

Supporting Information for

Aqueous Two-Phase Interfacial Assembly of COF Membranes for Water Desalination

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Supplementary Figures and Tables

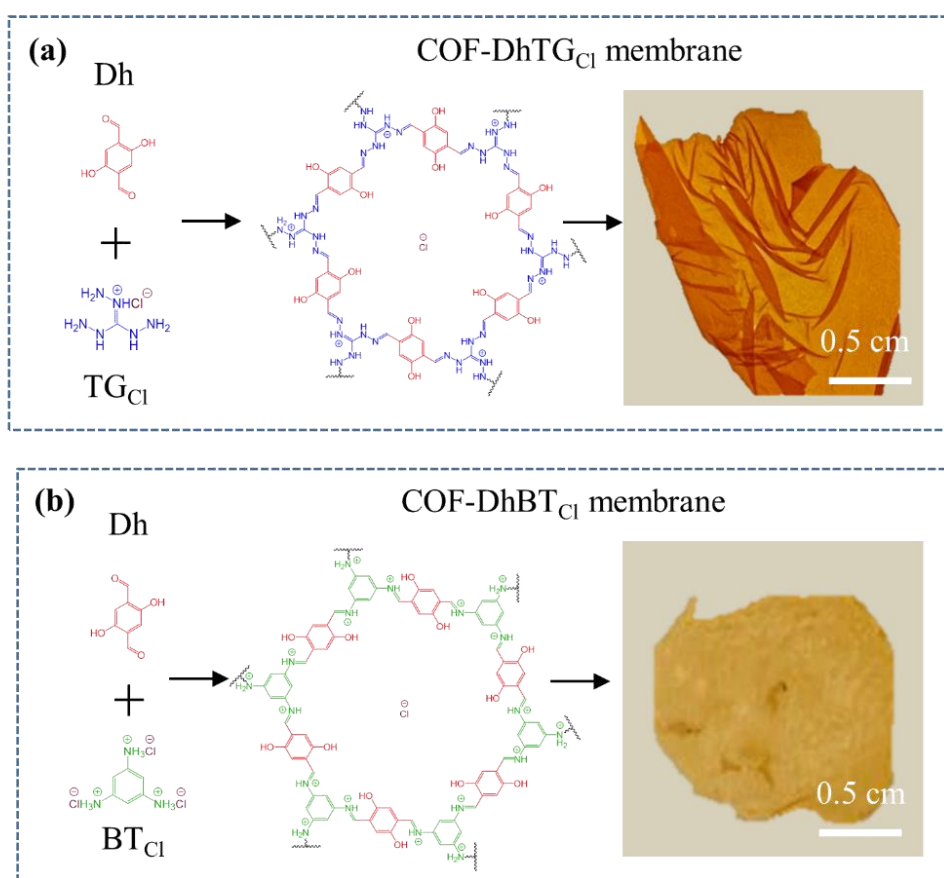


Fig. S1 Schematic illustration and digital photos of **a** COF-DhTG_{Cl} and **b** COF-DhBT_{Cl} membranes

