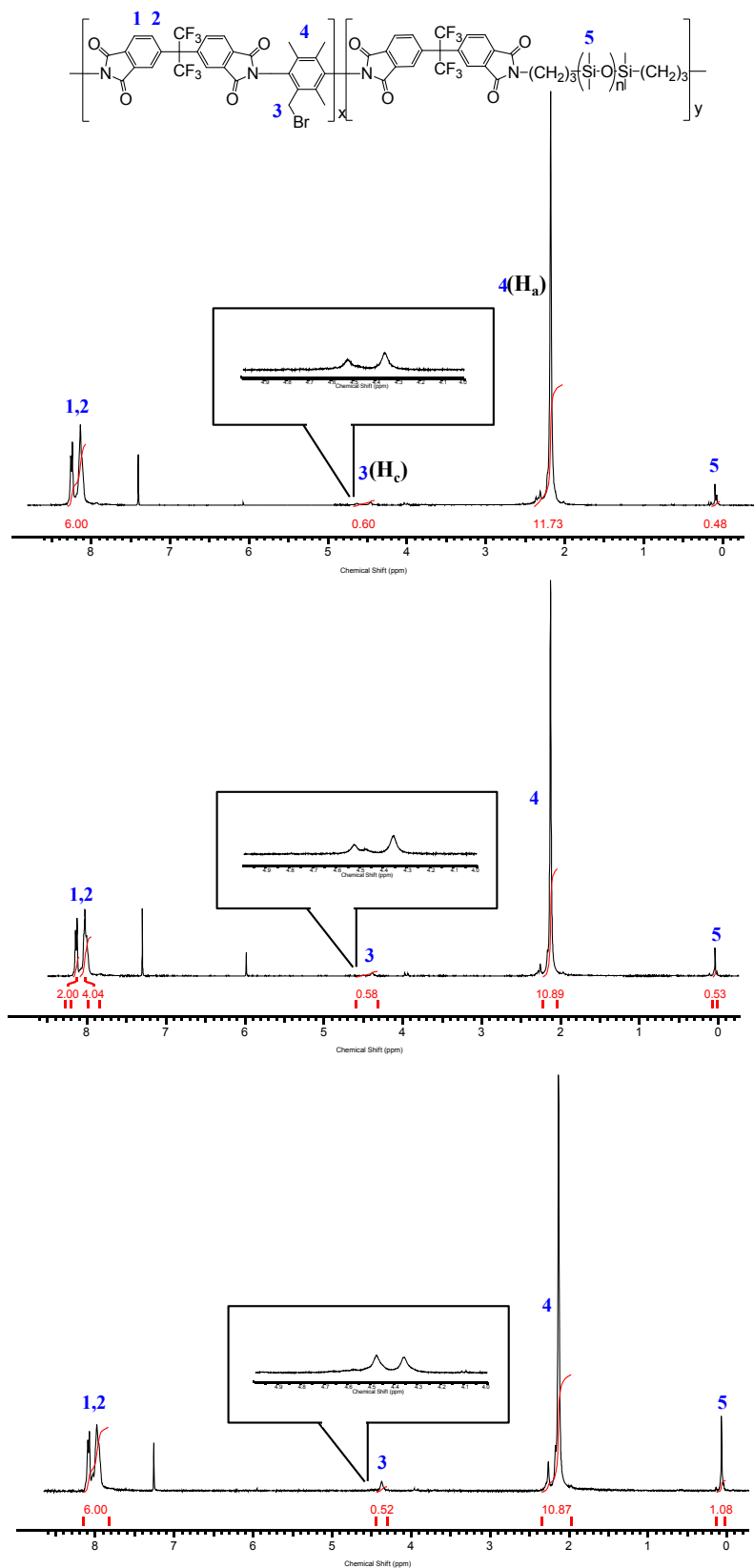


Figure S2. ^1H NMR spectra of Br-PI-PDMS-0.05 (a), Br-PI-PDMS-0.10 (b) and Br-PI-PDMS-0.15 (c)

