Electronic Supplementary Material (ESI) for Journal of Materials Chemistry A.

Supporting Information

Novel Janus Membrane with Unprecedented Osmosis Transport Performance

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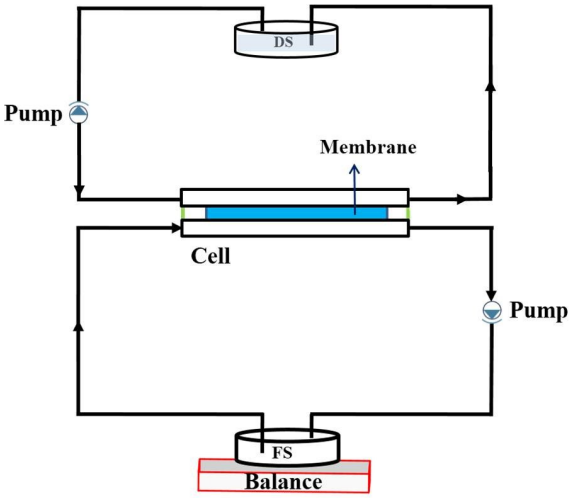

Figure S1. Schematic diagram of FO system

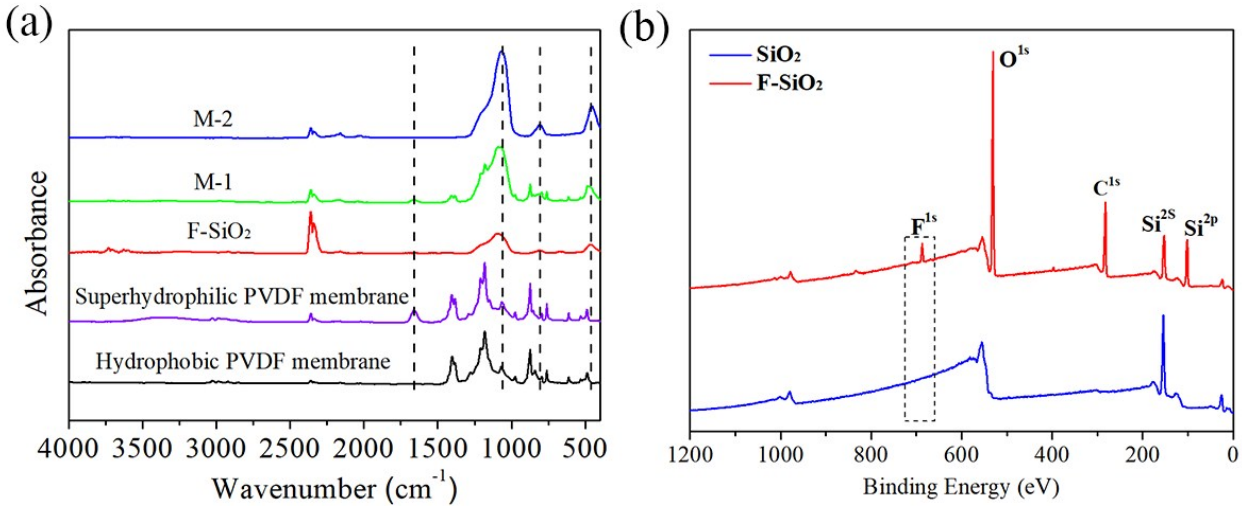

Figure S2. (a) FI-IR characterization of the pristine PVFD membrane, superhydrophilic PVDF membrane, Janus membrane M1, M2 with excess F-SiO_2 coating and F-SiO_2, respectively. (b) XPS characterization for pristine SiO_2 and F-SiO_2.

Figure S2 (a) gives the FT-IR spectrum of the membrane. The absorbance of characteristic peaks at 462

cm^{-1} and 806 cm^{-1} are attributed to Si-O stretching vibrations while distinct characteristic peak appeared at 1065 cm^{-1} belongs to stretching vibrations of Si-O-Si. The characteristic peaks at 1663 cm^{-1} are attributed to C=O existed in NVP. Figure S2b shows XPS characterization of pristine SiO_2 and F-SiO_2. An obvious peak at 686 eV is attributed to F^{1s}, which prove the successful grafting of FOTS onto the surface of SiO_2 nanoparticles.