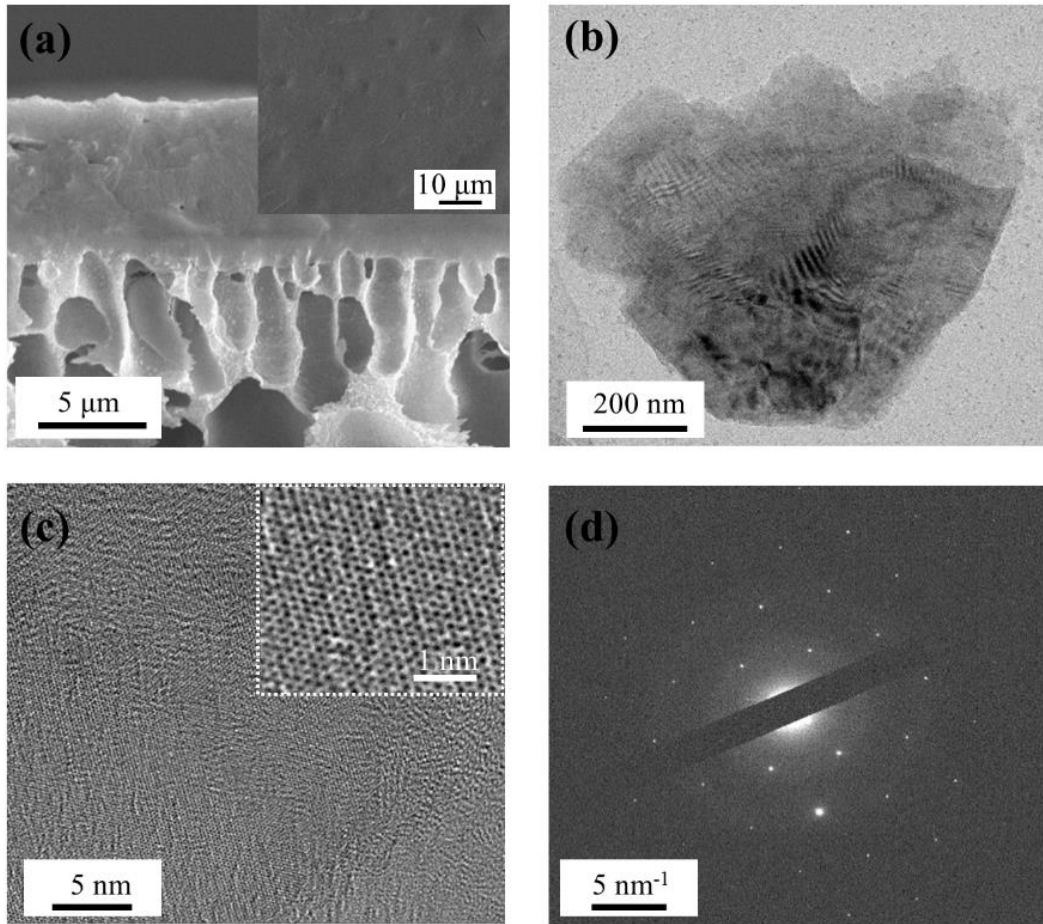


Fig. S2 a SEM, b-c TEM and d SAED measurements on COF-DhBT_{Cl} membrane

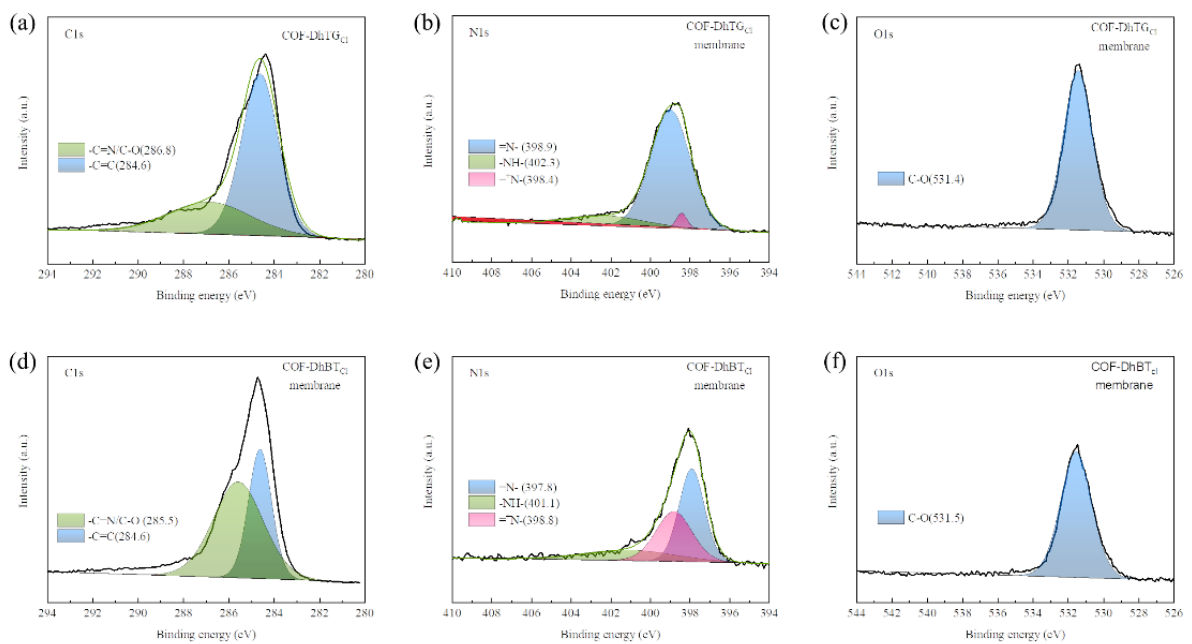


Fig. S3 XPS spectra of COF membranes. a C 1s, b N 1s and c O 1s spectra of COF-DhTG_{Cl} membrane. d C 1s, e N 1s and f O 1s spectra of COF-DhBT_{Cl} membrane

