F-SiO_2 Eables PLA-based Superhydrophobic Nanofiber Membrane with Highly Efficient Membrane Distillation

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Information S1. Materials

Dioxane (DX) was offered by Sinopharm Chemical Reagent Co Ltd (Shanghai, China). Polylactic acid (PLA) (4032D) was offered by NatureWorks (US). N-methyl pyrrolidone (NMP) was purchased from Tianjin Beichen Fangzheng Chemical Reagent Factory (Tianjin, China). Poly-dimethylsiloxane (PDMS) and its curing agent were supplied by Dow Corning Co., Ltd (US). Tetrahydrofuran (THF), silane (FTOS), silicon dioxide (25 mm), n-octane, tetraethyl orthosilicate (TEOS), trichloro (1H,1H,2H,2H-tridecafluoro-n-octyl) and trimethoxy (1H, 1H, 2H, 2H-heptadecafluorodecyl) silane were all obtained from Aladdin Biochemical Technology Co., Ltd (Shanghai, China).

Information S2. Calculation of membrane distillation flux performance.

$$L = \Delta V / (A \times \Delta t)$$ * MERGEFORMAT (1.1)

where L represents the flux ($L\,m^{-2}\,h^{-1}$) and ΔV, A and Δt represent the distillate volume variation over a predetermined time, the effective area of the composite membrane (m^2) and filtration time (h), respectively. The A is 11.63 cm^2. The cross-flow velocity on the membrane surface was 10 mL/min, and the downstream freshwater temperature was controlled at 10± 2°C by the low-temperature thermostat.

Information S3. Calculation of the salt rejection of the membrane.

$$R = (1 - \frac{C_P}{C_f}) \times 100\%$$ * MERGEFORMAT (1.2)

where C_f (g L^{-1}) and C_p (g L^{-1}) represent the conductivity of the feed solution and permeate water, respectively.

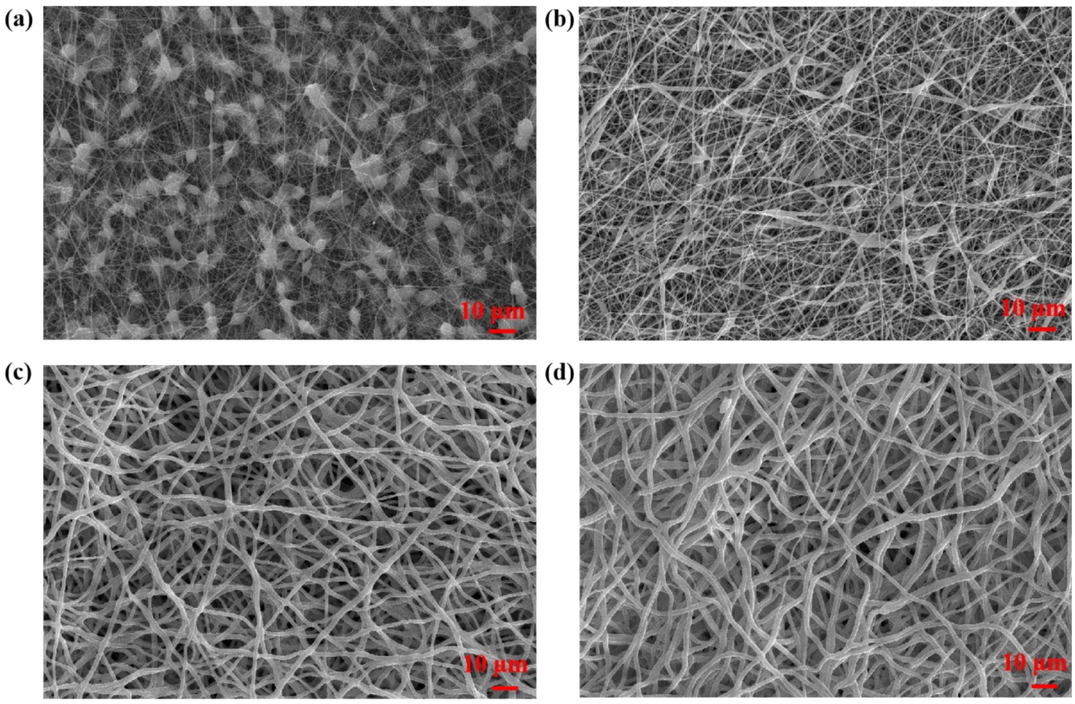

Fig. S1. Membrane surface morphology of desalination membranes with different concentrations of PLA: (a) 10%; (b) 12%; (c) 15%; (d) 17%.

