ADVANCED MATERIALS INTERFACES

Supporting Information

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Aminoclay-Graphene Oxide Composite for Thin-Film Composite Reverse Osmosis Membranes with Unprecedented Water Flux and Fouling Resistance

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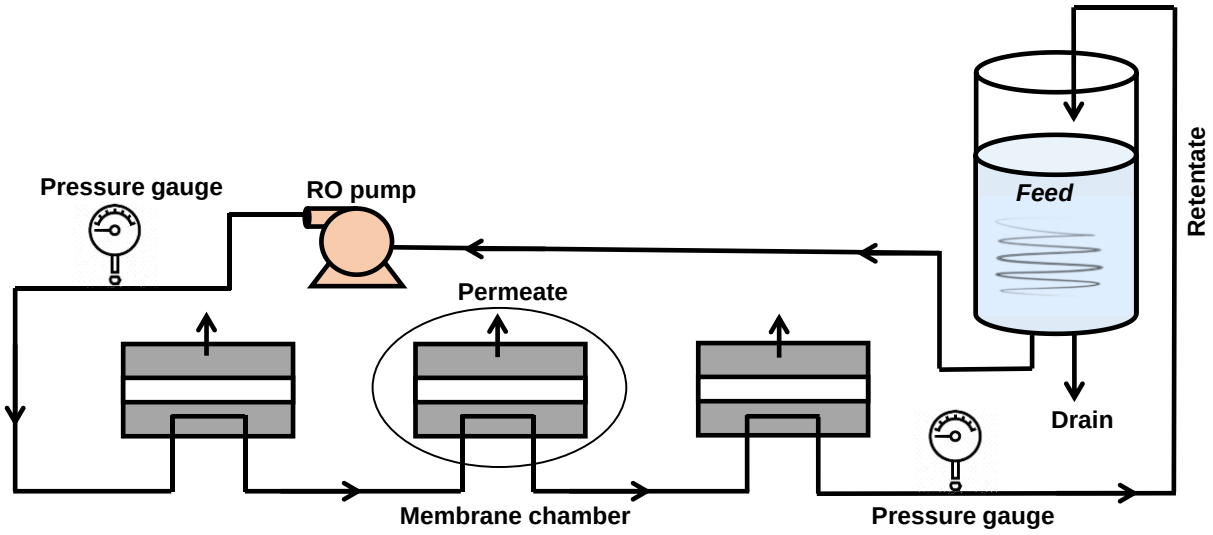

Figure S1. Experimental set-up of the RO skid.

