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Supplemental Information

High permeable porous organic cage composite membrane for gas separation

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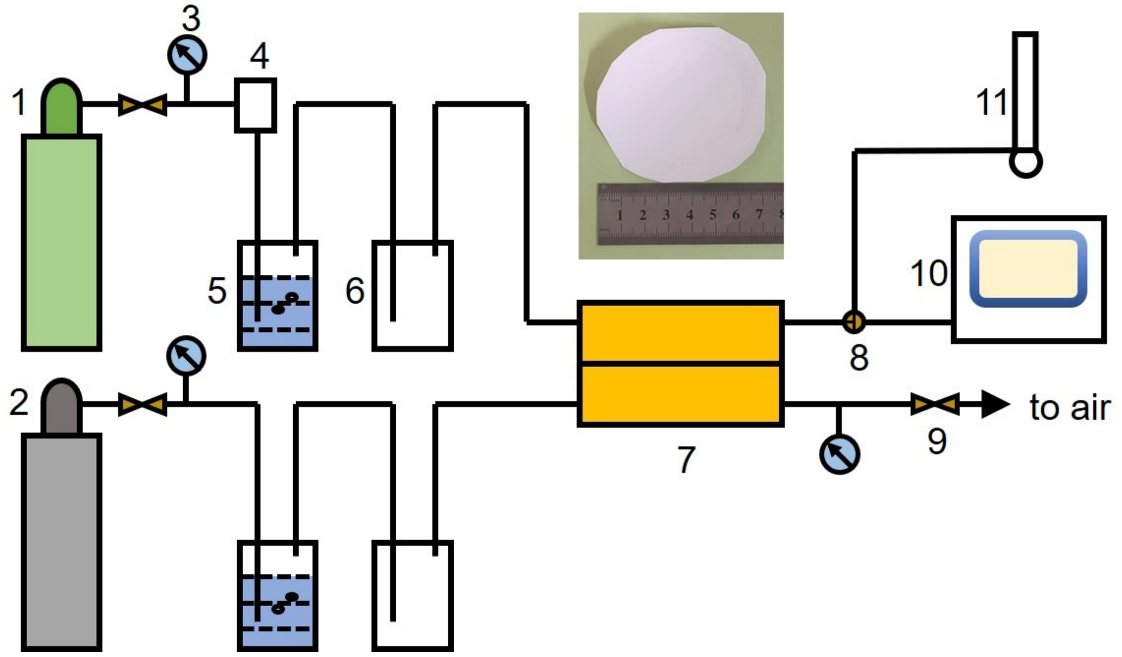

Figure S1. Flow chart of a lab-made device for gas separation test, (1) sweep gas, (2) feed gas, (3) pressure gage, (4) mass flowmeter, (5) humidifier, (6) dehumidifier, (7) membrane cell, (8) three-way valve (9) pressure regulating valve, (10) gas chromatography, and (11) soap bubble flowmeter.

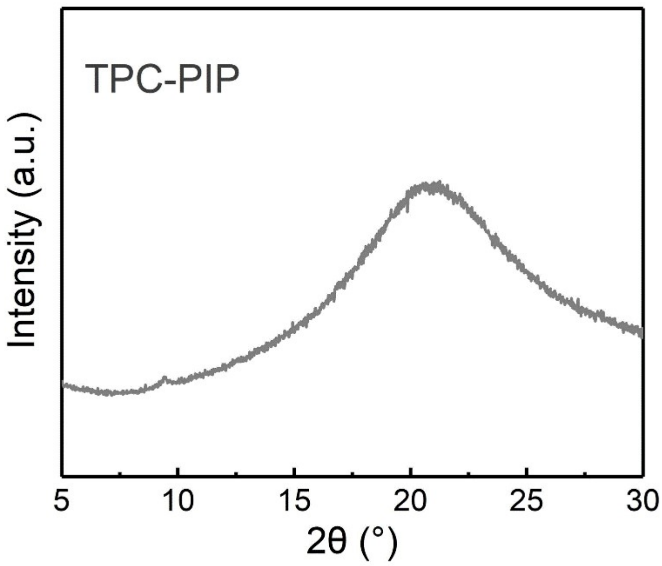

Figure S2. XRD pattern of TPC-PIP film.

