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Supplementary information for

Low pressure UV-cured CS-PEO-PTEGDMA/PAN thin film nanofibrous composite nanofiltration membranes for anionic dyes separation

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1. The optimization of CS-PEO-PTEGDMA TFNC membranes

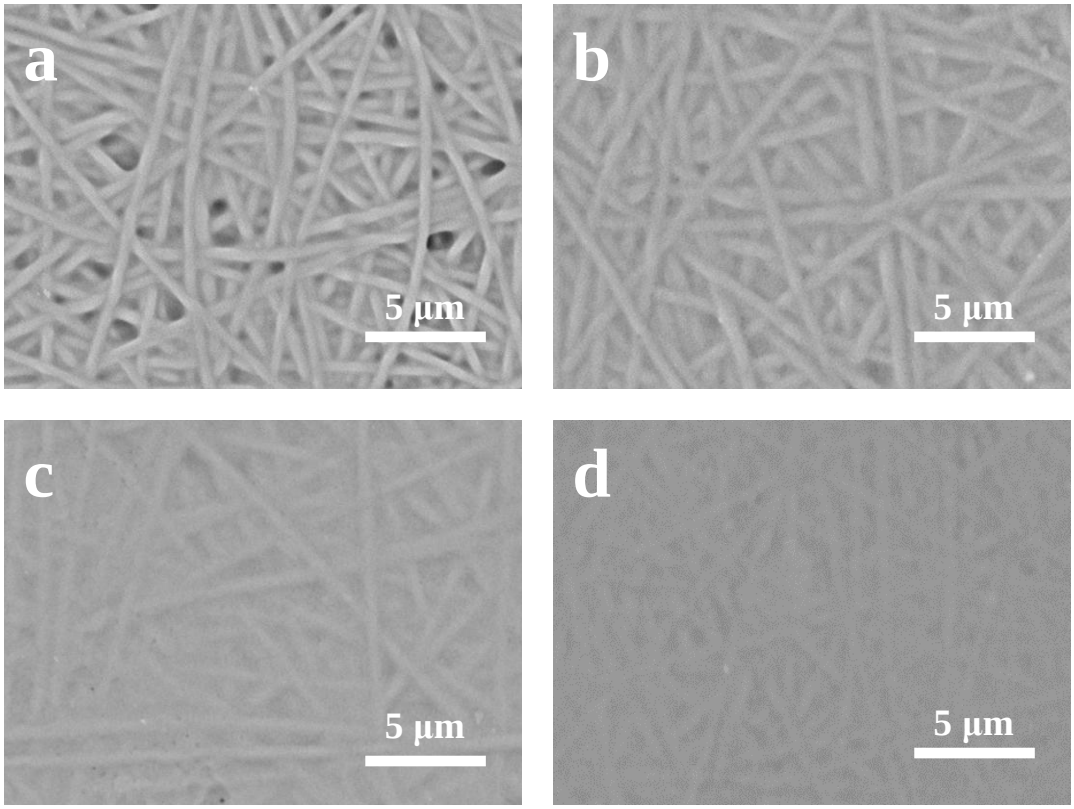

Fig. S1. The surface SEM images of CS-PEO-TEGDMA/PAN TFNC membranes with different depositing time of CS-PEO-TEGDMA nanobeads（a: 27 min; b: 30 min; c: 33 min; d: 36 min; acidic moistcuring time of 60 s, heating temperature of 50 ℃ and curing time of 4 min）

