Supplementary Materials for

Robust superhydrophobic dual layer nanofibrous composite membrane with hierarchically structured amorphous polypropylene skin for membrane distillation

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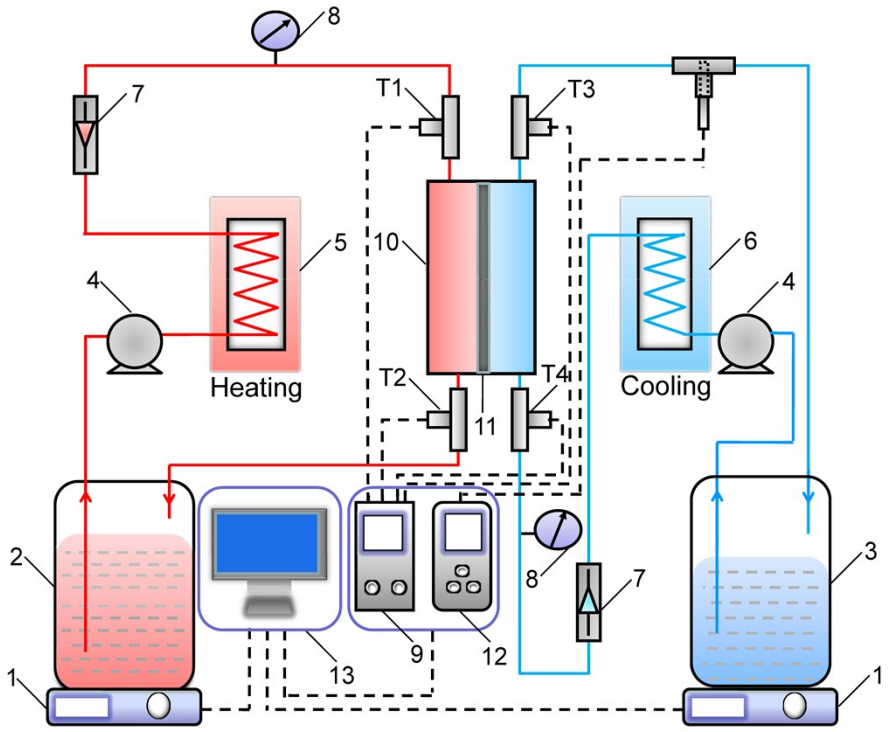

Fig. S1. Schematic diagram of the direct contact MD setup: (1) digital balance; (2) feed solution; (3) permeate tank; (4) diaphragm laboratory pump; (5) heating system; (6) chiller; (7) flowmeter; (8) manometer; (9) thermometer; (T1~T4) temperature probe; (10) membrane cell; (11) membrane; (12) conductivity meters; (13) Data Acquisition Hardware.

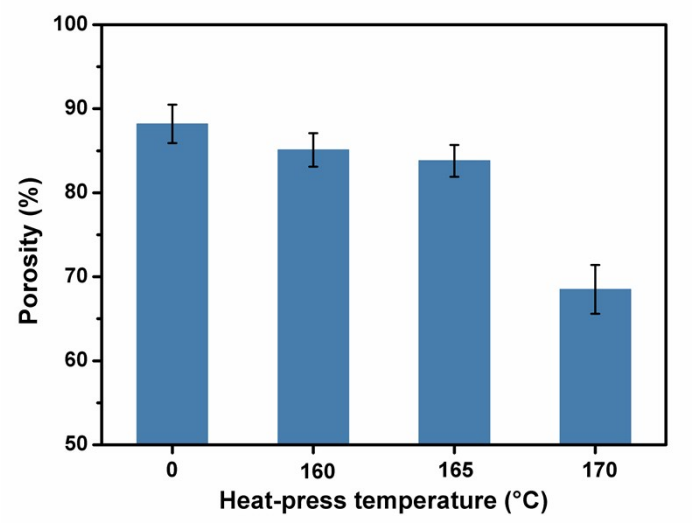

Fig. S2. Porosity of the pristine and post-treated PVDF nanofibrous membranes varied with different heat-press temperatures under the weight pressure of the hot plate (0.01 MPa) for 10 min.

