Supporting Information

Nanocomposite Membranes via the Codeposition of Polydopamine/ Polyethylenimine with Silica Nanoparticles for Enhanced Mechanical Strength and High Water Permeability

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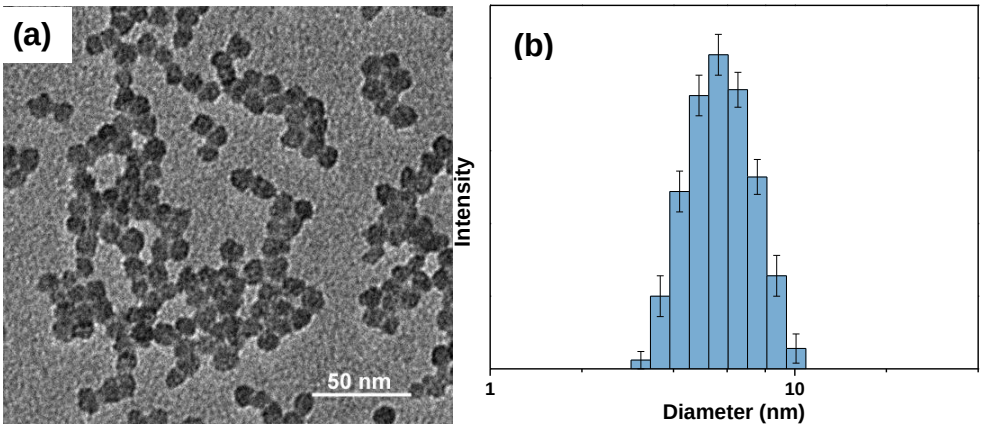
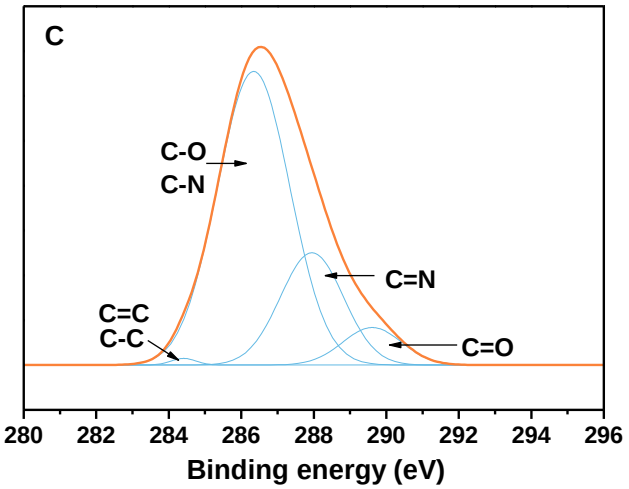
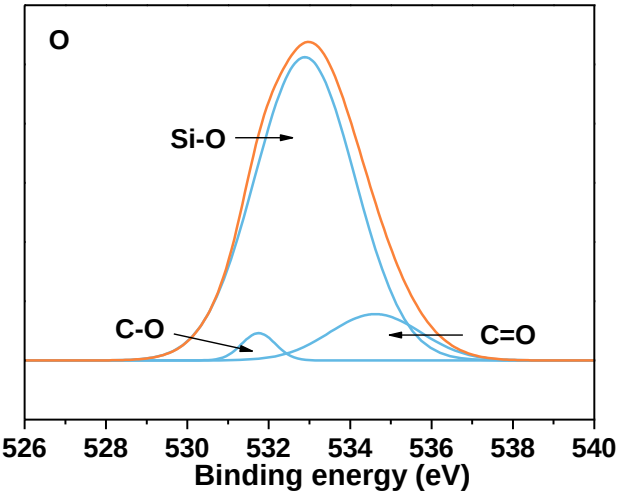


Figure S1. (a) TEM image and (b) size distribution of the synthesized SiO_2 NPs.