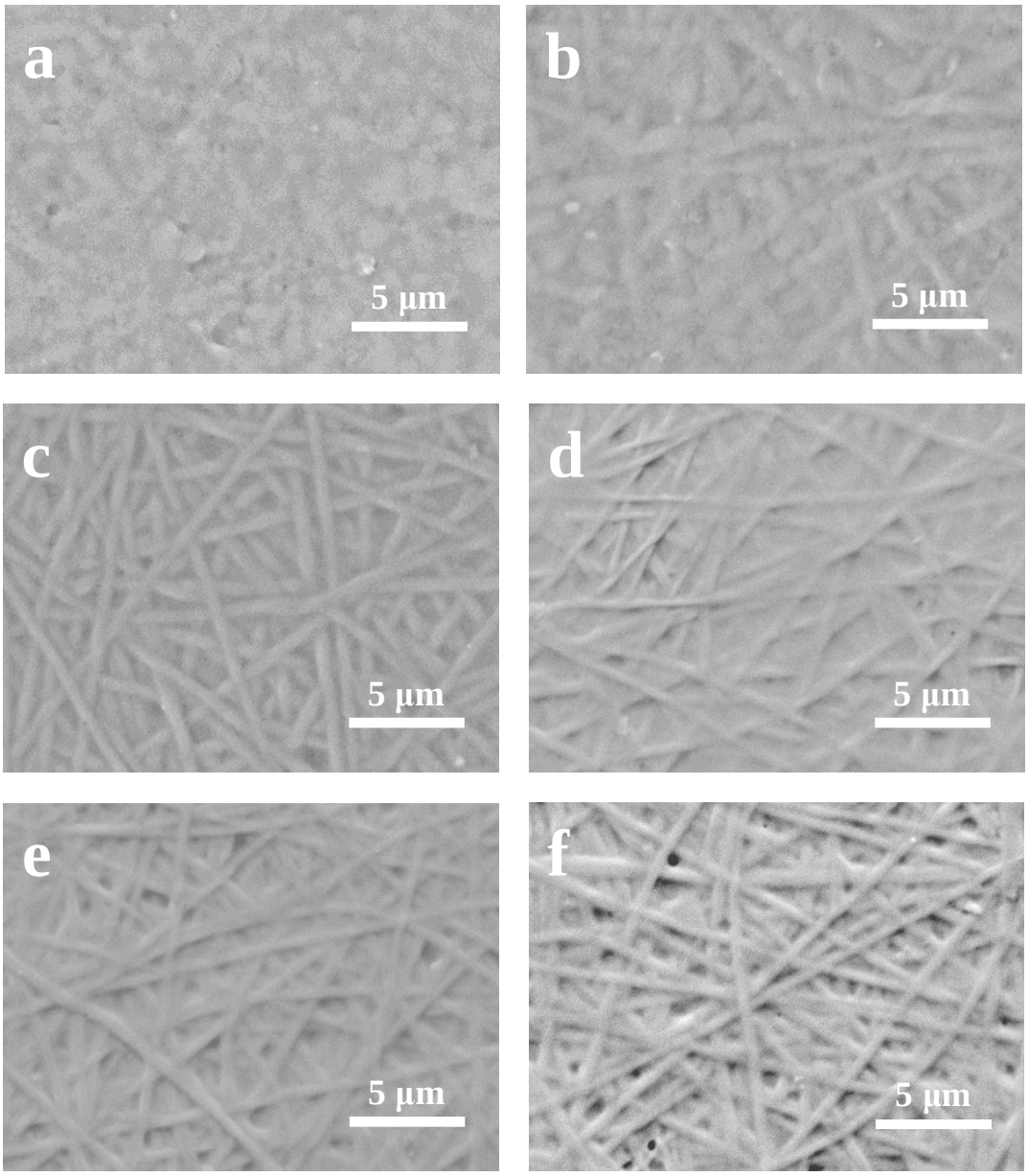

Fig. S2. The surface SEM images of CS-PEO-TEGDMA/PAN TFNC membranes with different heating temperatures in hot pressing treatment（a: 30 ℃; b: 40 ℃; c: 50 ℃; d: 60 ℃; e: 70 ℃; f: 80 ℃; acidic moistcuring time of 60 s, curing time of 4 min and deposition time of 30 min）