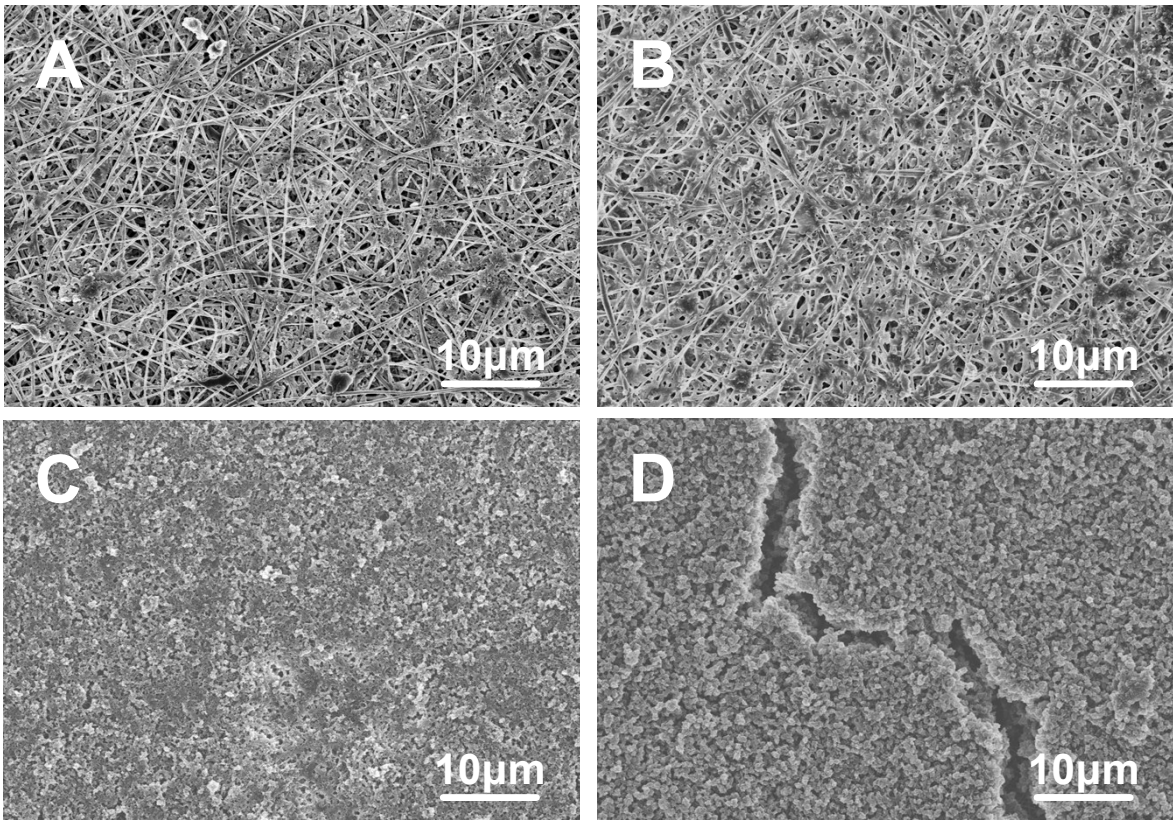

Fig. S3. Low-magnification FE-SEM images of the aPP/PVDF composite membranes (A) aPP/PVDF-90, (B) aPP/PVDF-75, (C) aPP/PVDF-60, and (D) aPP/PVDF-45.