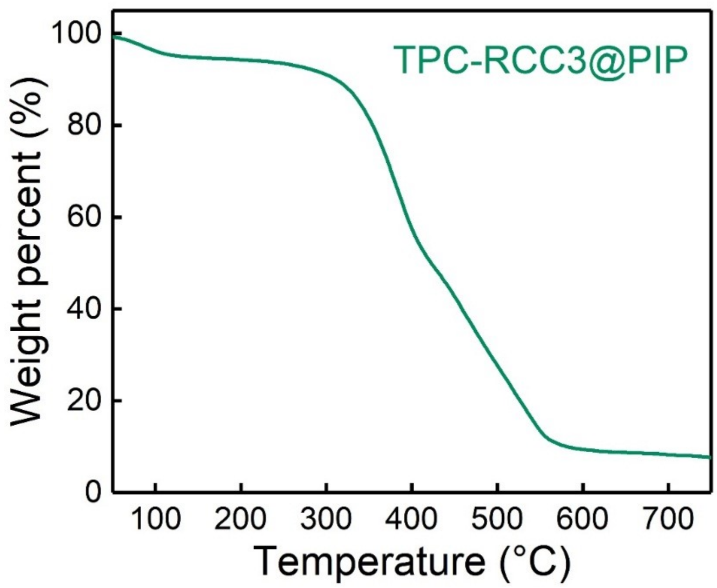

Figure S3. Thermogravimetric result of TPC-RCC3@PIP film.

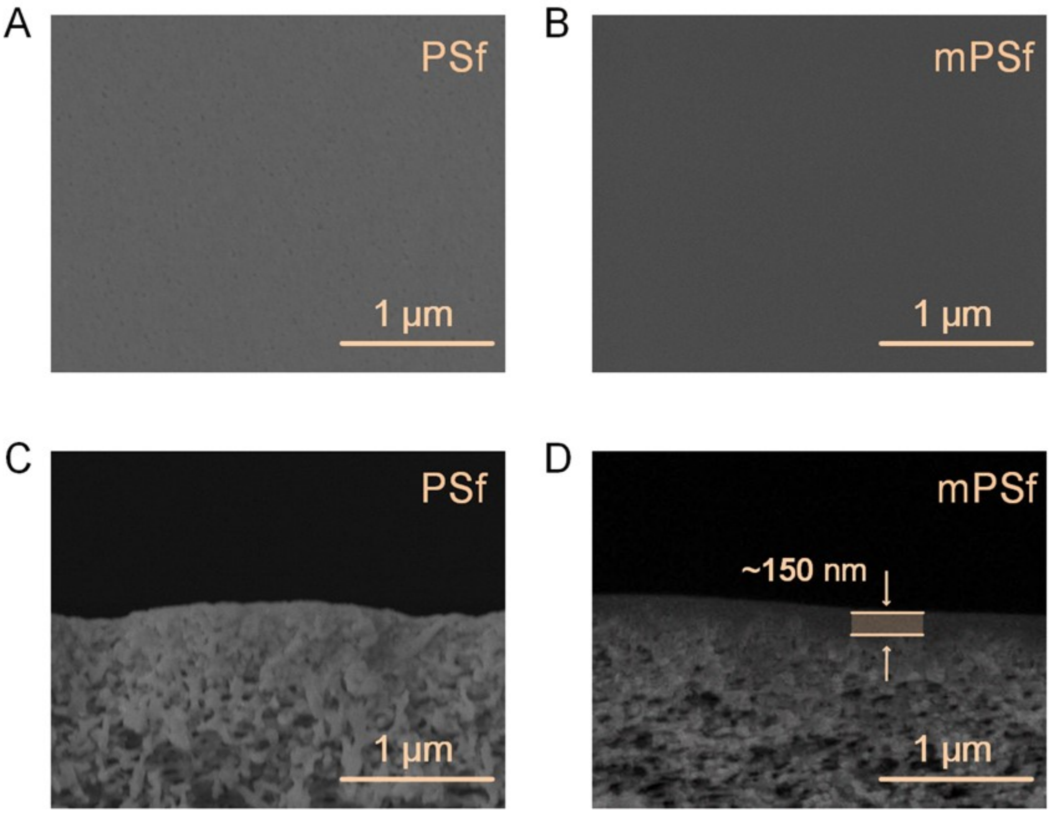

Figure S4. (A-B) Surface SEM images of polysulfone (PSf) and PDMS modified polysulfone (mPSf) membranes. (C-D) Cross-section SEM images of PSf and mPSf membranes.