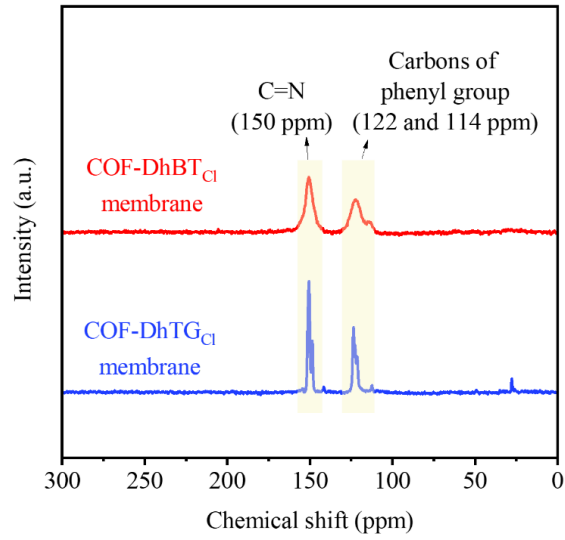


Fig. S4 ssNMR spectra of COF-DhTG_{Cl} and COF-DhBT_{Cl} membranes

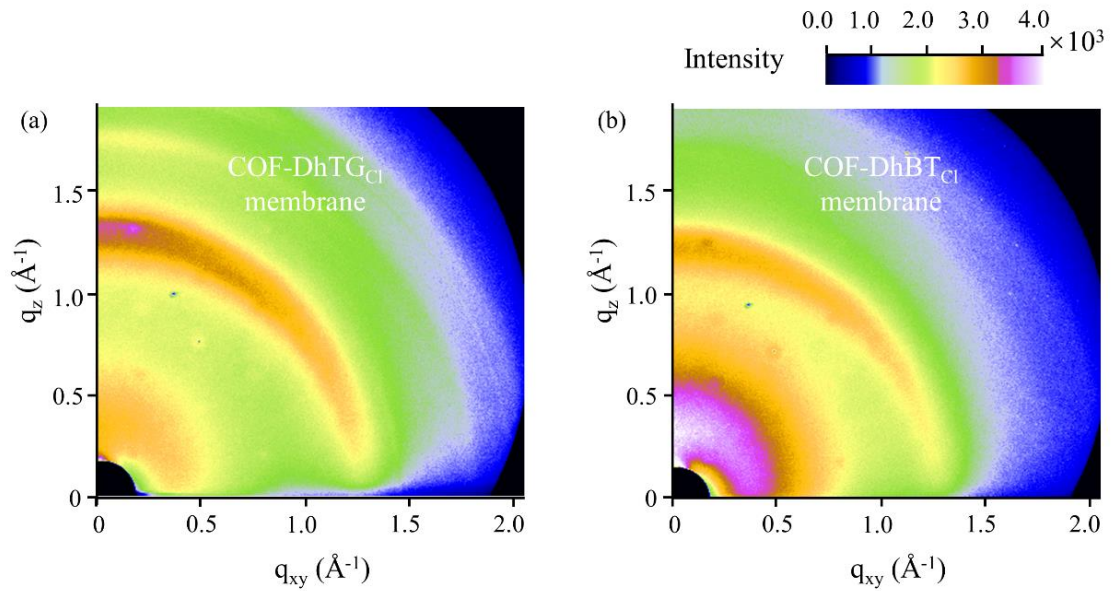


Fig. S5 2D-GIWAXS spectra of **a** COF-DhTG_{Cl} and **b** COF-DhBT_{Cl} membranes