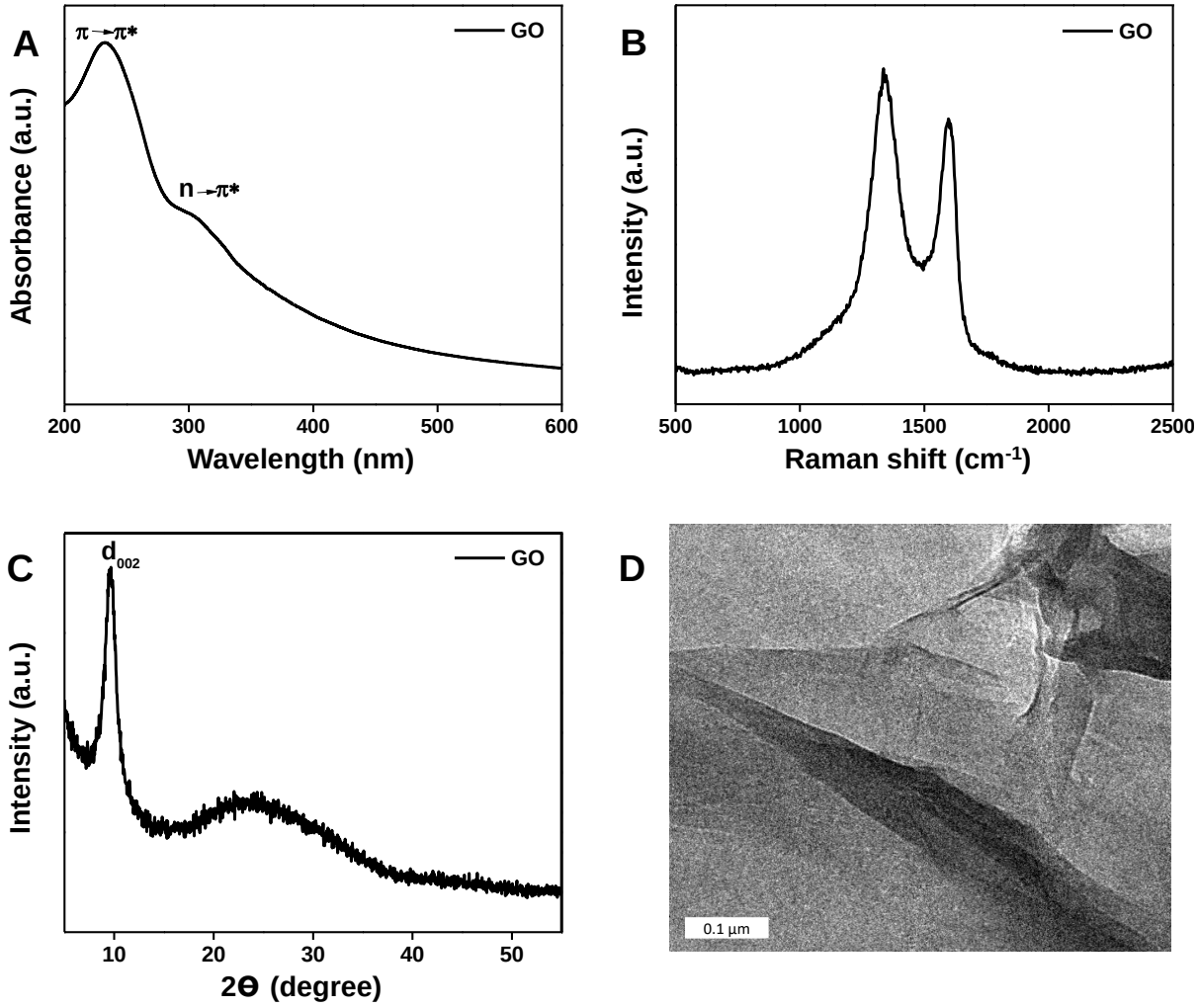

Figure S2. A) UV-Vis spectrum, B) Raman spectrum, C) XRD pattern, and D) TEM image of GO.

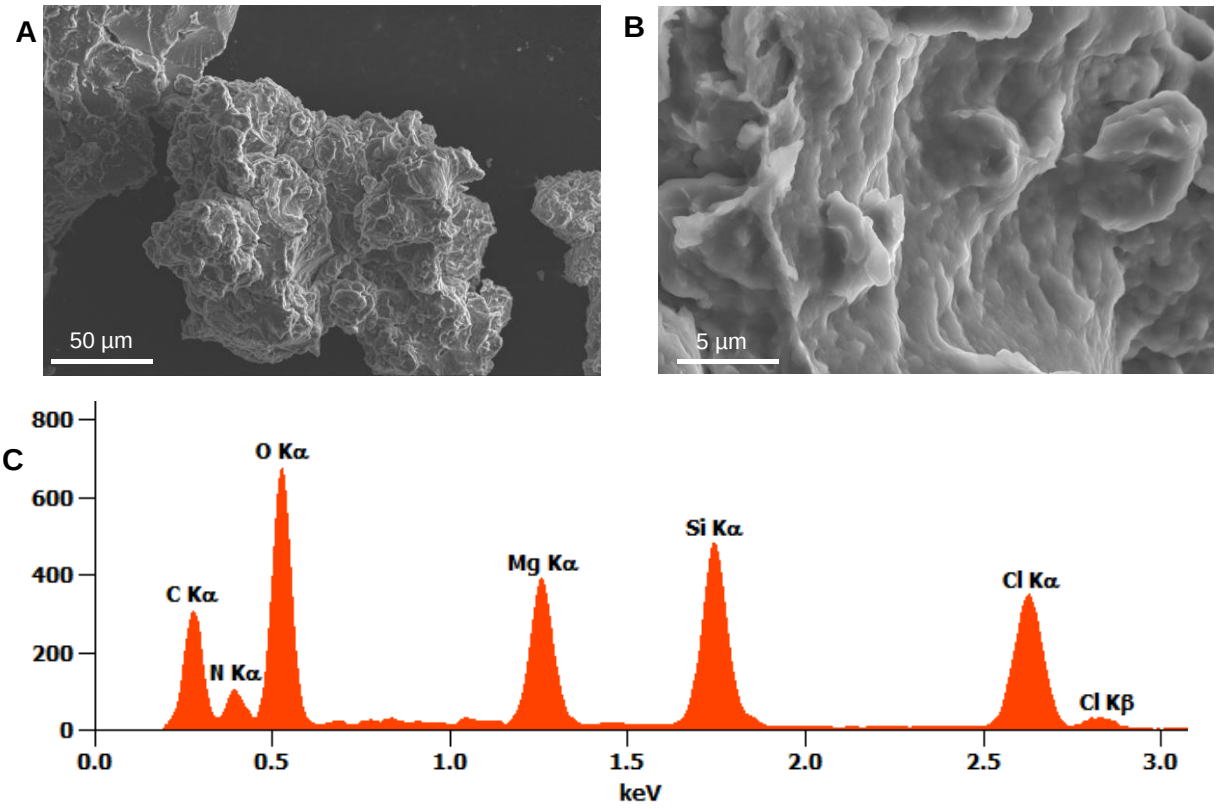

Figure S3. (A, B) FESEM images of AC at different magnifications. C) SEM EDS of AC.