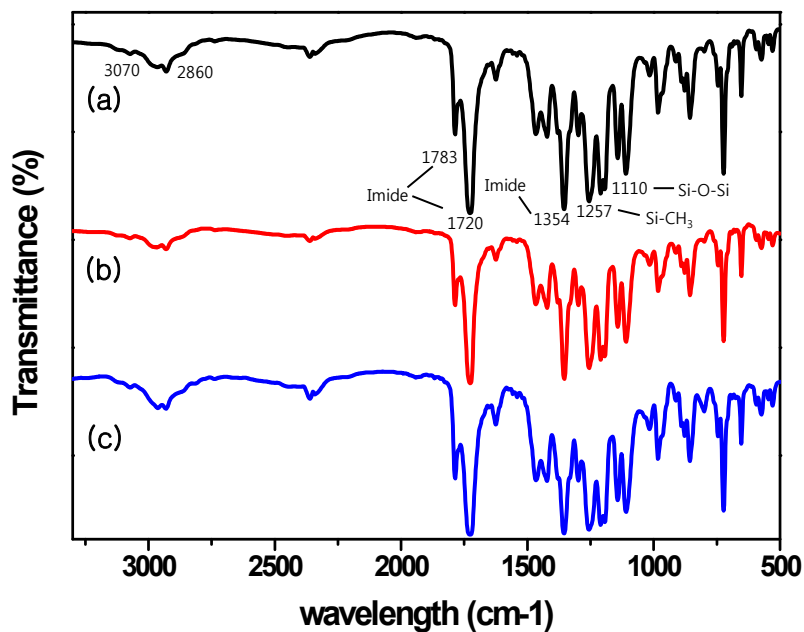


Figure S3. FT-IR spectra (500-3500 cm^{-1}) of the [xPI-PDMS-0.05][Br] (a), [xPI-PDMS-0.10][Br] (b) and [xPI-PDMS-0.15][Br] (c)

Table S1. Gas diffusivity coefficients^a and solubility coefficients^b at 2 atm and 30 °C

Membrane	D_{CO_2}	D_{N_2}	D_{CH_4}	$D_{\text{CO}_2/\text{N}_2}$	$D_{\text{CO}_2/\text{CH}_4}$	S_{CO_2}	S_{N_2}	S_{CH_4}	$S_{\text{CO}_2/\text{N}_2}$	$S_{\text{CO}_2/\text{CH}_4}$
[xPI-PDMS-0.05][Br]	13.1	10.1	1.62	1.30	8.09	0.47	0.03	0.12	13.59	3.90
[xPI-PDMS-0.10][Br]	17.0	13.4	1.49	1.29	11.41	0.47	0.04	0.14	12.34	3.16
[xPI-PDMS-0.15][Br]	9.62	7.38	0.82	1.30	11.73	0.39	0.03	0.13	13.87	3.03

^aDiffusivity coefficient ($10^{-8} \text{ cm}^2/\text{s}$) ^bSolubility coefficient ($\text{cm}^3 \text{ (STP)}/\text{cm}^3 \text{ cmHg}$)

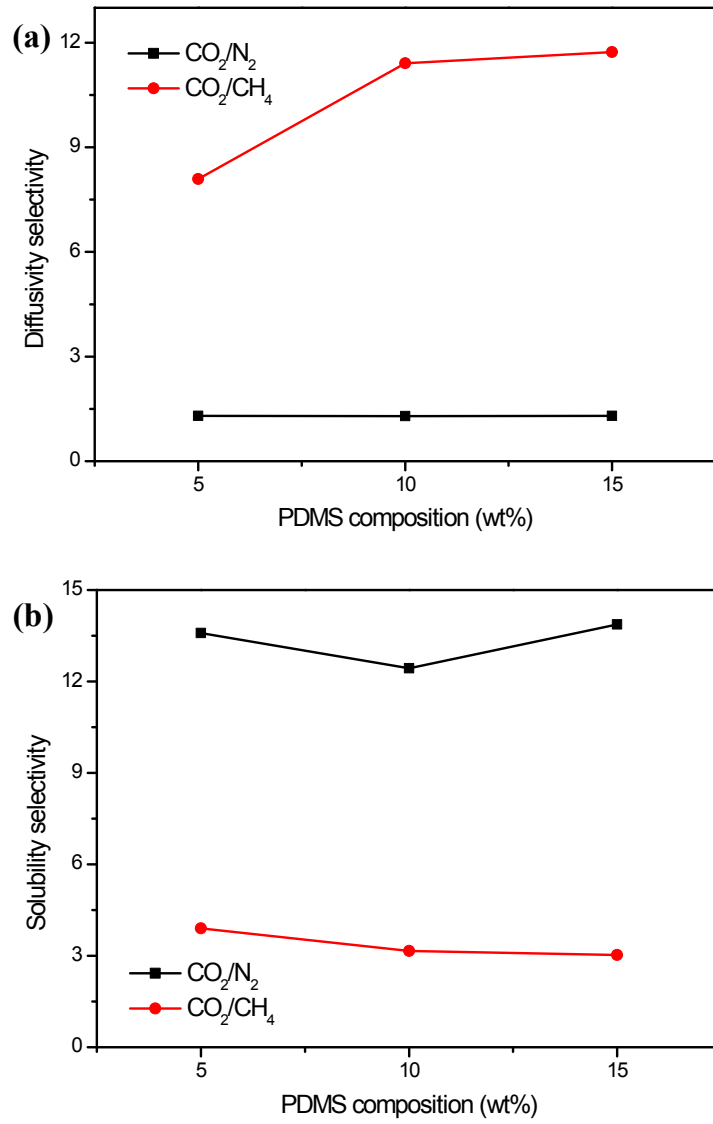


Figure S4. Diffusivity selectivity (a) and solubility selectivity of the [xPI-PDMS][Br] membranes as a function of the PDMS content