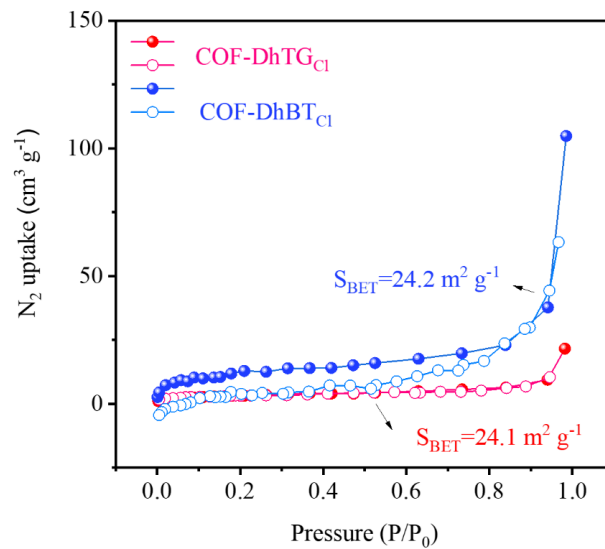


Fig. S6 N₂ adsorption measurement of COF membranes

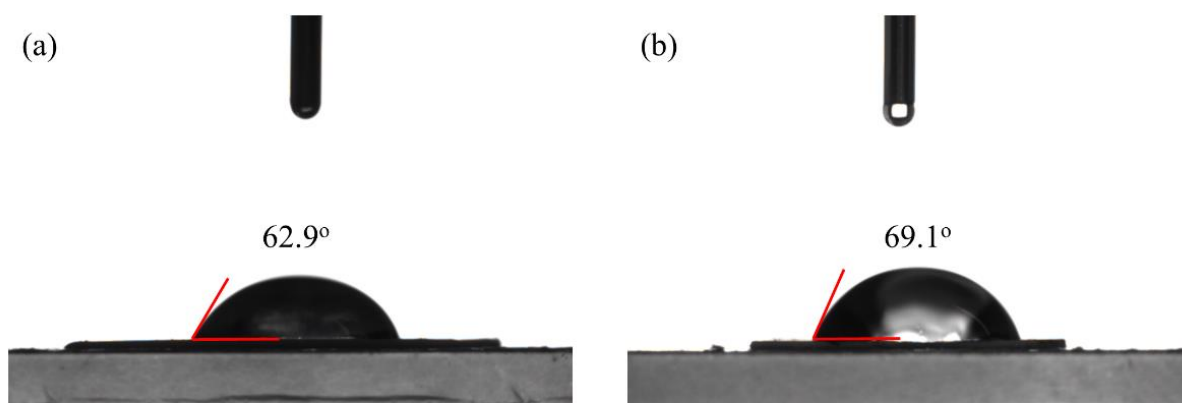


Fig. S7 WCA measurement of **a** COF-DhTG_{Cl} and **b** COF-DhBT_{Cl} membranes, respectively