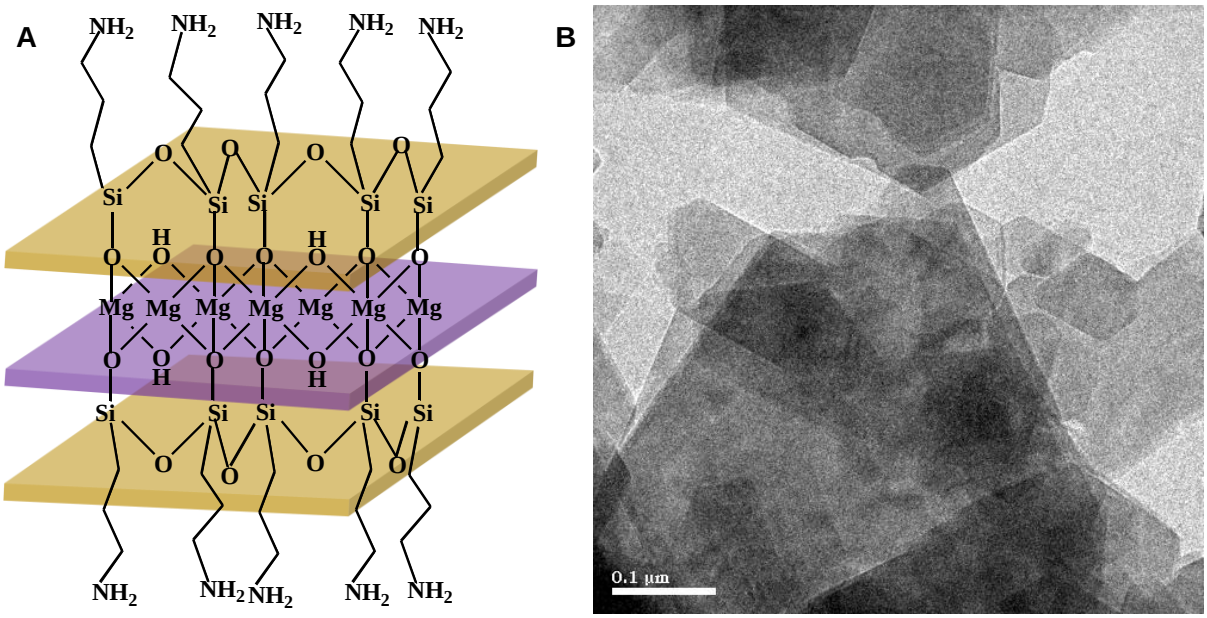

Figure S4. A) Schematic and B) corresponding TEM image of AC showing the layered structure.