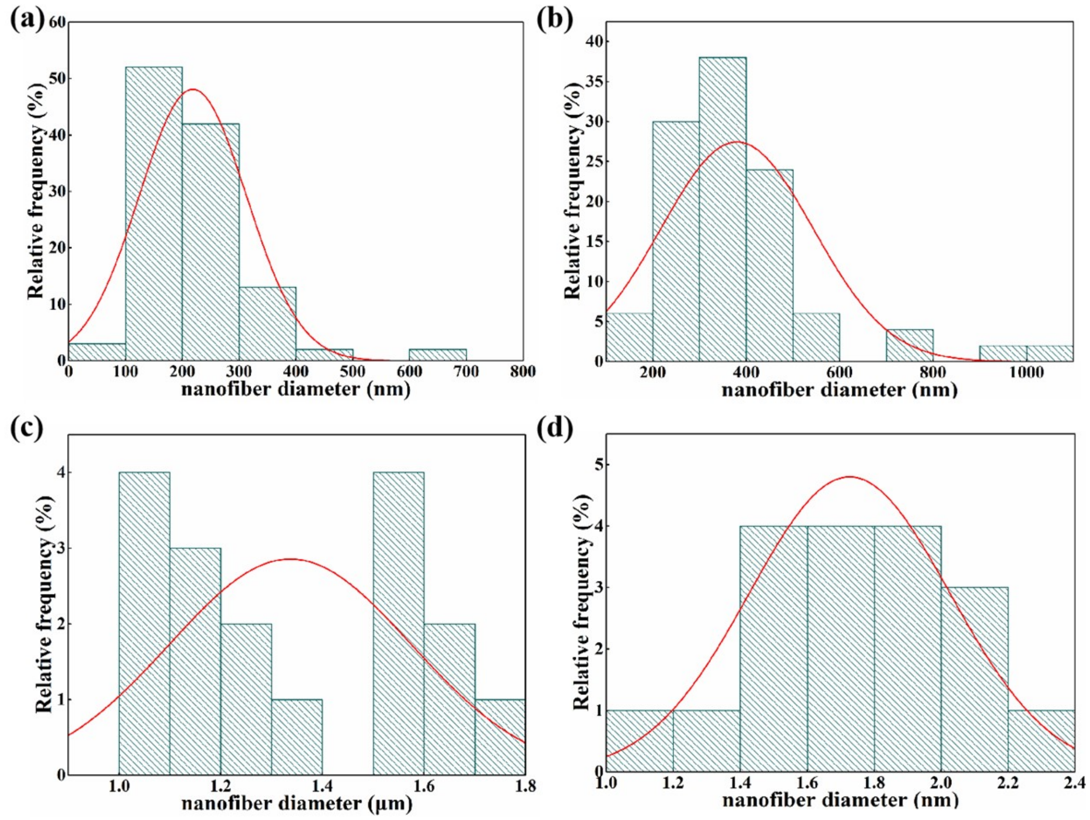

Fig. S2. Nanofibre diameters of desalination membranes with different concentrations of PLA: (a) 10%; (b) 12%; (c) 15%; (d) 17%.

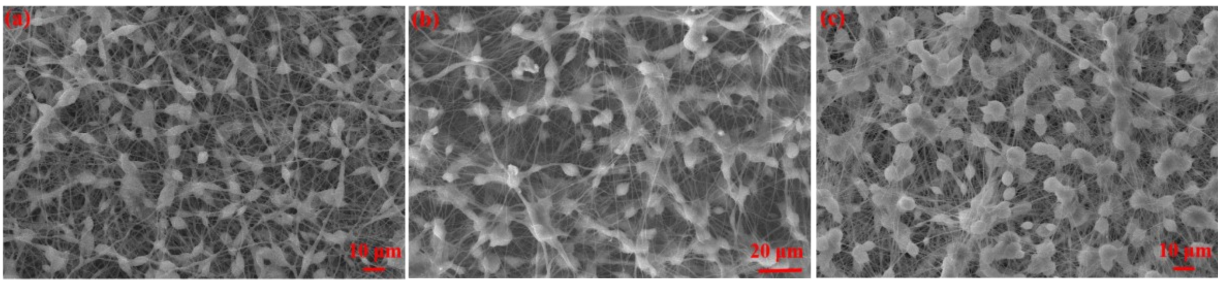

Fig. S3. Membrane surface morphology of desalination membranes with different concentrations of PDMS: (a) 8%; (b) 10%; (c) 12%.