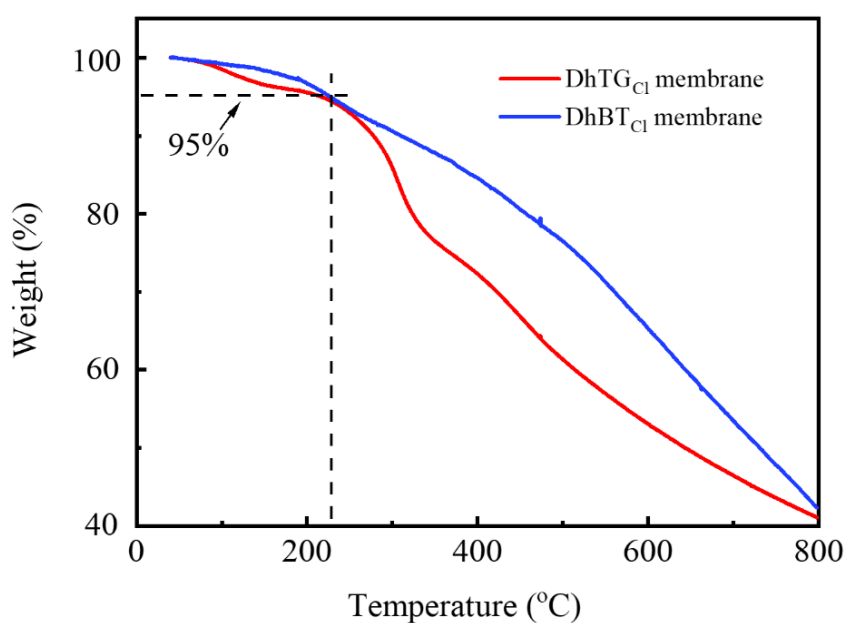


Fig. S8 TGA measurement of COF membranes

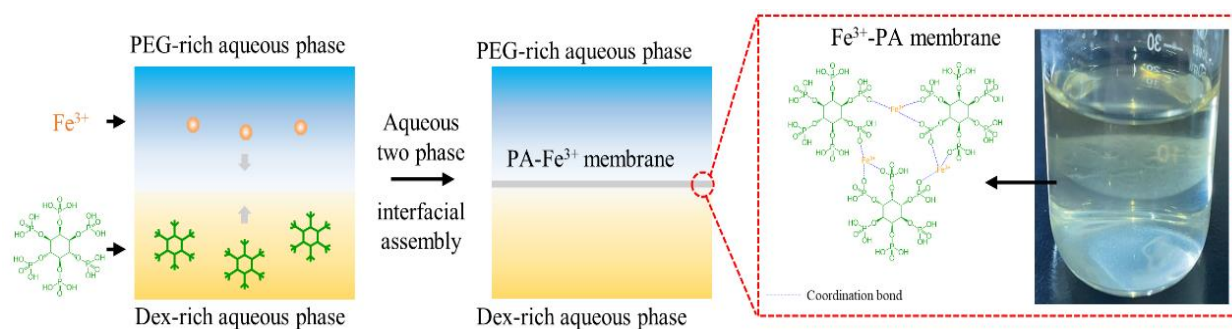


Fig. S9 Scheme illustration of fabricating metal organic polymer (metal-organophosphate) membranes using aqueous two-phase interfacial assembly

