

Supporting Information

High-Flux Ultrafiltration Membranes Combining Artificial Water Channels and Covalent Organic Frameworks

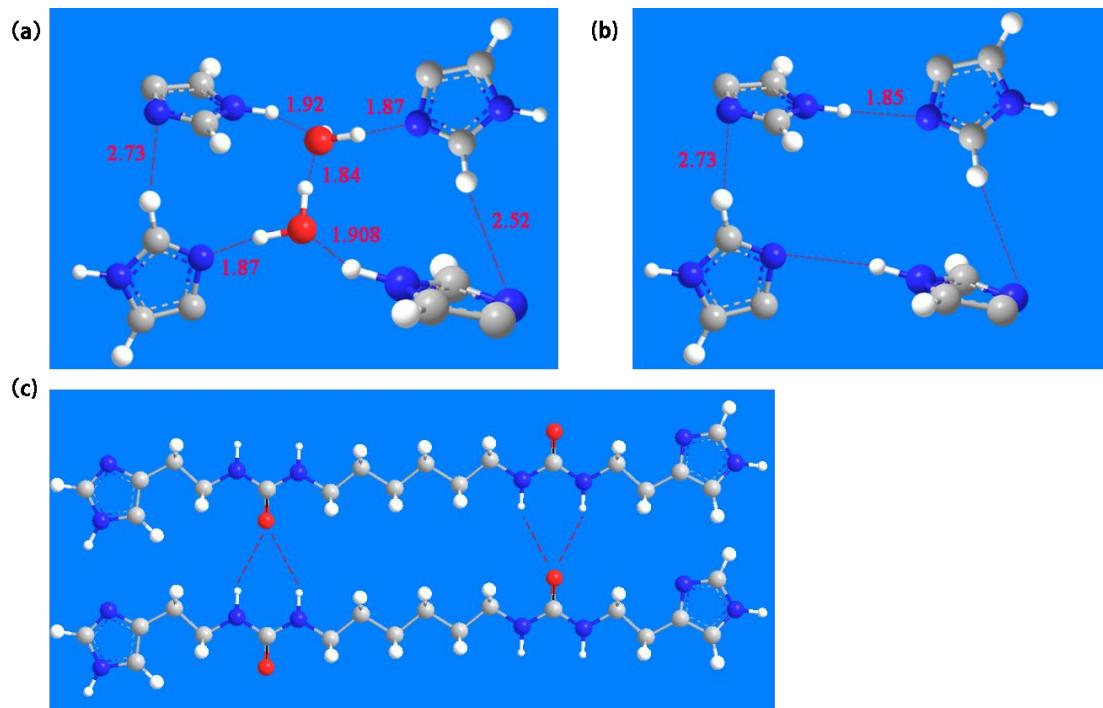


Fig. S1. (a) Water-free I-quartet formation *via* CH···N and NH···N interactions; (b) Water-assisted I-quartet formation *via* CH···N, N···HO, and NH···O-H interactions; (c) HC6H molecules linked via C=O···H (White: H, gray: C, blue: N, red: O, the data is atom distance (Å))

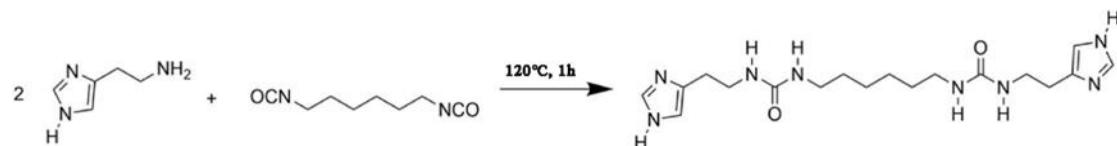


Fig. S2. Synthesis of alkylureido-imidazoles (HC6H) using hexamethylene diisocyanate and histamine