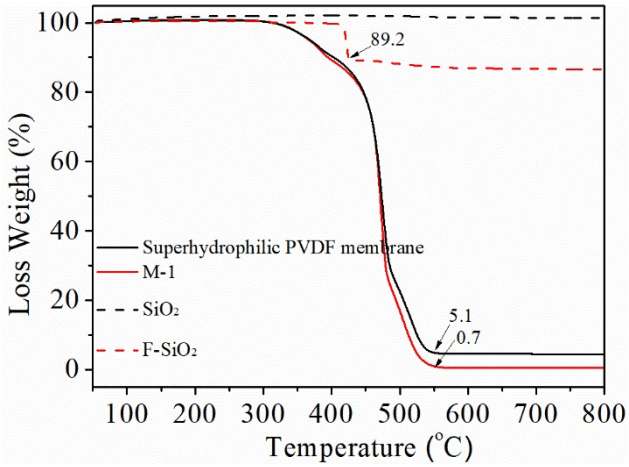

Figure S3. TGA curves for calculating the loading of F-SiO_2 on superhydrophilic PVDF membrane surface

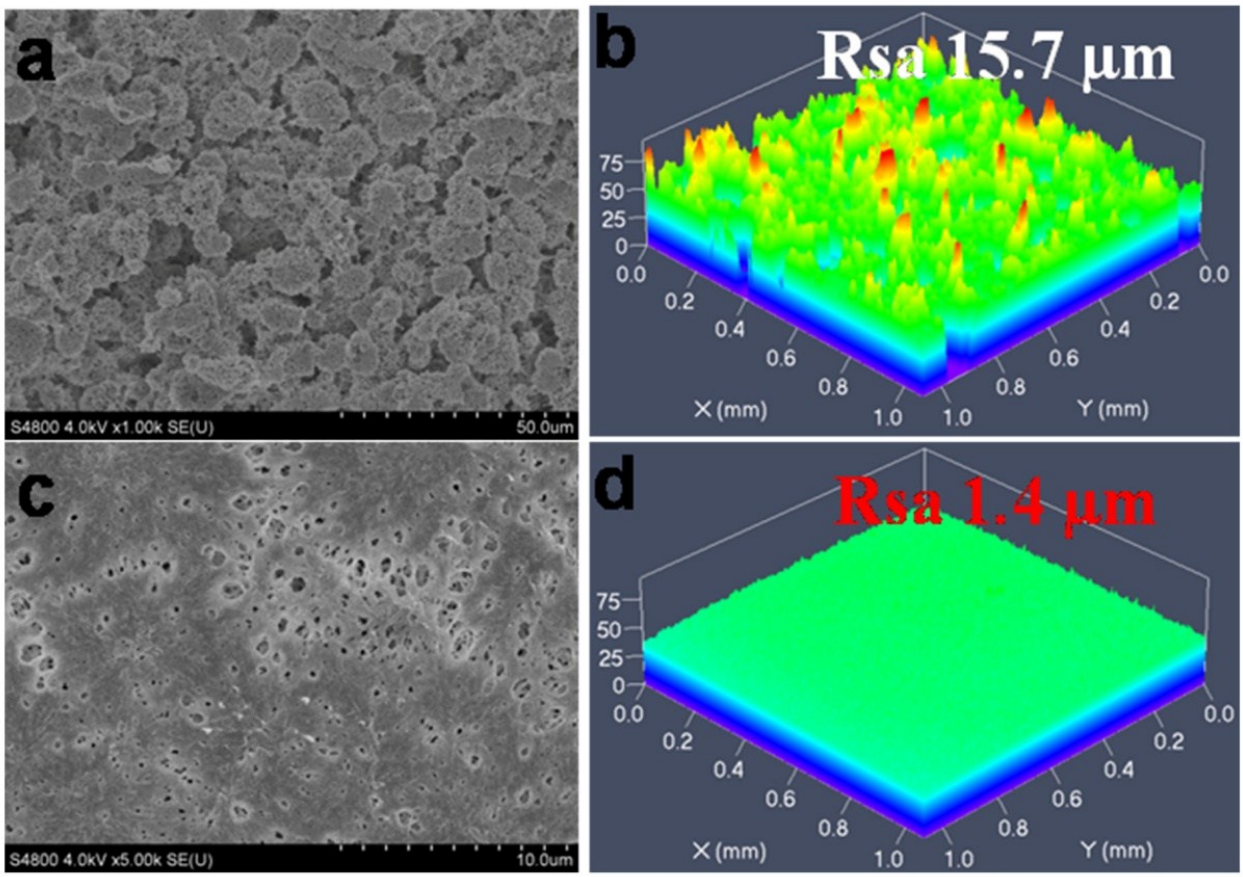

Figure S4. (a, b) Micro-structure and roughness of Janus-A side; (c, d) The micro-structure and roughness of Janus-B side

