

Supplementary Information

MOFs-positioned polyamide membrane with fishnet-like structure for elevated nanofiltration performance

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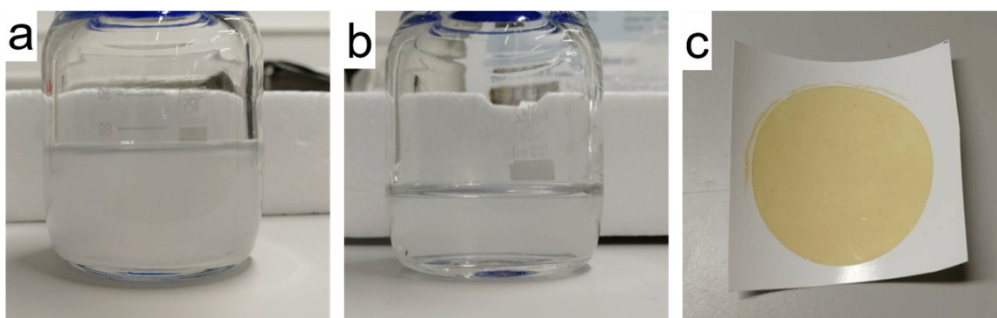


Figure S1 Photo images of UiO-66-NH₂. (a) 0.1 mg mL⁻¹ UiO-66-NH₂ suspension after sonication, (b) Supernatant collected after 72 h static settlement with a calculated concentration of 0.02 mg mL⁻¹. (c) The MOF powder collected via filtration of the residual suspension onto an ultrafiltration membrane.

Table S1 IP reaction parameters corresponding to the assigned membranes.

Membrane	PIP concentration (mg mL ⁻¹)	TMC concentration (mg mL ⁻¹)	IP time (min)	UiO-66-NH ₂ loading mass (μg cm ⁻²)
TFC	2.0	1.5	1.0	0
TFN-AU1 ^a	2.0	1.5	1.0	6.8
TFN-AU2	2.0	1.5	1.0	10.3
TFN-AU3	2.0	1.5	1.0	13.7
TFN-AU4	2.0	1.5	1.0	20.5

^a AU is short for amine-functionalized UiO-66 (UiO-66-NH₂).

Table S2 Comparison of water permeance and mono/divalent salt selectivity of various polyamide-based membranes reported in the literature and this work

Membranes	Water permeance (L m ⁻² h ⁻¹ bar ⁻¹)	Salt selectivity	Testing condition	Ref.
NCM_0.025%-0.05%	30.8	31.5	1.5 g L ⁻¹ , Na ₂ SO ₄ / NaCl solution, 4 bar	This work
TFN-rGO/TiO ₂	6.1	9.9	2 g L ⁻¹ of Na ₂ SO ₄ / NaCl solutions, 10 bar	1
TFN-mZIF2	14.9	13.1	1.0 g L ⁻¹ , Na ₂ SO ₄ / NaCl solution, 4 bar	2
PA-SNW-1/PES	19.3	4.9	1.0 g L ⁻¹ , Na ₂ SO ₄ / NaCl solution, 2.5 bar	3
MWCNT-OH/PA	6.9	27.0	2.0 g L ⁻¹ , Na ₂ SO ₄ / NaCl solution, 6 bar	4
TFC2.0_5	14.5	24.1	1.0 g L ⁻¹ , Na ₂ SO ₄ / NaCl solution, 4 bar	5
NH ₂ -MWCNT/PA	5.0	14.7	2 g L ⁻¹ of Na ₂ SO ₄ / NaCl solutions, 10 bar	6
PA/PD-PES	11.4	10.8	1.0 g L ⁻¹ , Na ₂ SO ₄ / NaCl solution, 2 bar	7
Sericin-TFC	11.9	12.9	0.5 g L ⁻¹ , Na ₂ SO ₄ / NaCl solution, 5 bar	8
NF-2	12.1	9.1	1.0 g L ⁻¹ , Na ₂ SO ₄ / NaCl solution, 6 bar	9
NF4	17.2	27.9	0.5 g L ⁻¹ , Na ₂ SO ₄ / NaCl solution, 5 bar	10