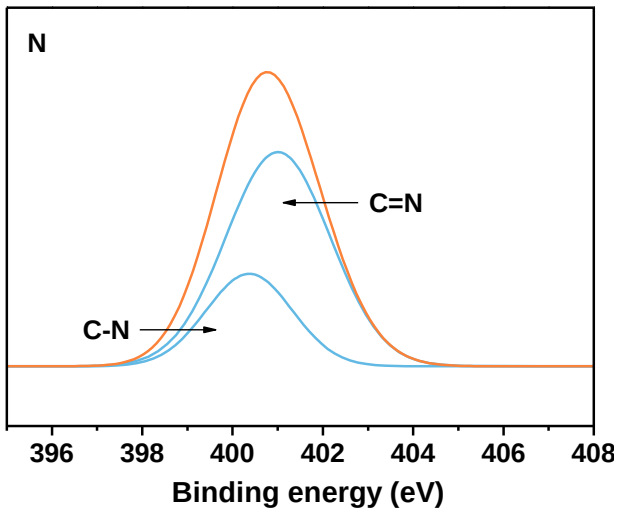


Figure S2. High-resolution XPS spectra of C 1s, O 1s, and N 1s region of the TFC NFMs containing SiO_2 NPs.

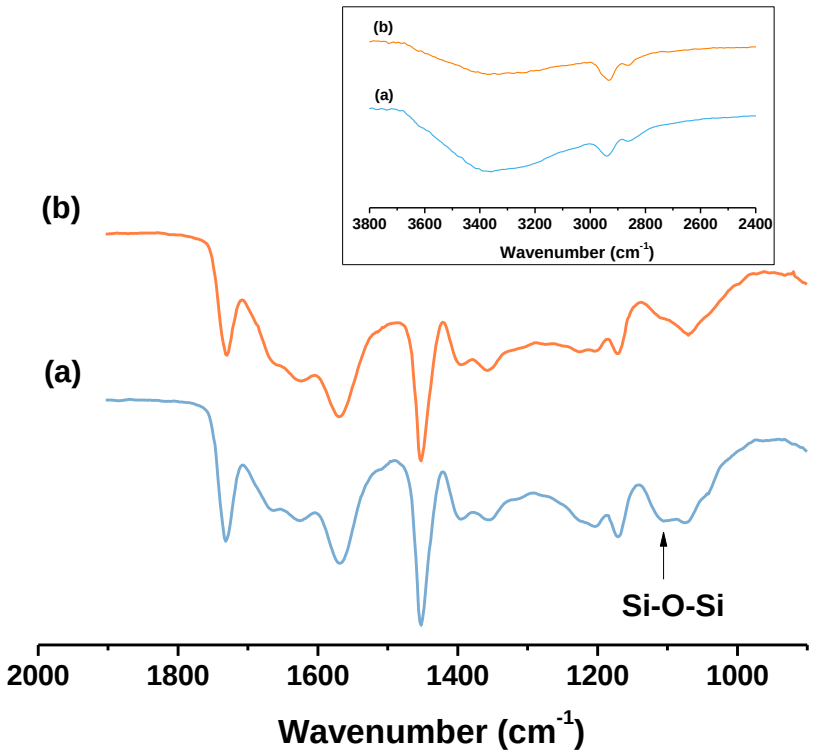


Figure S3. FT-IR/ATR spectra of TFC NFMs with (a) and without (b) SiO_2 NPs.

Table S1 Chemical composition on the surface of the prepared membranes containing SiO_2 NPs at different fabrication steps from XPS spectra (in atomic percent).

Fabrication steps	C 1s (%)	O 1s (%)	N 1s (%)	Si 2p (%)
Co-deposition	60.98	22.32	13.30	3.40
Crosslinking	61.07	23.41	12.36	3.16
Grafting	61.84	19.26	15.98	2.92