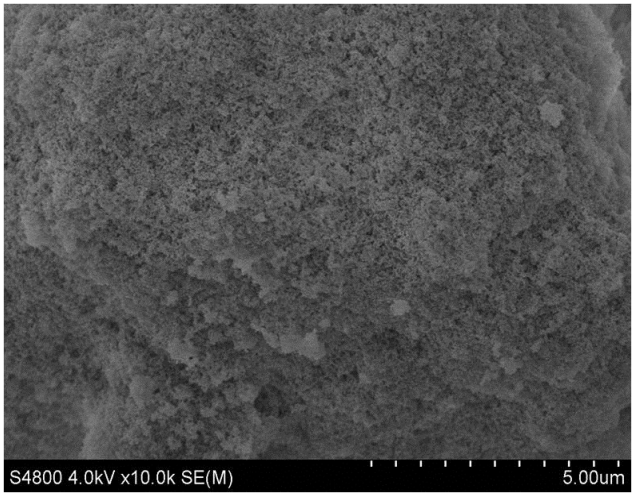

Figure S5. SEM image of Janus M-2 membrane with 2% F-SiO_2 loading

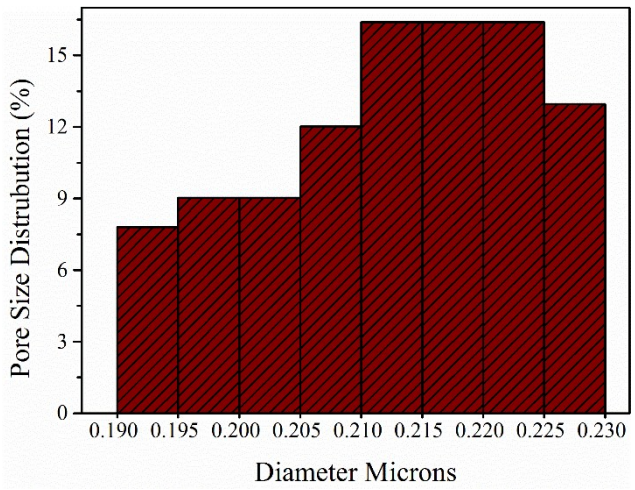

Figure S6. Pore size distribution of our Janus membrane.

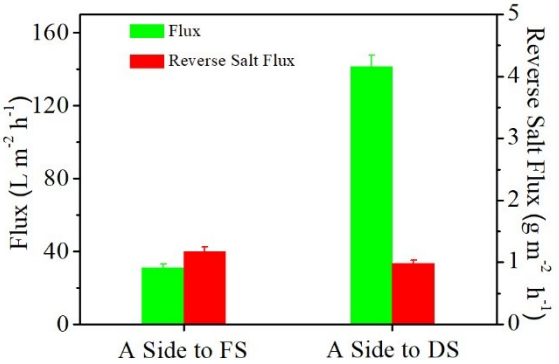

Figure S7. Water flux and reserve salt flux with superhydrophobic A side facing to FS (FO mode) and DS (PRO mode) respectively.