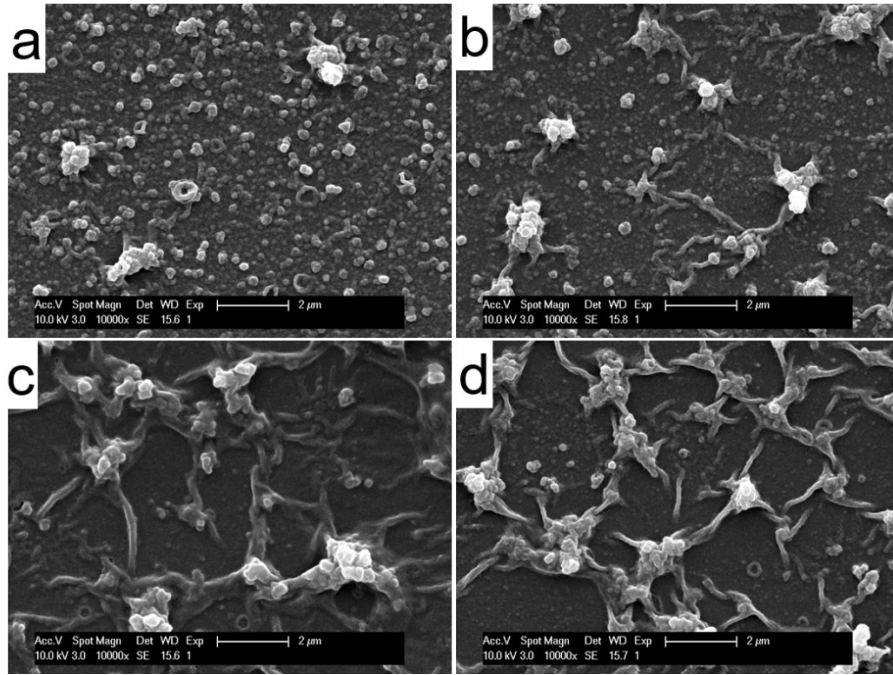


Fig. S2 SEM images of TFN-AU PA membranes containing different loading mass: (a) $6.8 \mu\text{g cm}^{-2}$, (b) $10.3 \mu\text{g cm}^{-2}$, (c) $13.7 \mu\text{g cm}^{-2}$, and (d) $20.5 \mu\text{g cm}^{-2}$.

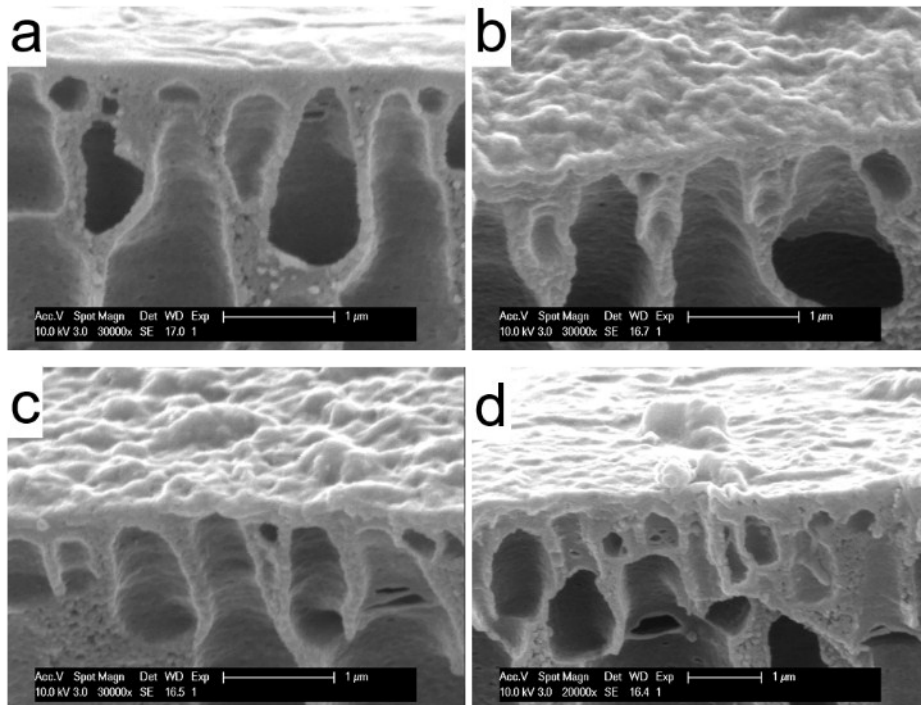


Fig. S3 Cross-sectional images of TFC (a) and TFN (b-d) membranes: (b) TFN-AU1, (c) TFN-AU2, and (d) TFN-AU3.