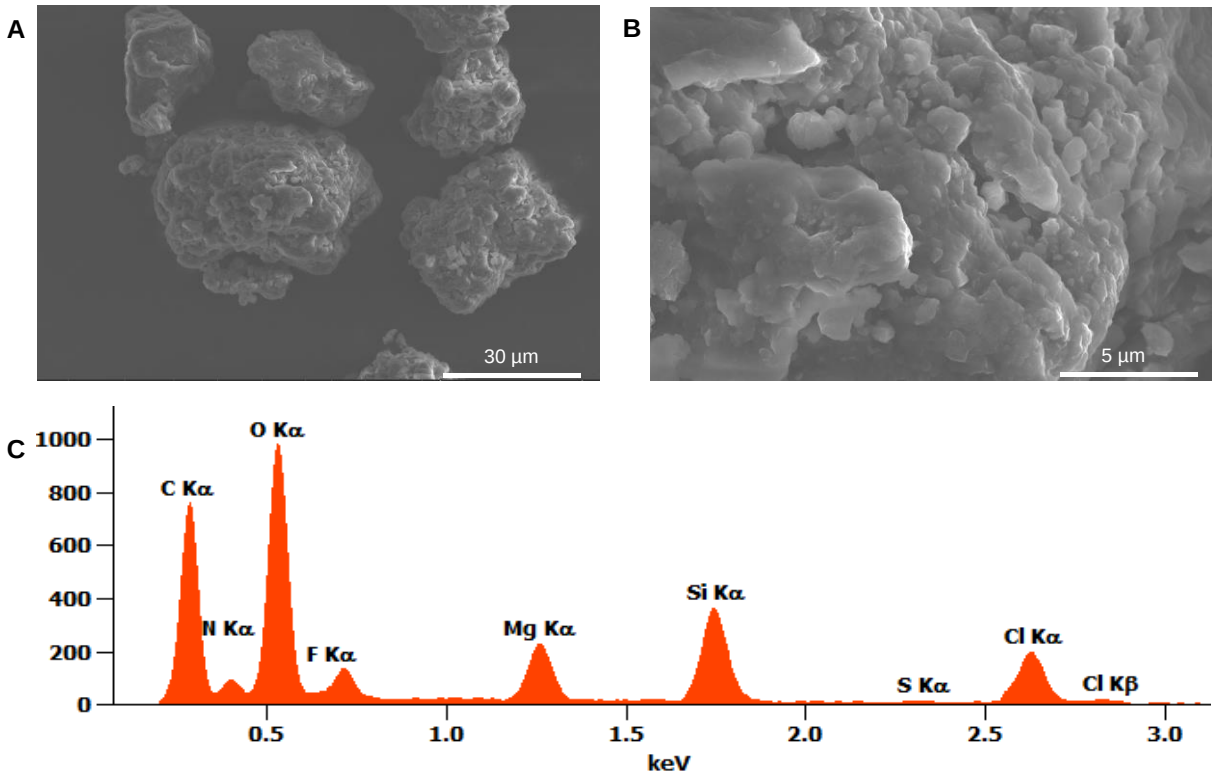

Figure S5. (A, B) FESEM images of AC-GO at different magnifications. C) SEM EDS of AC-GO.

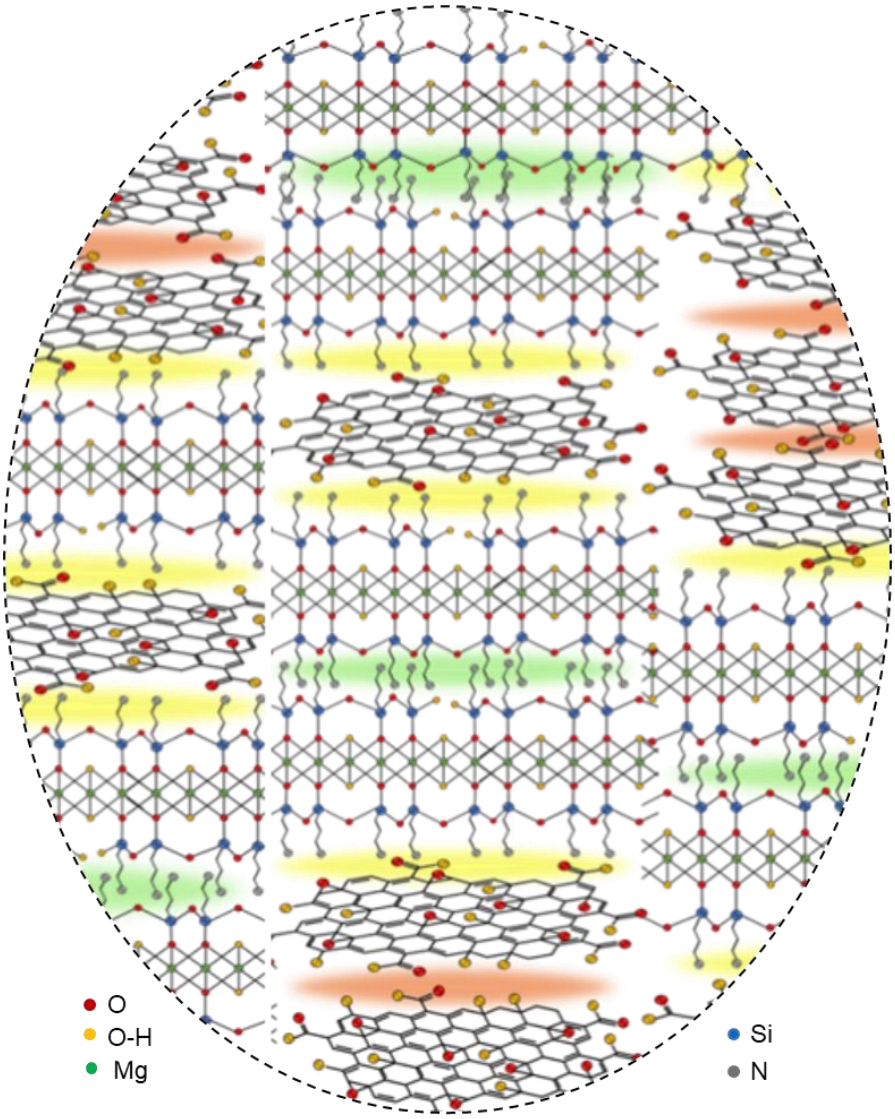

Figure S6. Possible bond formation between AC and GO in AC-GO composites (yellow shade shows AC and GO interaction, green shade for AC and AC interaction, and red shade for GO and GO sheets interaction).