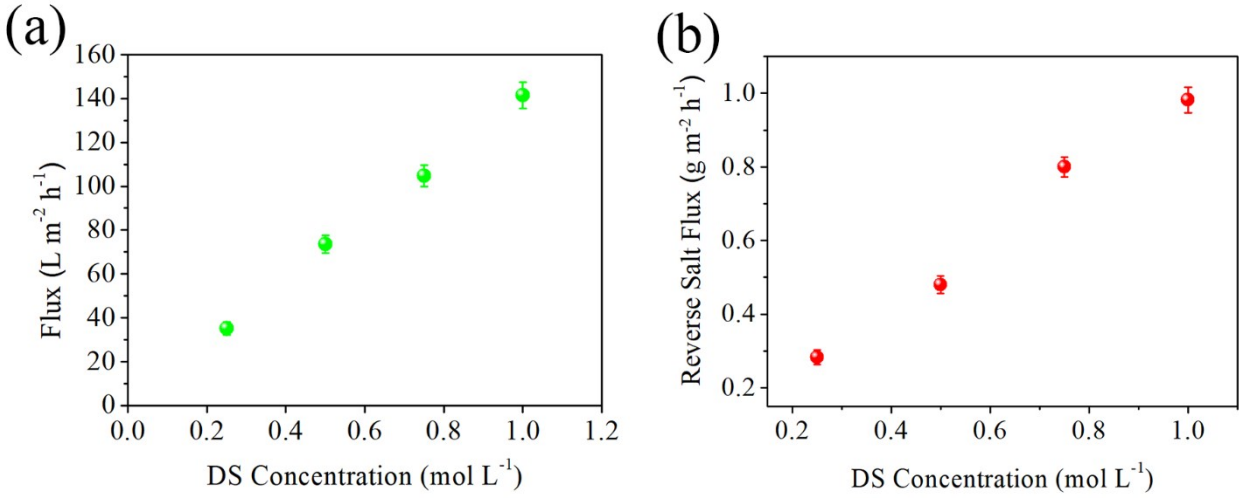

Figure S8. Water flux and reserve salt flux as a function of draw solution concentration

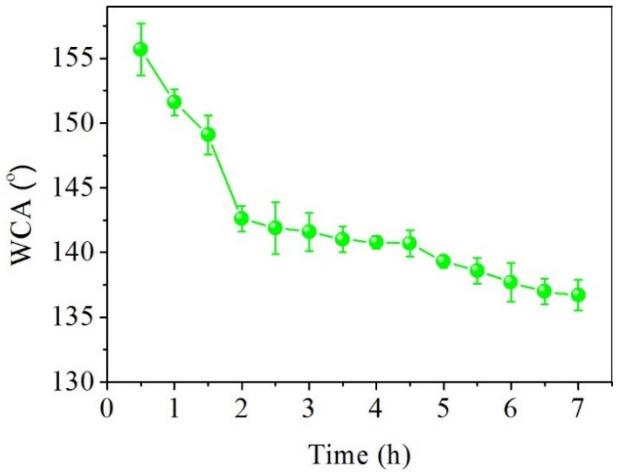

Figure S9. WCA as a function of time

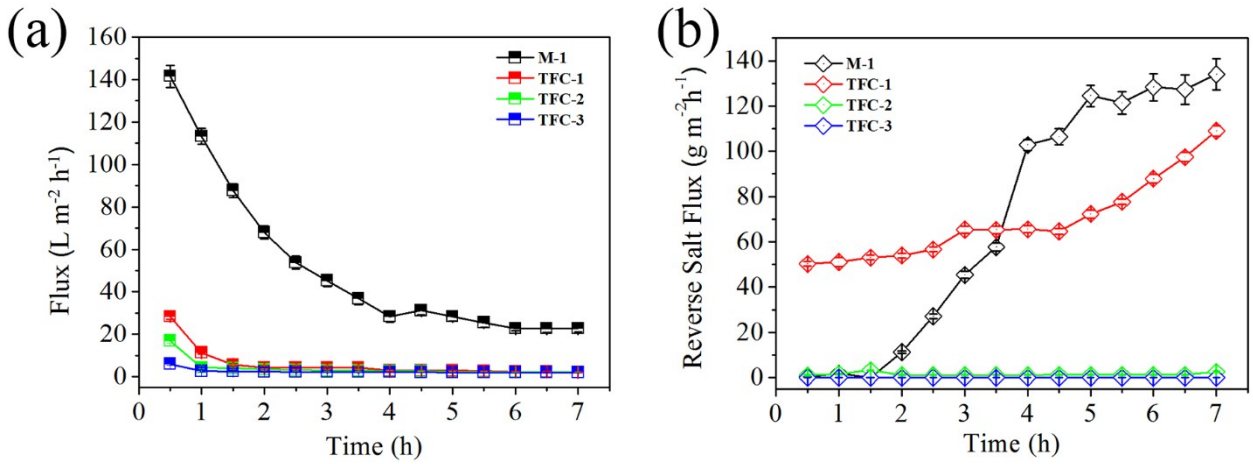

Figure S10. Water flux and reserve salt flux change as a function of time.

Table S1. The structure of three different membranes M-1, M-2, M-3.

Membrane	A Side	B Side	Thickness (μm)
M-1	F-SiO_2	Superhydrophilic PVDF	220
M-2	Excess F-SiO_2	superhydrophobic PVDF	220
M-3	F-SiO_2	Superhydrophilic PVDF	220