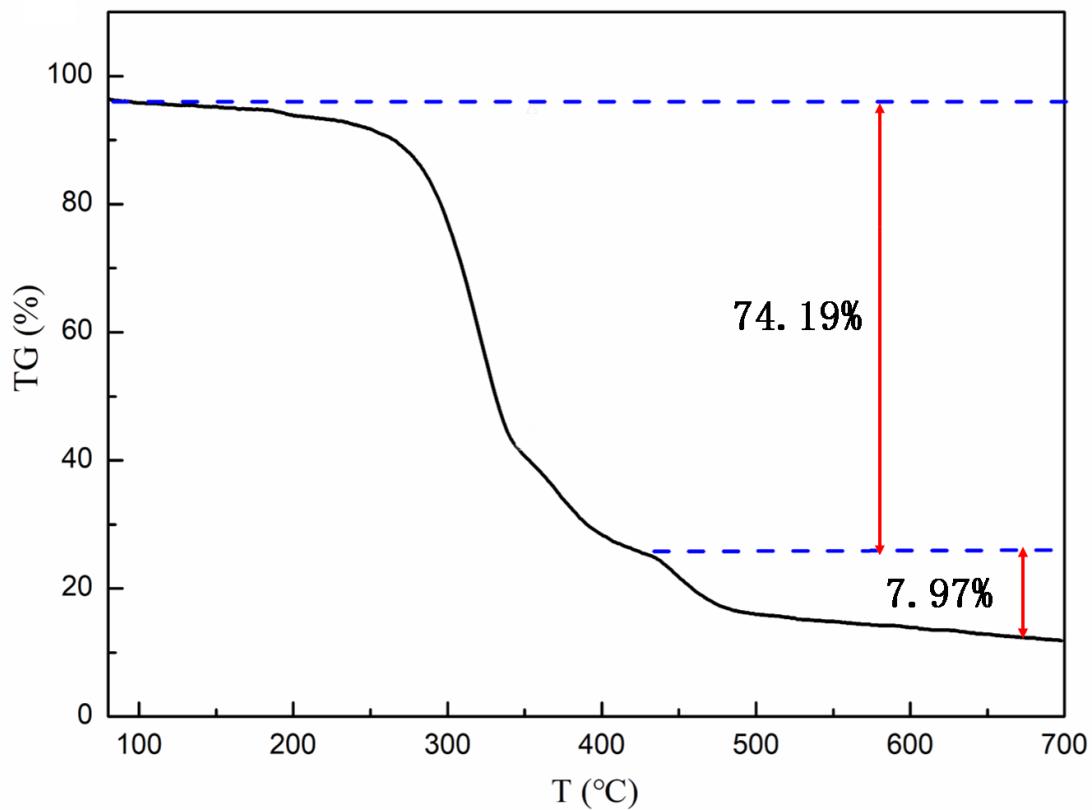


Fig. S3. TGA curves of the synthesized HC6H powders

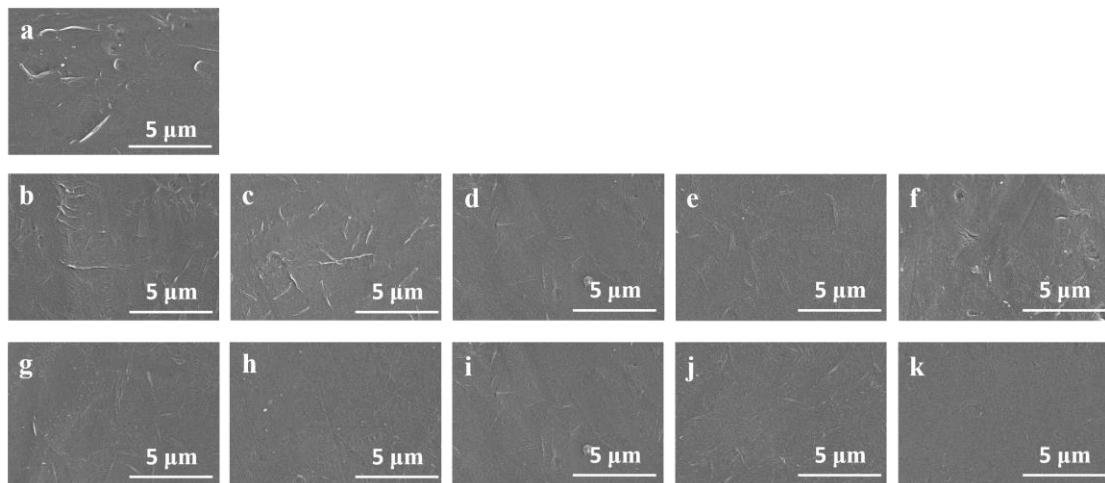


Fig. S4. The SEM images of the upper surfaces of TpPa/HPAN and HC6H-TpPa/HPAN composite matrix membranes prepared at different reaction times and concentrations of HC6H (a: TpPa/HPAN; b: 10 min; c: 15 min; d: 20 min; e: 25 min; f: 30 min; g: 1 mg/mL; h: 1.5 mg/mL; i: 2 mg/mL; j: 2.5 mg/mL; k: 3 mg/mL. The HC6H concentrations for b-f reactions was 2 mg/mL, and the reaction time for g-k reactions was 20 minutes.)