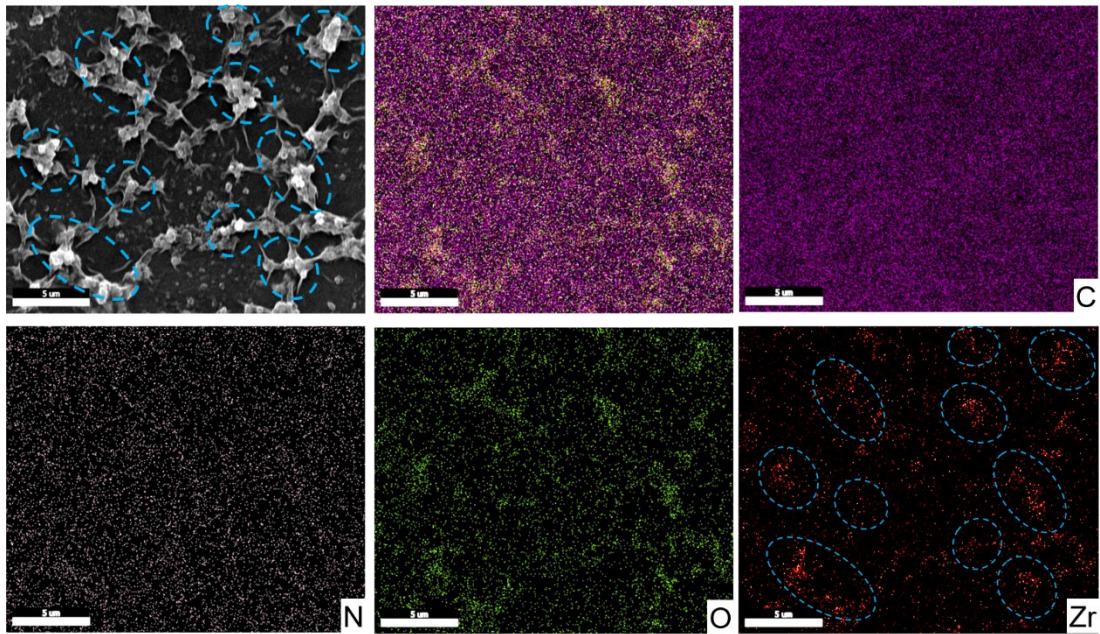


Fig. S4 EDS mapping of TFN-AU4 membranes with C, N, O, and Zr elements.

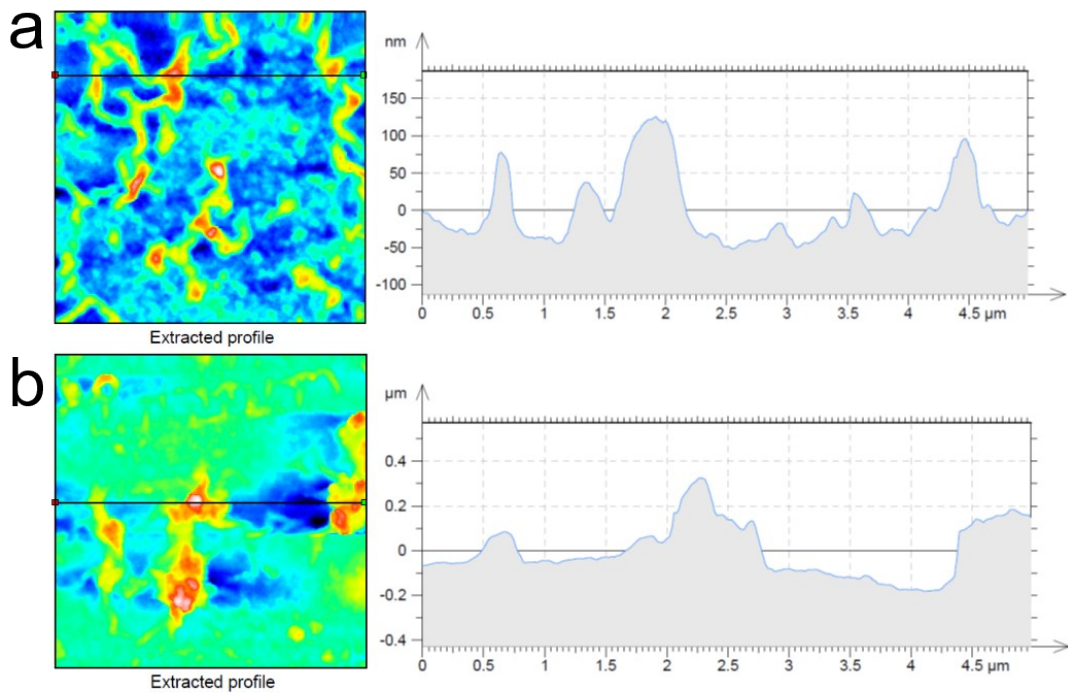


Fig. S5 Line scans taken along the line of AFM images: (a) TFN-AU1 membrane and (b) TFN-AU2 membrane.

References

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