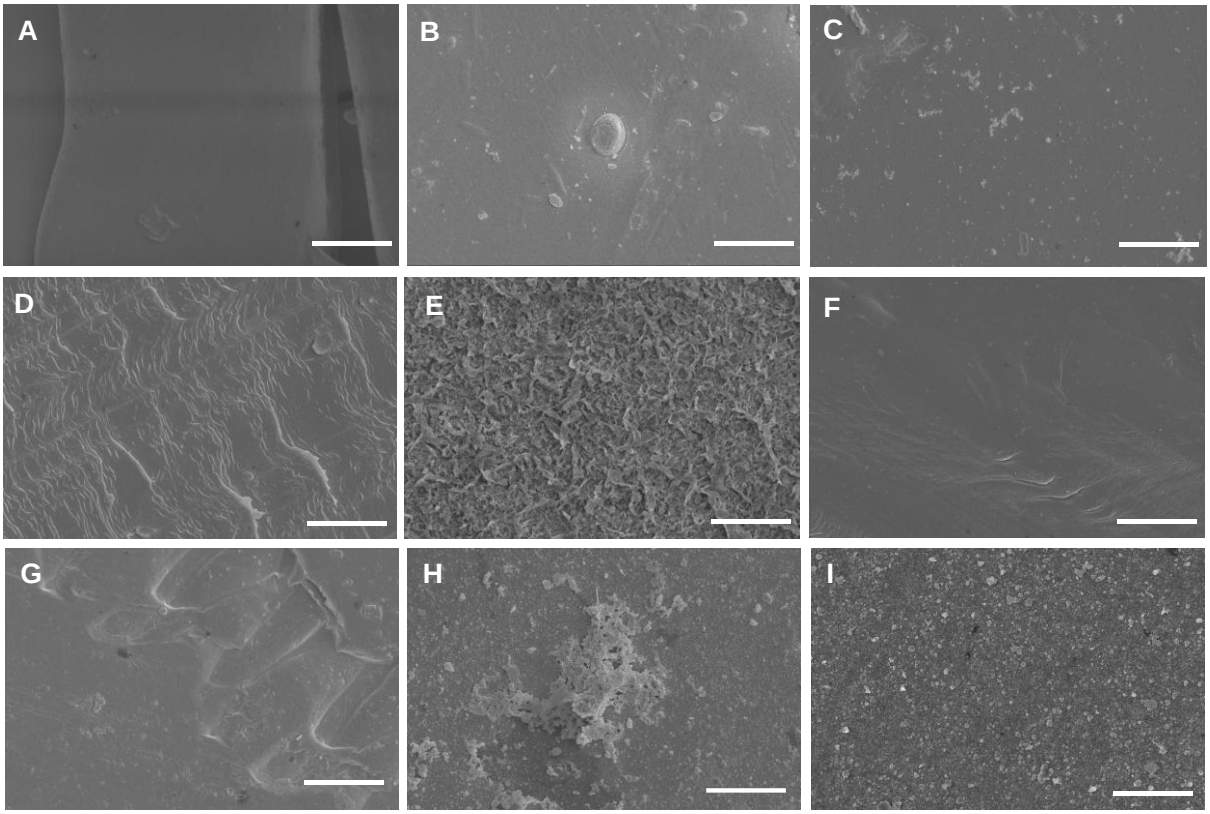

Figure S7. FESEM images of A) fabric, B) blank PSf and, loading dependent C) 0.005, D) 0.01, E). 0.015, F) 0.02, G) 0.025, H) 0.05 and I) 0.1 wt% of TFC/AC-GO membranes (scale bar for all images 5 µm).