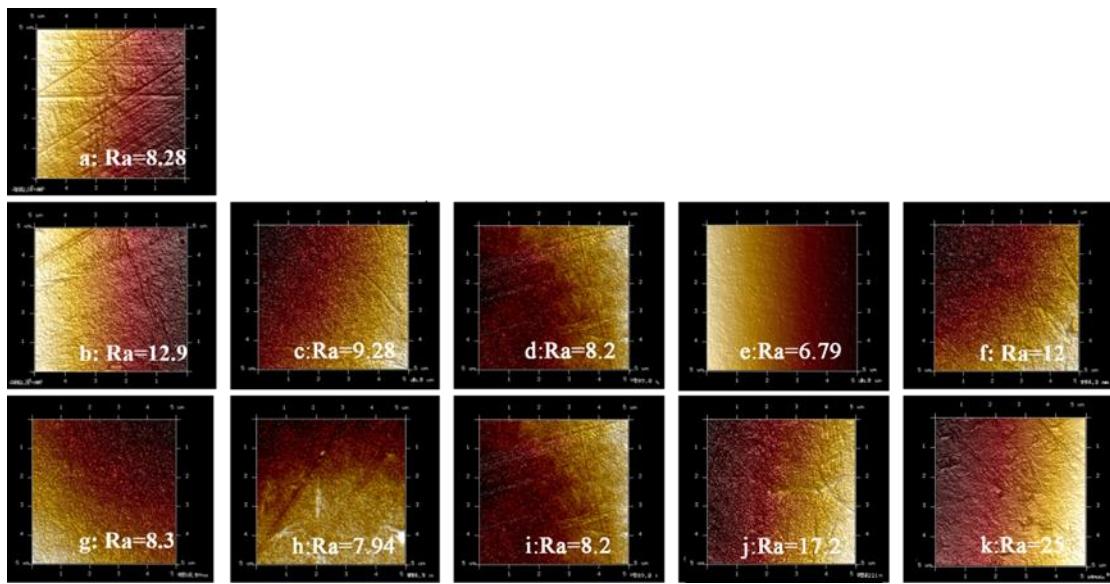


Fig. S5. The AFM images of the upper surfaces of TpPa/HPAN and HC6H-TpPa/HPAN mixed dimensional membranes prepared at different reaction times and concentrations of HC6H (a: TpPa/HPAN; b: 10 min; c: 15 min; d: 20 min; e: 25 min; f: 30 min; g: 1 mg/mL; h: 1.5 mg/mL; i: 2 mg/mL; j: 2.5 mg/mL; k: 3 mg/mL. The HC6H concentrations for b-f reactions was 2 mg/mL, and the reaction time for g-k reactions was 20 minutes.)