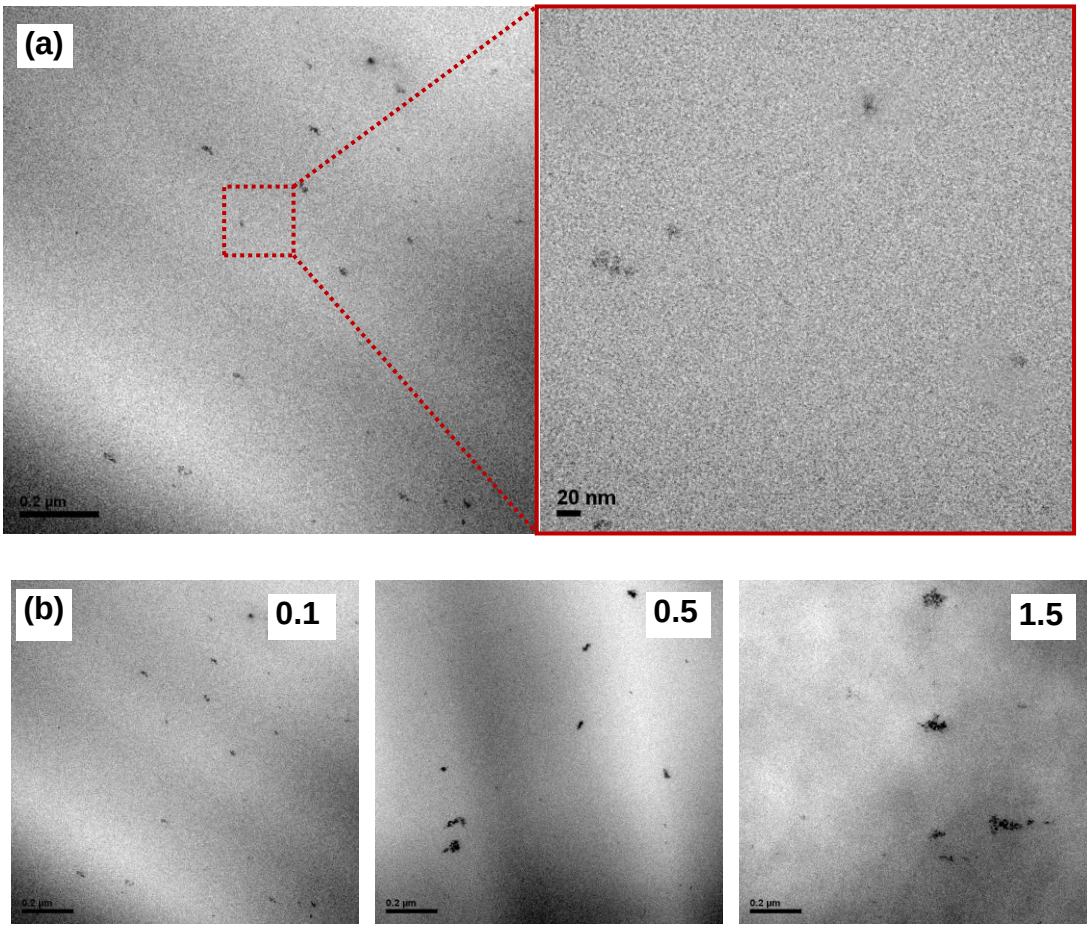


Figure S4. (a) TEM images from the cross-section of the TFN NFMs with separated SiO_2 NPs in the selective layer and (b) TEM images of the selective layer with different SiO_2 NP concentrations (mg/mL).

Table S2. The statistical mean thickness of the selective layer with different deposition times from SEM images (50000×, SiO_2 NPs concentration is 0.5 mg/mL).

Time (h)	Thickness (μm)
0	0.055 ± 0.010
1	0.242 ± 0.037
2	0.393 ± 0.078
3	0.470 ± 0.019
4	0.494 ± 0.009
5	0.553 ± 0.076
6	0.681 ± 0.045

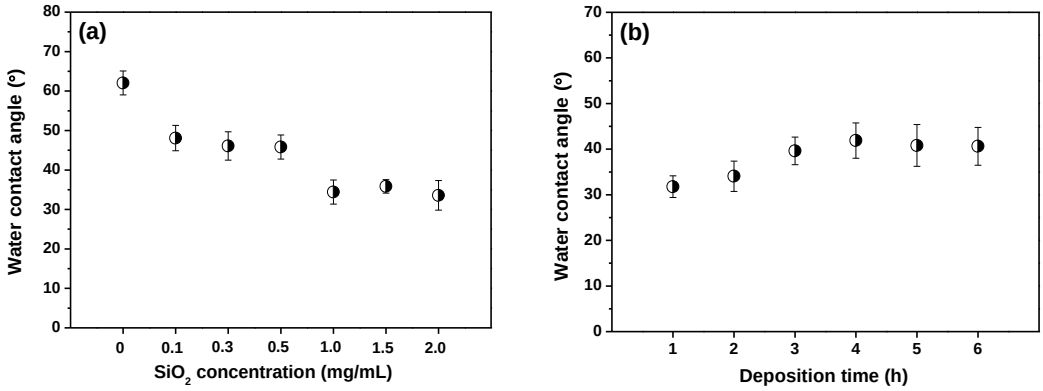


Figure S5. Water contact angles of the TFN NFMs prepared with (a) different SiO_2 NP concentrations and (b) different deposition times.