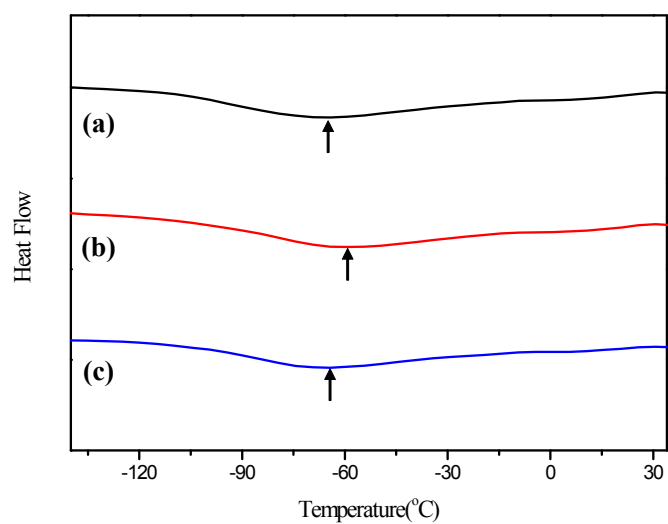


Figure S5. DSC plots of the [xPI-PDMS-0.05][Br] (a), [xPI-PDMS-0.10][Br] (b) and [xPI-PDMS-0.15][Br] (c) membranes

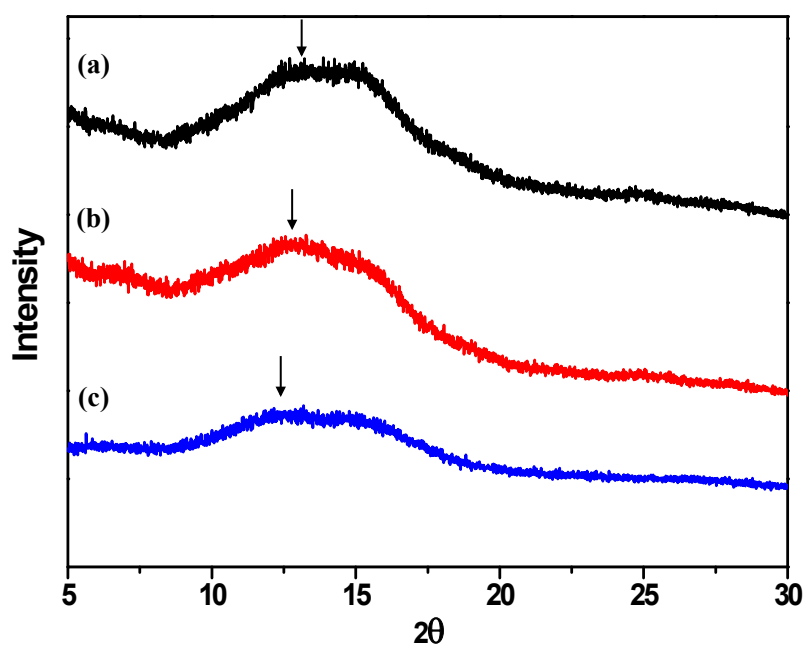


Figure S6. Wide-angle X-ray diffraction plots of the [xPI-PDMS-0.05][Br] (a), [xPI-PDMS-0.10][Br] (b) and [xPI-PDMS-0.15][Br] (c) membranes.

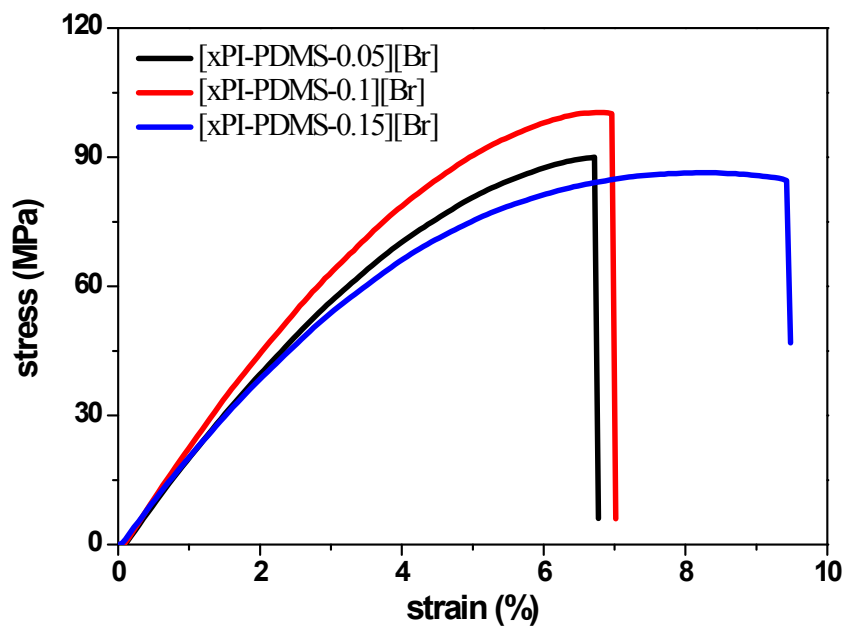


Figure S7. Stress-strain behavior of the [xPI-PDMS-0.05][Br], [xPI-PDMS-0.10][Br], and [xPI-PDMS-0.15][Br] membranes