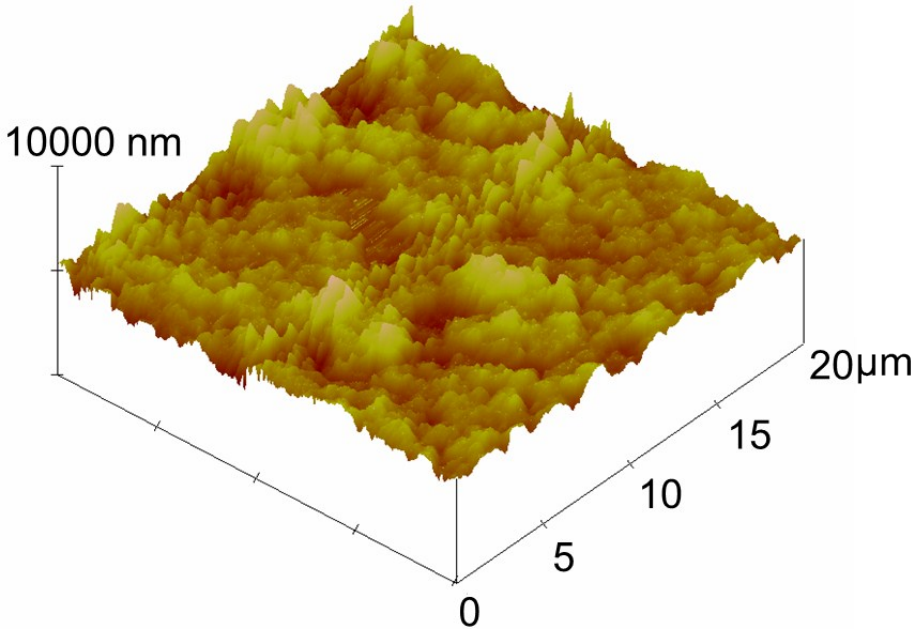

Fig. S4. Surface roughness of the aPP/PVDF-60 composite membrane.

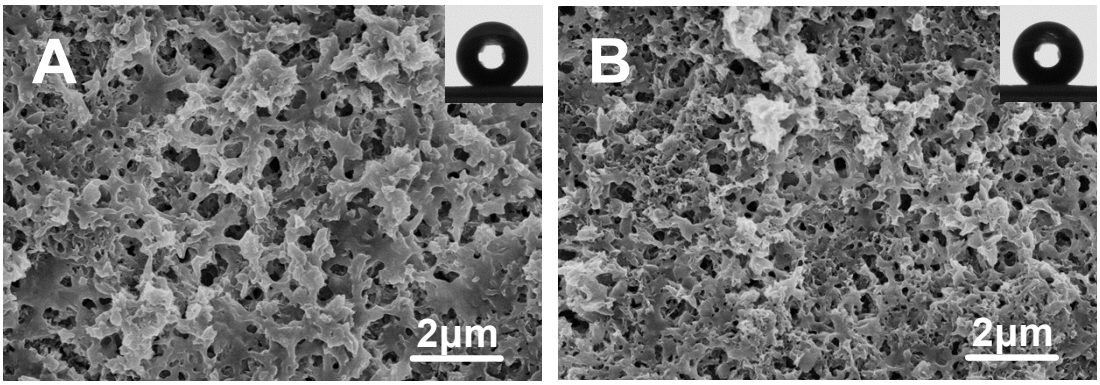

Fig. S5. SEM and WCA images of the superhydrophobic aPP/PVDF-60 composite membrane after immersed in aqueous solution of 1 mol/L HCl (A) and 0.1 mol/L NaOH (B) for 2 h.