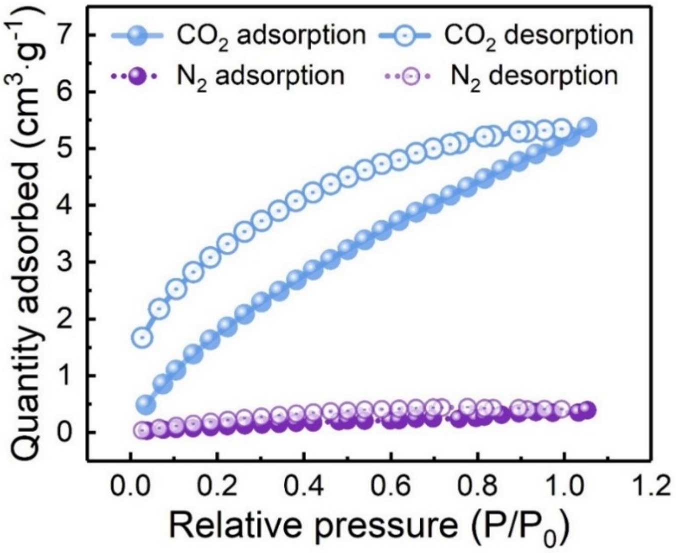

Figure S5. Single gas adsorption-desorption of TPC-RCC3@PIP film at 298 K.

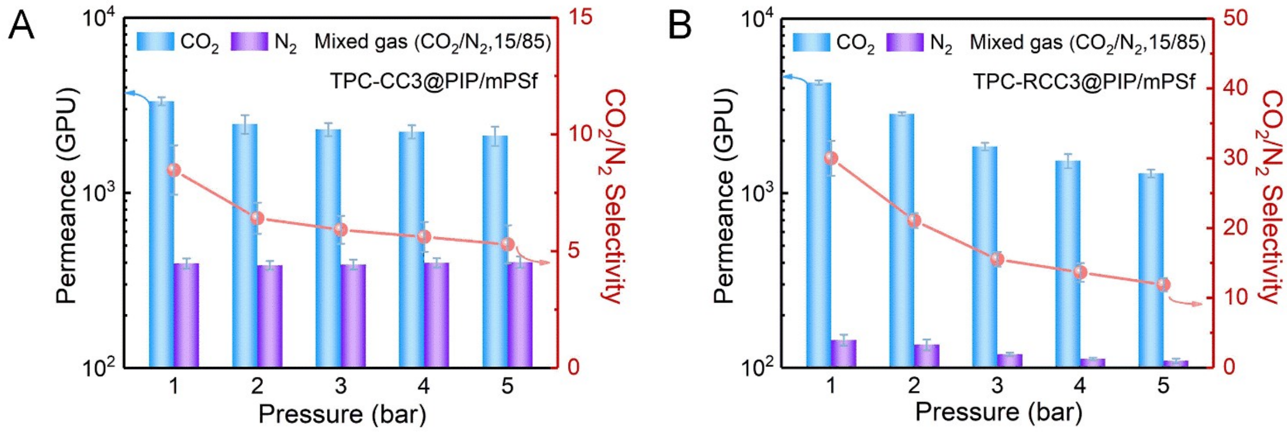

Figure S6. Mixed CO_2/N_2 separation performance of (A) TPC-CC3@PIP/mPSf and (B) TPC-RCC3@PIP/mPSf composite membranes at different feed gas pressures.

Table S1. CO_2/N_2 separation performance of the TPC-RCC3@PIP/mPSf membrane developed in this work in comparison with other reported membranes.

TFC membranes	Feed gas pressure (bar)	CO_2 permeance (GPU)	CO_2/N_2 selectivity	Ref.
XLPEG/COF-LZU1/PAN	1	1843	28	[1]
Polyactive/ZnTCPP/PAN	1	2070	33	[2]
PGO-MIL-140C/PTMSP/PSf	1	1100	30	[3]
PAR-TTSBI/PDMS/PSf	2	860	43	[4]
Pebax/PDMS/PSf	1	1500	38	[5]
PVAm-PVA/PDMS/PSf	2	910	78	[6]
HPEO2-800/PDMS/PSf	1.4	850	37	[7]
MPF-1/PSf	1	1304	59	[8]
TPC-RCC3@PIP/mPSf	1	4303	30	This work

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