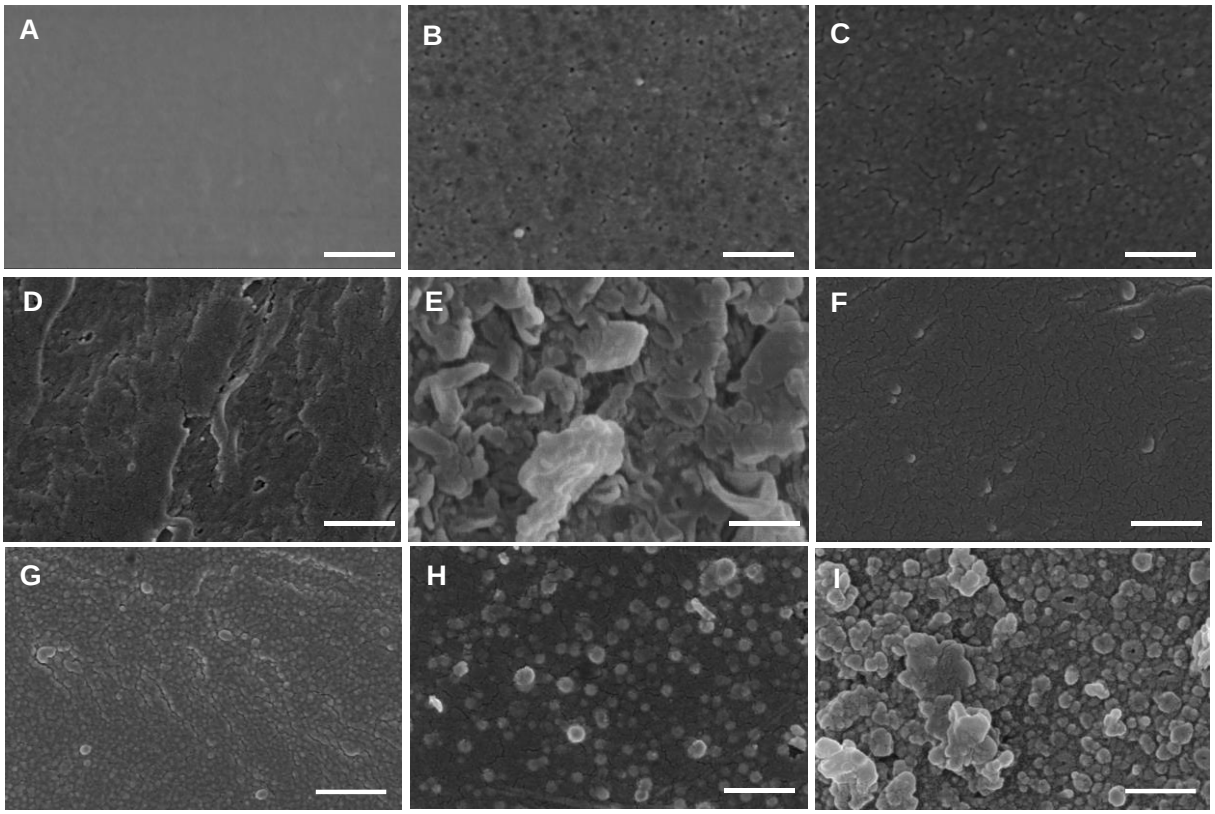

Figure S8. FESEM images of A) fabric, B) blank PSf and, loading dependent C) 0.005, D) 0.01, E). 0.015, F) 0.02, G) 0.025, H) 0.05 and I) 0.1 wt% of TFC/AC-GO membranes (scale bar for all images 500 nm).