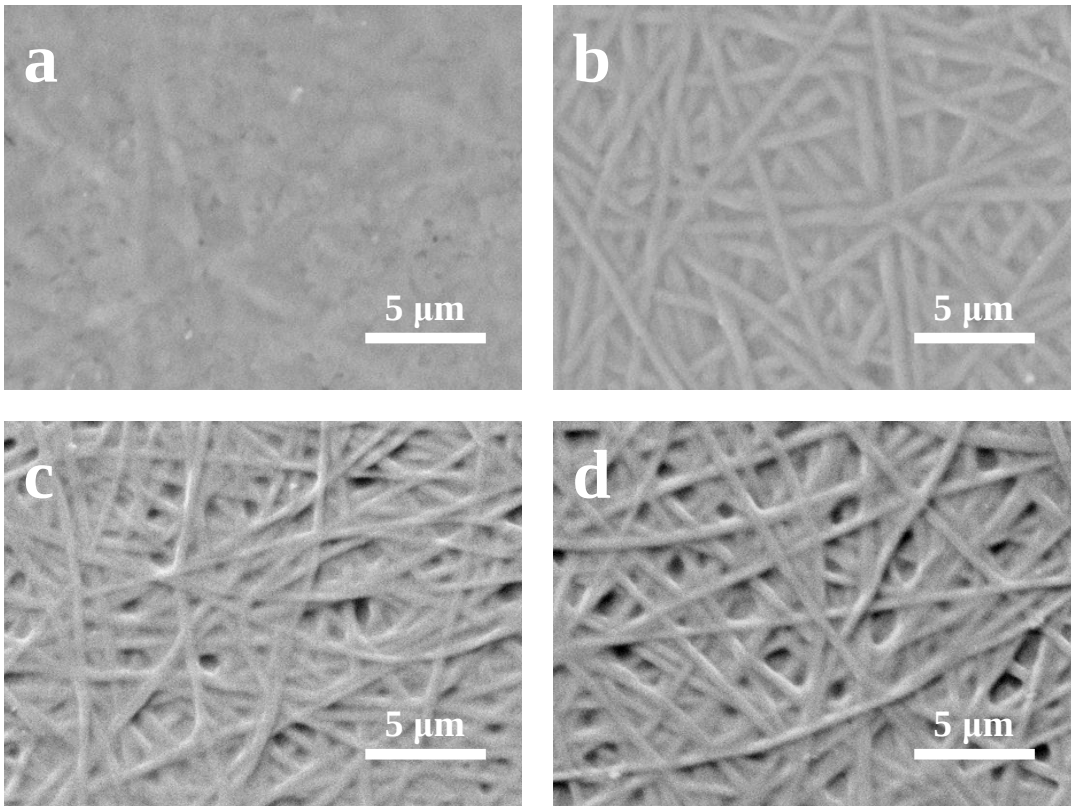

Fig. S3. The surface SEM images of CS-PEO-TEGDMA/PAN TFNC membranes with different curing time in hot pressing treatment (a: 2 min; b: 4 min; c: 6 min; d: 8 min; acidic moistcuring time of 60 s, heating temperature of 50 ℃ and deposition time of 30 min).

2. The ATR-FTIR spectra of CS-PEO-PTEGDMA composite membranes

FT-IR Fourier transform infrared (FT-IR) spectra were recorded on a Nicolet 8700 FT-IR spectrometer (USA) with the resolution of 4cm^{-1} at spectral the range of 4000-600cm^{-1} with ATR method to characterize surface chemical compositions of the CS-PEO-PTEGDMA composite membranes with different CS/TEGDMA mass ratios as shown in Fig. S4.

For the virgin CS/PEO spectrum in absence of PTEGDMA (1:0), there were absorption bands at 3360 cm^{-1}, 2880 cm^{-1}, 1151 cm^{-1}, 1076 cm^{-1} and 1035 cm^{-1}, which corresponded to the superposition peak of -OH and -NH_2 band, C-H stretching band, the bridge oxygen stretching band, and the C-O stretching bands[1, 2]. The peaks which are located from 1660 cm^{-1} to 1500 cm^{-1} were formed by the co-contribution of the residual acetamide group bands[1] since the chitosan used here has an average degree of deacetylation of 85.5%. New peak at 1731 cm^{-1} appeared after PTEGDMA was added and its intensity increases with the PTEGDMA content. This peak was attributed to the C=O stretching vibration of ester groups in PTEGDMA and confirms the successful introduction of PTEGDMA into CS/PEO membranes. It was also observed that the peak at 1141 cm^{-1} (ascribed to C-O stretching bands) for pure PTEGDMA prepared by UV-curing TEGDMA cast film directly was shifted gradually to around 1075 cm^{-1} in CS-PEO-PTEGDMA composite, which indicated the formation of complex involving hydrogen bonding among CS, PEO and PTEGDMA[3-5].