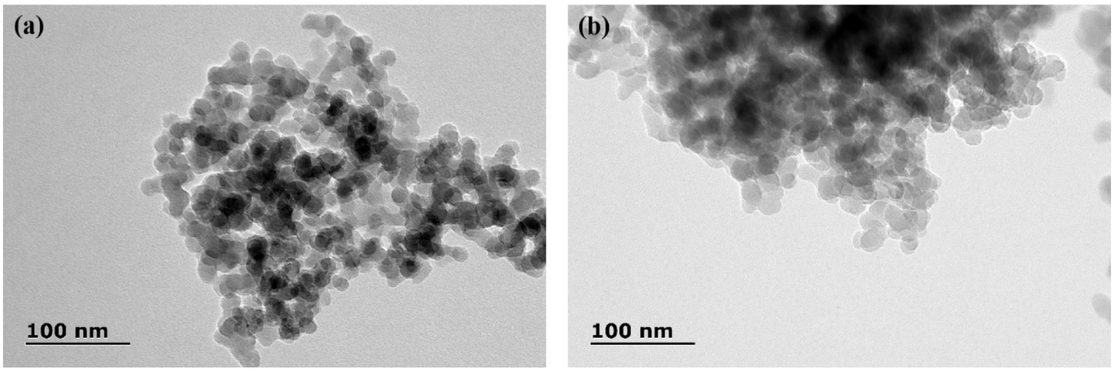

Fig. S4. TEM images of (a) SiO_2, (2)F-SiO_2.

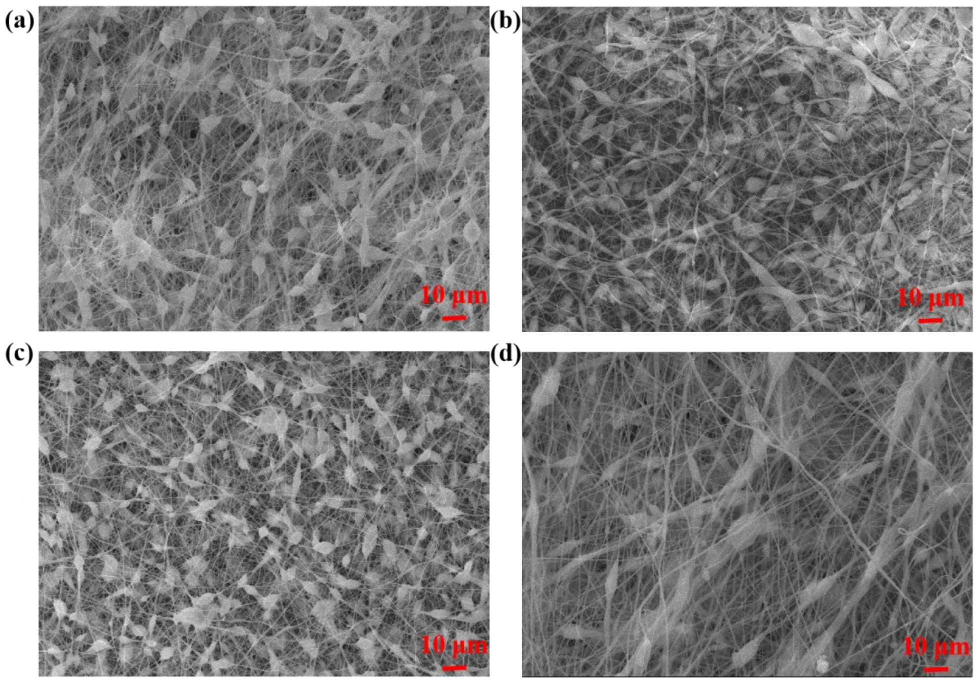

Fig. S5. Membrane surface morphology of desalination membranes with different concentrations of F-SiO_2 nanoparticles: (a) 0.05%; (b) 0.1%; (c) 0.2%; (d) 0.5%.