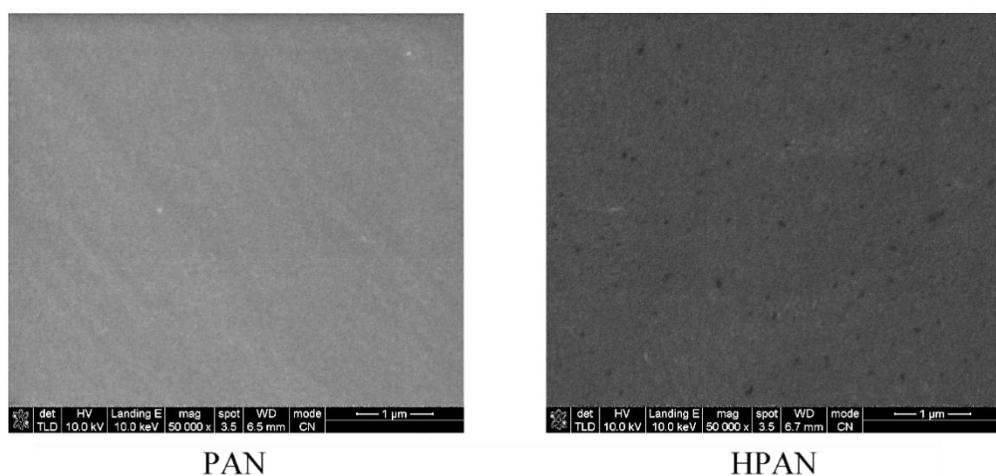


Fig. S6. SEM images of PAN and HPAN membranes.

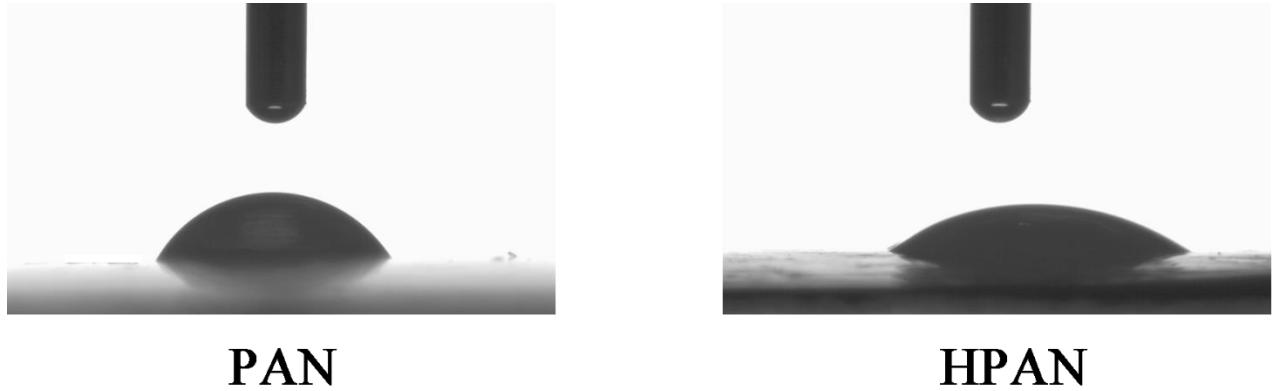


Fig. S7. Water contact angles of the PAN and HPAN membranes

Table S1. The elemental atomic percentage on the membrane surface

	TpPa-HPAN	HC6H-TpPa-HPAN
C 1s	73.2%	72.94%
N 1s	18.33%	20.25%
O 1s	8.48%	6.81%
N/O	2.16	2.97

Table S2. Performance comparison among various membranes towards different dyes rejection

	Dye molecule	Operation pressure(bar)	Flux(L/m ² *h*bar)	Rejection (%)	Reference
CMCNa/PP	Congo red	3	9.9	99.8	1
DEA-Modified PA-TFC	Congo red	5	15.74	99.6	2
PAEK-COOH	Congo red	4	25.225	99.8	3
COFs-Go	Congo red	4	30	99.62	4
2D+1D COFs membrane	Congo red	2	42.8	99.6	5
COFs on polysulfone substrate	Congo red	3	50	99.5	6
COFs-LZU1/PES	Congo red	2	80	99	7
M-TpTD	Congo red	1	120	80	8
PVDF-COFs	Congo red	5	200	99	9
	Rhodamine B			89	
HC6H-TpPa/HPAN composite matrix membranes	Congo red	2	271.76	99.9	This work
	Rhodamine B			96.6	

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