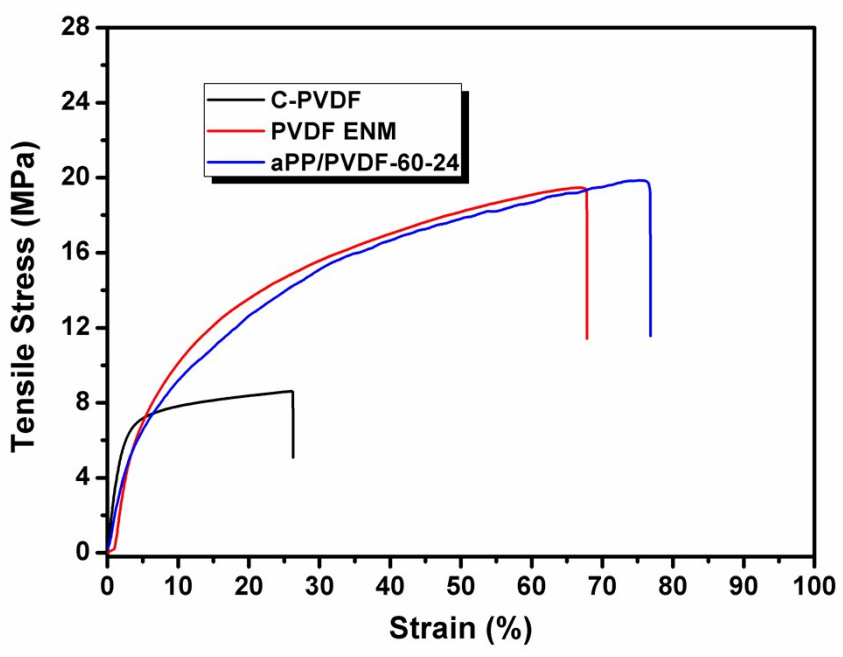

Fig. S6. Tensile stress−strain curves of the PVDF and aPP/PVDF-60-24 membranes and C-PVDF membrane.

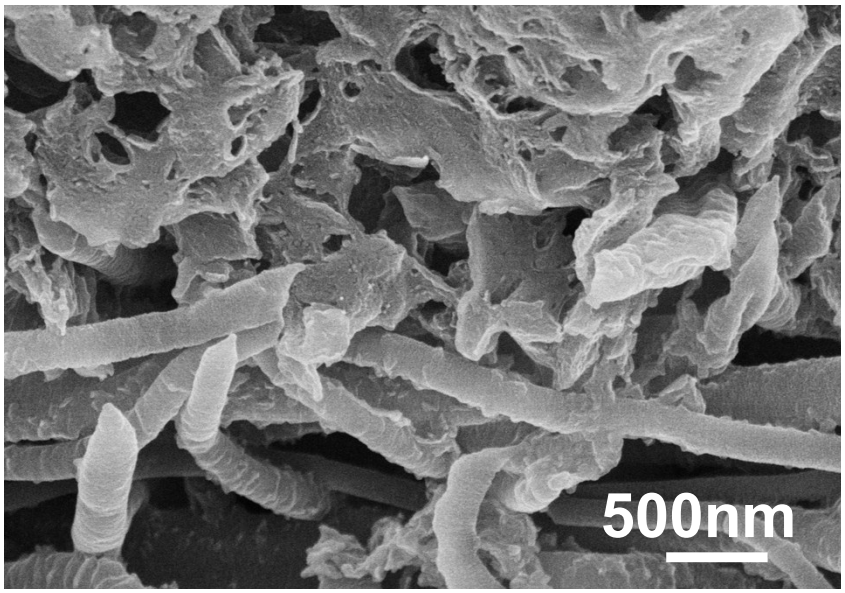

Fig. S7. High-magnification interacting morphology image between aPP skin layer and PVDF nanofibrous support of aPP/PVDF-60-24 after thermal-cold cycling treatment.