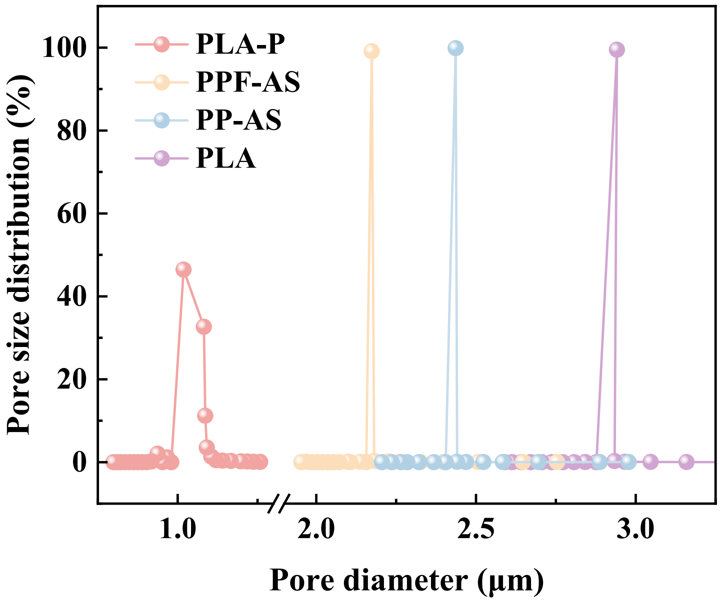

Fig. S6. Pore size distributions of PLA, PLA-P, PP-AS and PPF-AS membranes.

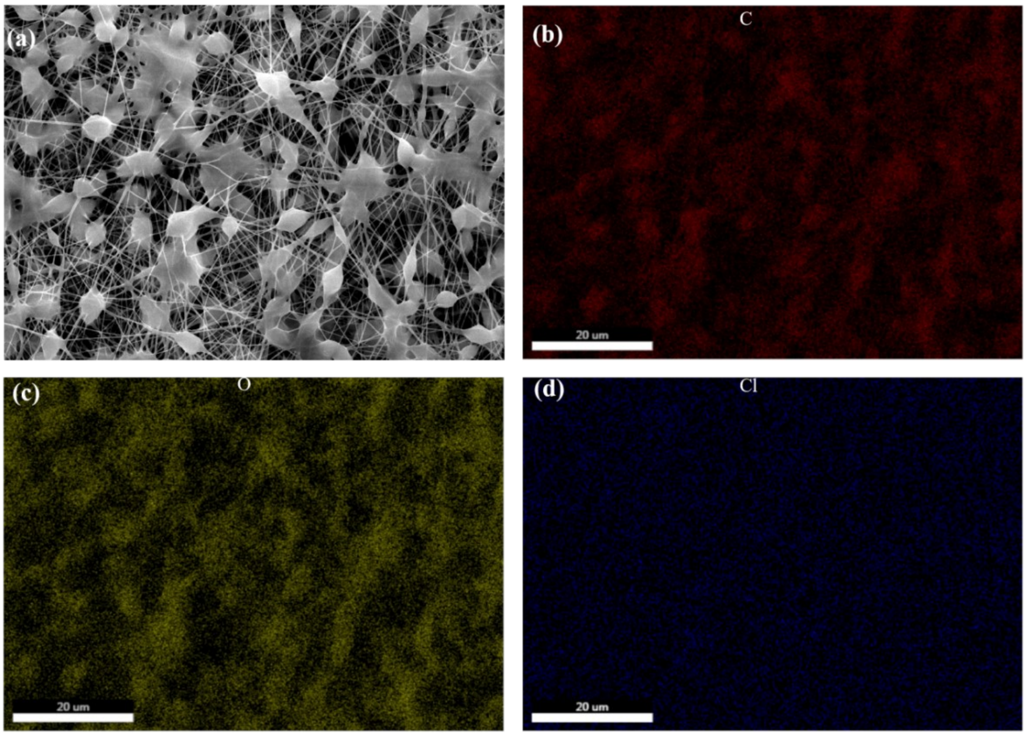

Fig. S7. EDS images of the PPF-AS membrane: (a) Range of distribution, (b) C element, (c) O element, (d) Cl element.