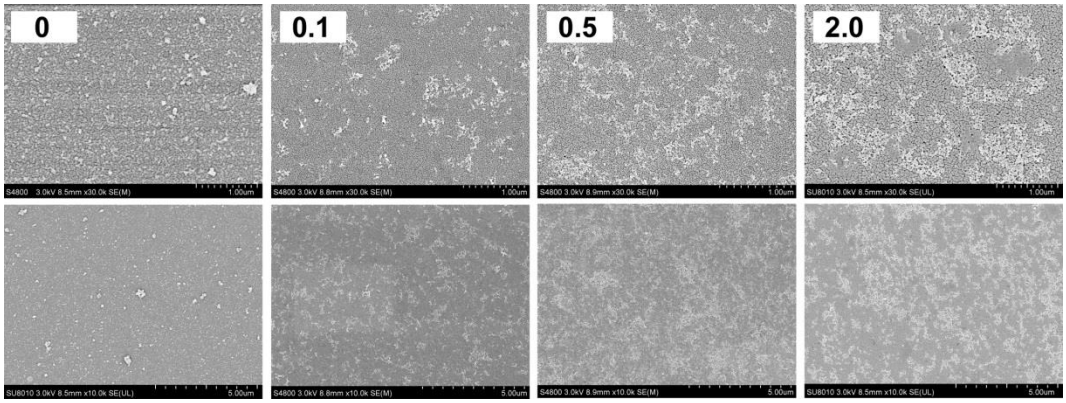


Figure S6. SEM images from the surfaces of the TFC NFMs with different SiO_2 NP concentrations (mg/mL). (deposition time is 4 h)

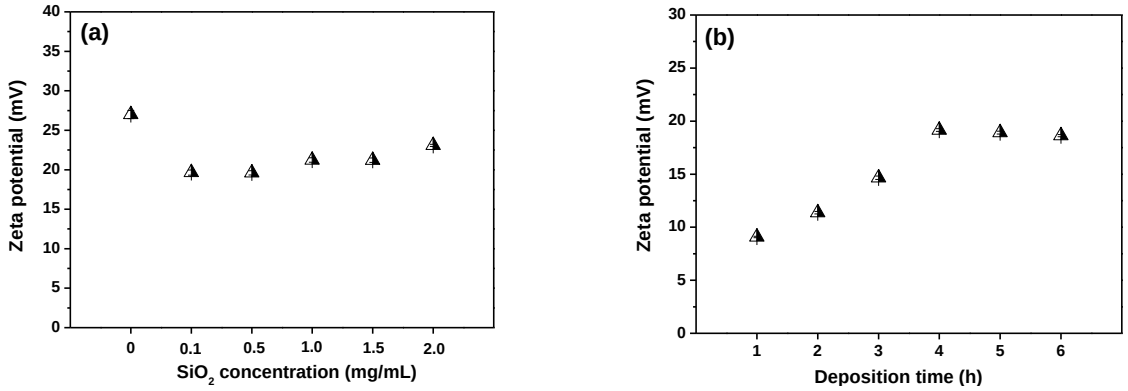


Figure S7. ξ-potentials at pH 6.0 for the TFN NFMs surfaces with (a) different SiO_2 NP concentrations and (b) different deposition times.