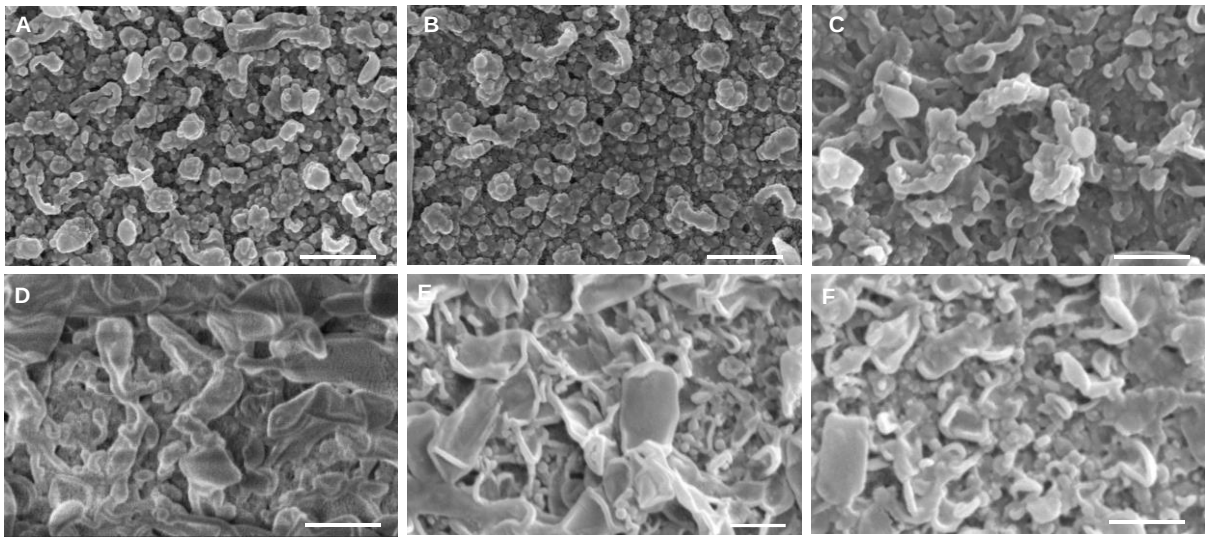

Figure 9. FESEM images of membrane: A) M10, B) M20, C) M30, D) M40, E) M50 and F) M60 (scale bar for all images 500 nm).

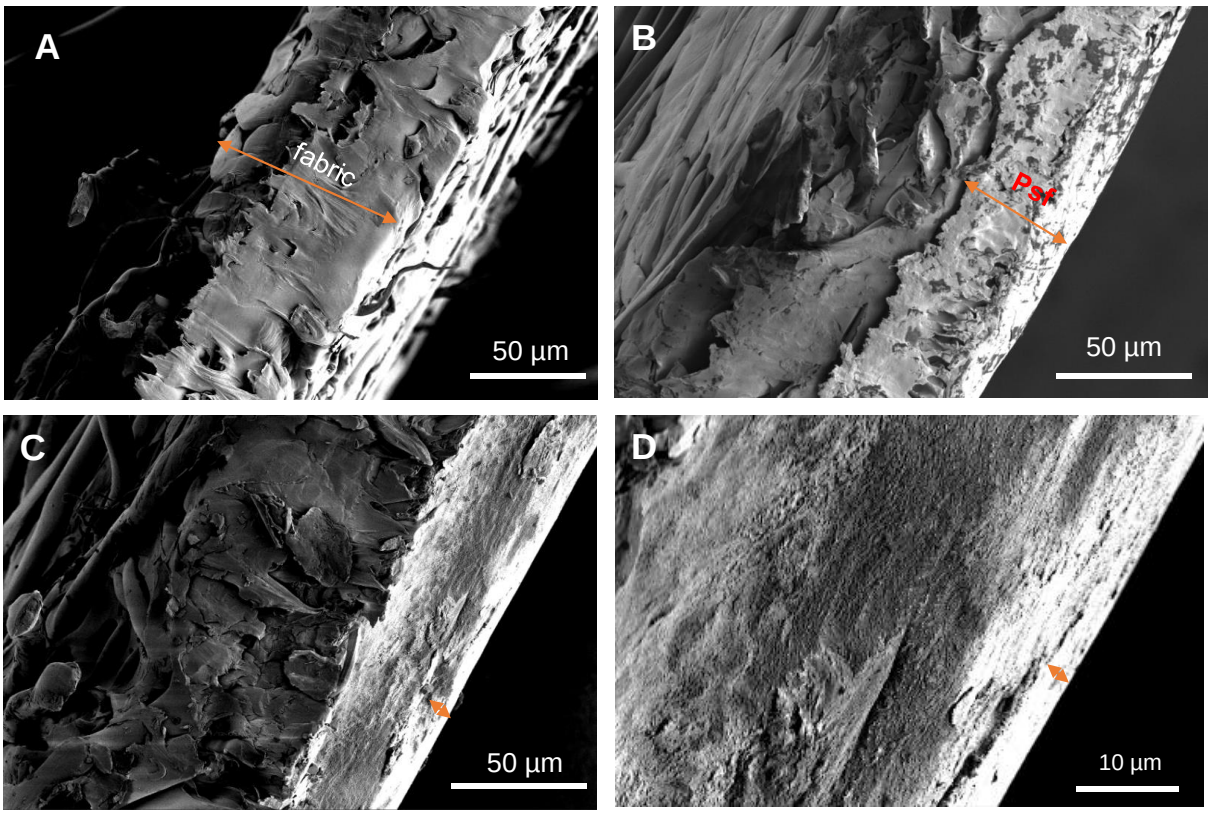

Figure 10. The cross-sectional view of A) fabric (scale bar 50 µm), B) fabric+PSf (scale bar 50 µm), C) M30 (scale bar 50 µm) and D) M30 membrane at higher magnification (scale bar: 10 µm).