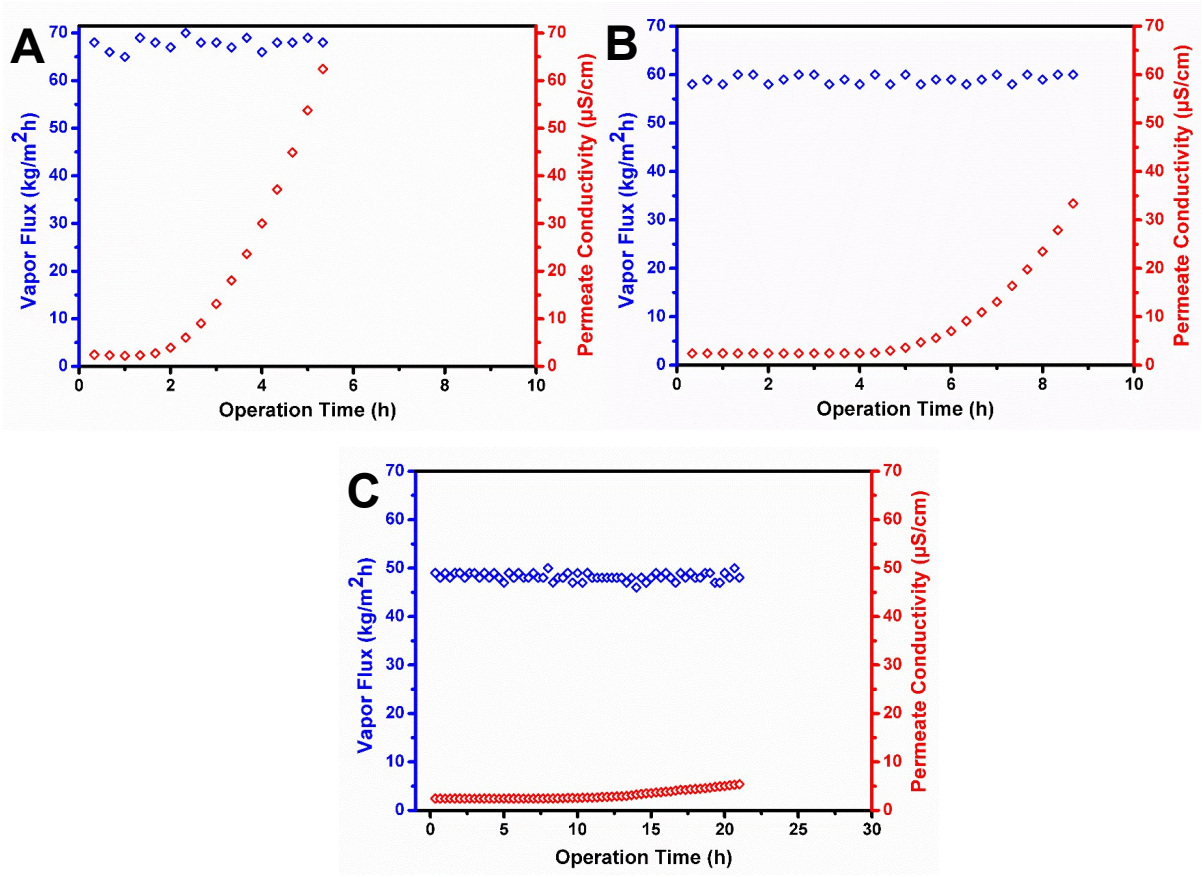

Fig. S8. Continuous DCMD test of (A) PVDF ENM, (B) aPP/PVDF-75-24, and (C) aPP/PVDF-45-24 membrane (3.5 wt% NaCl solution as feed; ΔT = 40 ℃; flow rate at feed and permeate side = 0.6 L/min).

Table S1 Structural properties of the aPP/PVDF-75-24, aPP/PVDF-60-24, and aPP/PVDF-45-24 membranes.

Membranes	Pore size range (μm)	MFP size (μm)	Porosity (%)	LEPw (bar)
aPP/PVDF-75-24	0.51-2.59	0.55	80.8 ± 1.8	1.10 ± 0.15
aPP/PVDF-60-24	0.28-1.38	0.46	79.7 ± 1.3	2.10 ± 0.15
aPP/PVDF-45-24	0.31-2.46	0.43	77.9 ± 2.3	1.35 ± 0.20