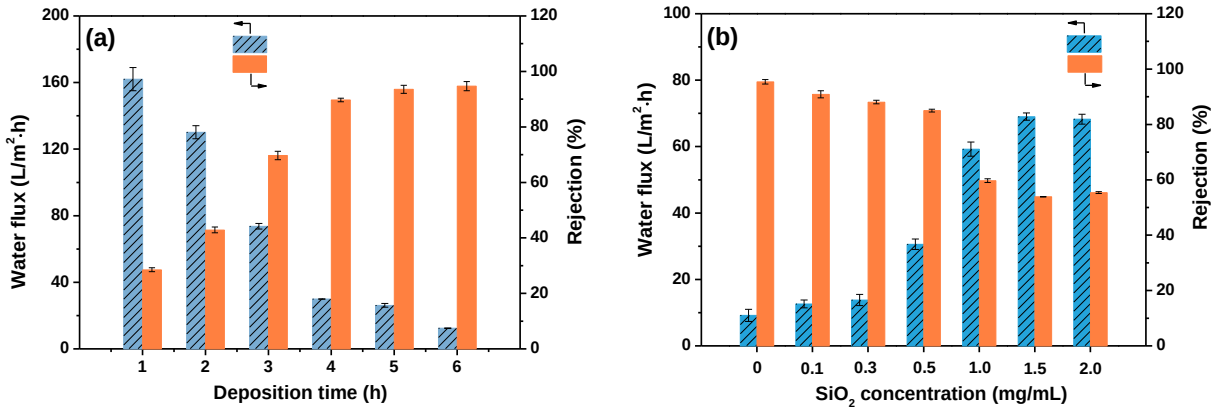


Figure S8. (a) Effects of the deposition time and (b) the concentration of SiO_2 NPs on the nanofiltration performances of the TFN NFMs. Test conditions: $MgCl_2$ concentration = 1000 mg/L, 30 °C, pH = 6, 0.6 MPa, cross-flow rate = 30 L/h.

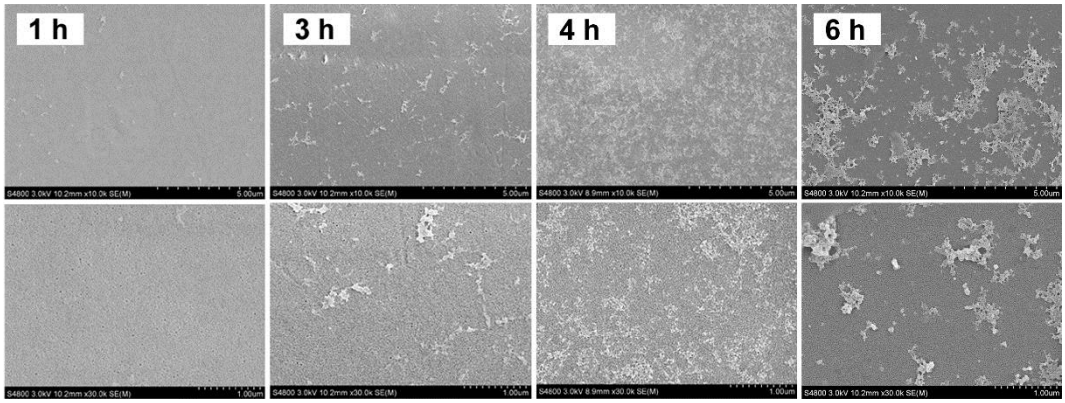


Figure S9. SEM images from the surfaces of the TFN NFMs with different deposition times. (SiO_2 NP concentration is 0.5 mg/mL).

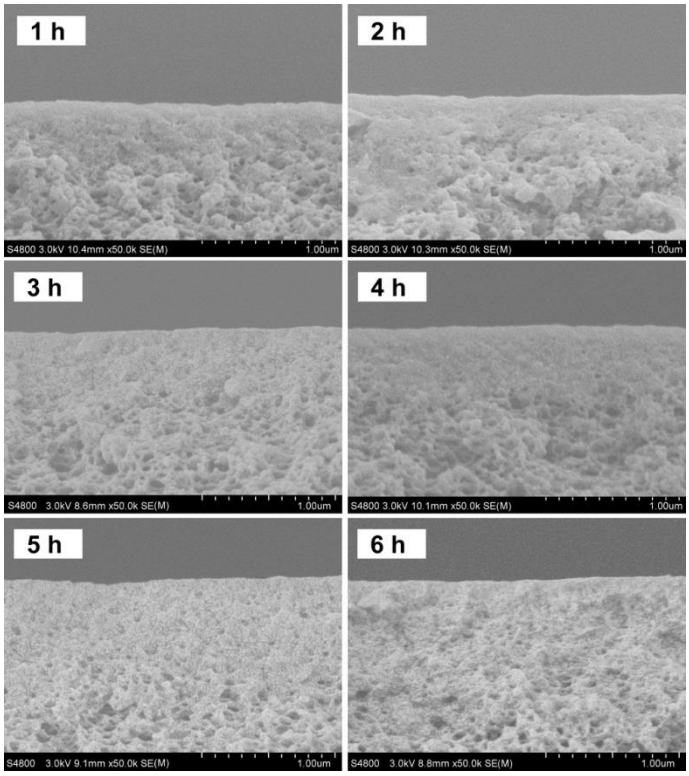


Figure S10. SEM images from the cross-section of the TFN NFMs with different deposition times (SiO_2 NP concentration is 0.5 mg/mL).