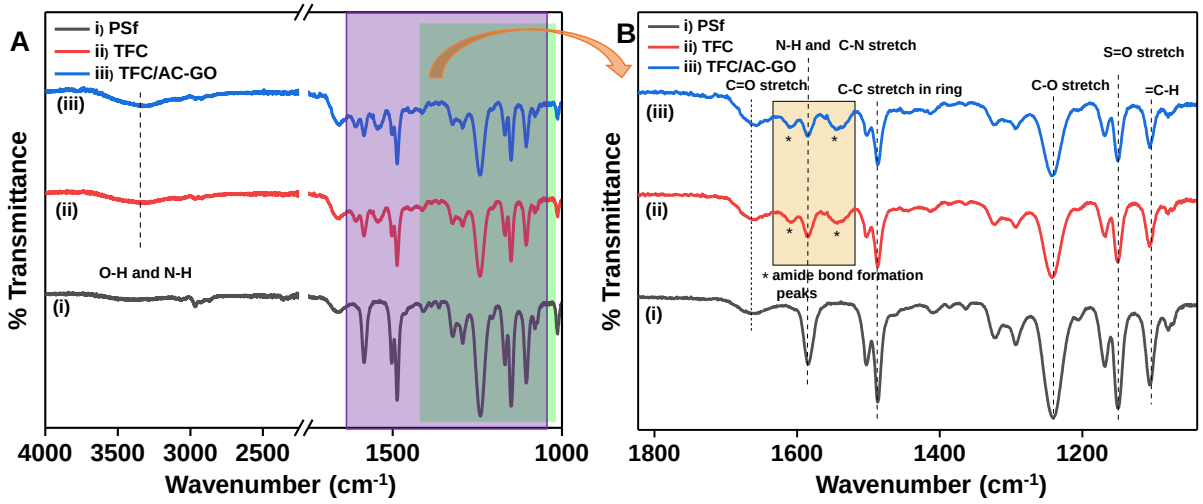

Figure S11. FTIR analysis of i) PSf, ii) unmodified TFC, and iii) AC-GO modified TFC membrane (M30).

Table S1. Water flux, % salt rejection and permeance for PSf support layer, unmodified M30, and modified M30 membranes (0.015 w% of AC, GO, and AC-GO) at 2000 ppm salt concentration and 20 bar pressure.

Membrane	**Flux (L/m^{2}h)**	**Permeance (Lm^{-2}h^{-1}bar^{-1})**	**% salt rejection**
PSf	8.04 ± 0.20	~ 0.402 ± 0.01	23.67 ± 1.58
PA	15.62 ± 0.36	~ 0.781 ± 0.02	97.03 ± 1.07
AC	32.02± 1.42	~ 1.601 ± 0.07	99.30 ± 0.36
GO	31.96 ± 1.55	~ 1.598 ± 0.08	99.51 ± 0.09
AC-GO	50.28 ± 1.69	~ 2.514 ± 0.08	99.51 ± 0.10

Table S2. Water flux and salt rejection studies of AC-GO modified M30 membrane at 20 bar pressure and different salt concentrations (2000, 5000, and 10,000 ppm).

	Salt concentration (ppm)					
Membrane	**2000 ppm**		**5000 ppm**		**10,000 ppm**	
	Flux (L/m^{2}h)	**% salt rejection**	**Flux (L/m^{2}h)**	**% salt rejection**	**Flux (L/m^{2}h)**	**% salt rejection**
M10	19.79 ± 1.22	99.36± 0.18	14.80 ± 0.58	99.33 ± 0.14	10.21 ± 0.44	99.02 ± 0.08
M20	46.47 ± 1.38	99.49 ± 0.12	37.68 ± 1.18	99.22 ± 0.07	23.91 ± 0.88	99.11 ± 0.05
M30	50.28 ± 1.69	99.51± 0.10	39.23 ± 1.16	99.41 ± 0.07	25.39 ± 0.80	99.21 ± 0.06
M40	47.42 ± 1.28	99.48 ± 0.08	36.32 ± 0.99	99.33 ± 0.07	23.07 ± 0.67	99.04 ± 0 11
M50	39.05 ± 1.08	99.29 ± 0.16	30.11 ± 0.69	99.24 ± 0.10	19.52 ± 0.40	98.70 ± 0.27
M60	40.13 ± 2.21	99.31 ± 0.07	29.04 ± 0.58	99.20 ± 0.11	20.69 ± 0.41	98.58 ± 0.05

Table S3. Pressure-dependent permeation studies of M30 membrane for feed water salt concentration of 2000 ppm.

Pressure (bar)	15	20	25	30	35	40
Flux (L/m^{2}h)	36.12 ± 0.99	50.28 ± 1.69	55.68 ± 1.94	66.63 ± 0.78	77.63 ± 1.73	85.60 ± 1.29