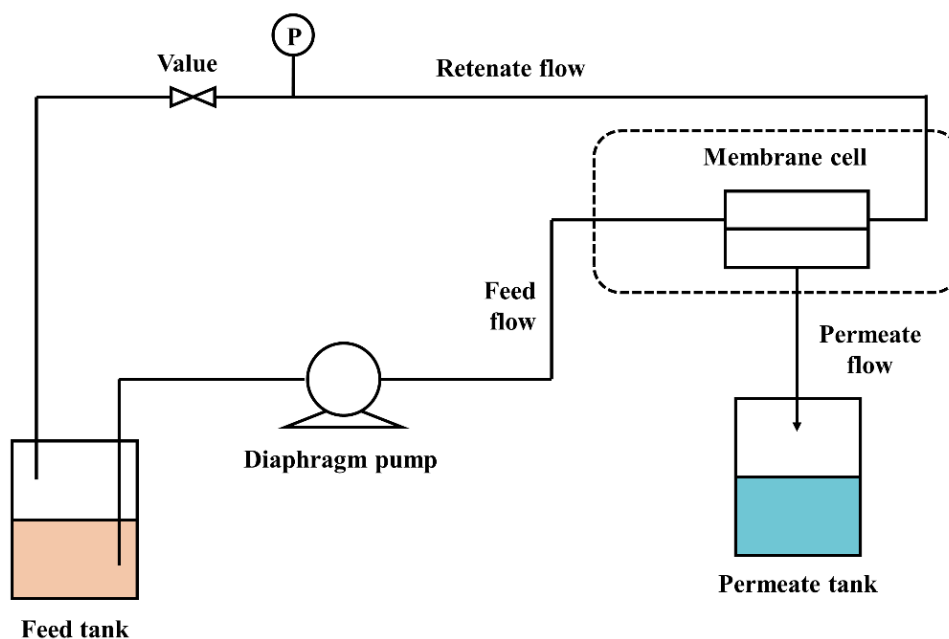


Fig. S10 Apparatus of nanofiltration desalination with cross-flow configuration

Table S1 Zeta potential of COF membranes

Membrane	Zeta potential (ξ , mV)
COF-DhTG _{Cl}	20.1 ± 1.2
COF-DhBT _{Cl}	9.8 ± 1.8

Table S2 Monomer concentration in the recipe for COF-DhTG_{Cl} membrane fabrication

Name	Dh concentration ($\mu\text{mol mL}^{-1}$)	TG _{Cl} concentration ($\mu\text{mol mL}^{-1}$)
M1	0.4	0.25
M2	0.6	0.4
M3	0.8	0.5
M4	1.0	0.7

Table S3 Phase composition and interfacial properties [S1, S2] of ATPS in this study

Name	PEG fraction in solution A (wt%)	DEx fraction in solution B (wt%)	Total polymer fraction (wt%)	Interfacial tension (mN m ⁻¹)
1	2.1	2.6	2.30	0.001
2	5.0	6.4	5.62	0.012
3	10	16	12.6	0.103
4	15	19.2	16.3	0.209
5	20	25.6	21.4	0.381

Table S4 Nanofiltration/reverse osmosis/forward osmosis desalination (NaCl rejection) performances of membranes in literatures

Membrane	Filtration method	Pressure (bar)	Water permeation ($\text{L m}^2 \text{h}^{-1} \text{bar}^{-1}$)	NaCl rejection (%)	Refs.
Graphene/GO	Cross flow	50	0.34 (± 0.1)	85 (± 2)	[S3]
Graphene/GO	Cross flow	50	0.22 (± 0.1)	54 (± 5)	[S3]
Graphene/GO	Cross flow	50	0.46 (± 0.2)	85 (± 1)	[S3]
Graphene/GO	Cross flow	50	0.38 (± 0.1)	85 (± 7)	[S3]
Graphene/GO	Cross flow	50	0.44 (± 0.02)	83 (± 5)	[S3]
Graphene/GO	Cross flow	50	0.67 (± 0.02)	79 (± 8)	[S3]
Laminated GO	Dead end	2	4	25	[S4]
GO/TMC	Dead end	3.4	~50	19	[S5]
GO/CNT	Dead end	5	5.5	59	[S6]
GO/PECs	Cross flow	5	0.80	43	[S7]
GO	Dead end	1.5	16.9	50.1	[S8]
GO	Forward osmosis	0.28	0.068 (± 0.007)	90	[S9]
GO	Forward osmosis	0.28	0.029 (± 0.005)	90	[S9]
GO/graphene	Forward osmosis	1	0.035	~94	[S10]
GO/graphene	Forward osmosis	5	0.007	97	[S10]
GO	Forward osmosis	5	0.0084	60	[S10]
Graphene	Dead end	1	20	40	[S11]
Graphene/CNT	Dead end	5	11.3	51	[S6]
Graphene/CNT	Cross flow	5	12.1	39.6	[S6]
Graphene	Dead end	5	3.26	42	[S11]
MoS ₂	Dead end	9	33.7 (± 13.5)	82.5 (± 6)	[S12]
MoS ₂	Dead end	9	1.6 (± 0.53)	87.6 (± 5.2)	[S12]
MoS ₂	Dead end	9	6.7 (± 1.35)	77.9 (± 17.4)	[S12]

Supplementary References

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