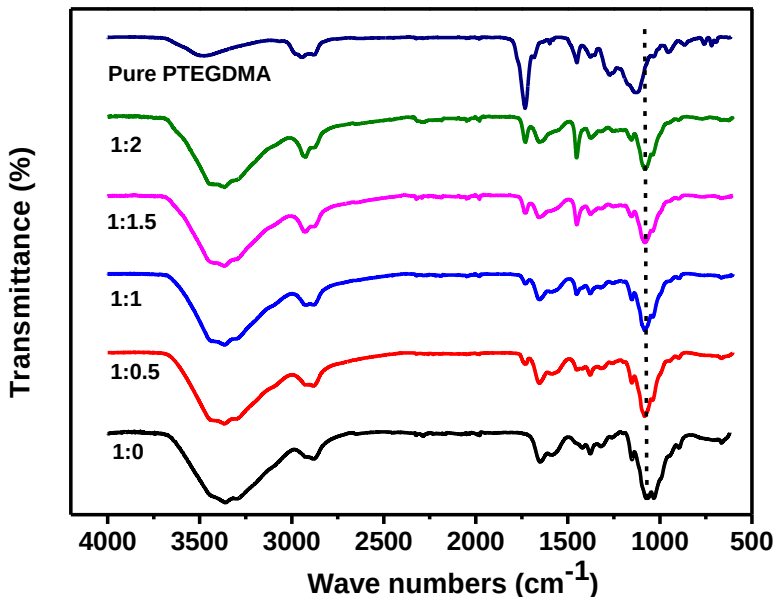

Fig. S4. The ATR-FTIR spectra of CS-PEO-PTEGDMA composite membranes with different CS/TEGDMA mass ratios.

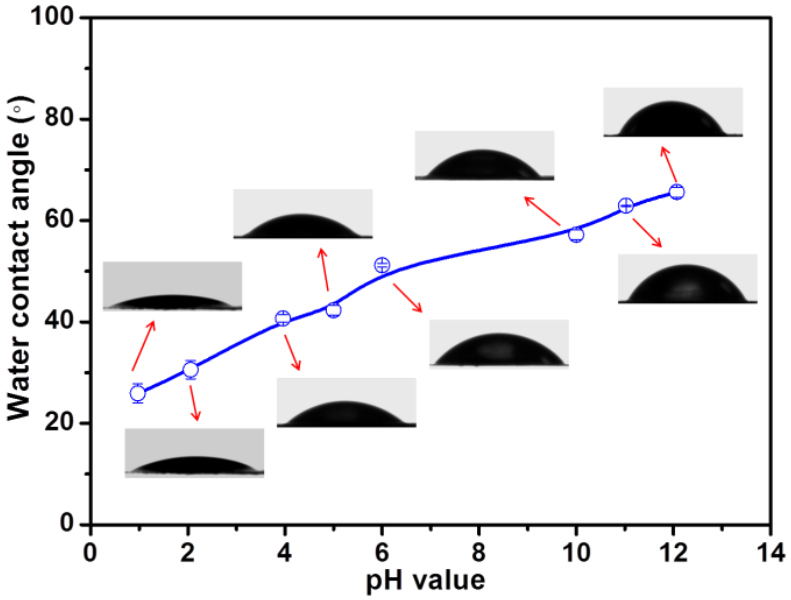

Fig. S5. The effect of initial solution pH of direct red 80 on the water contact angle of CS-PEO-PTEGDMA membranes

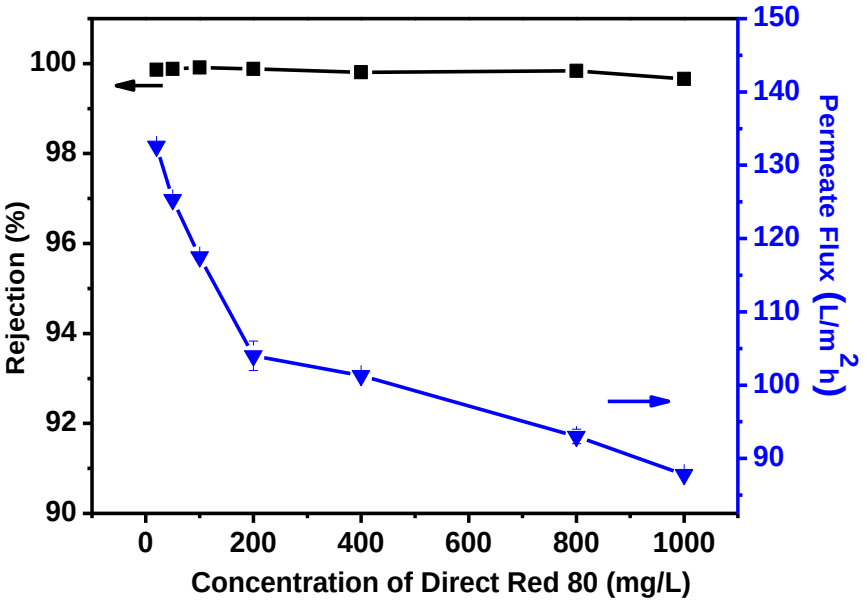

Fig. S6. The effect of dye concentration on the filtration performance of CS-PEO-PEGDMA TFNC membrane (20-25 ˚C, 0.2 MPa, pH= 6.0 ± 0.1).

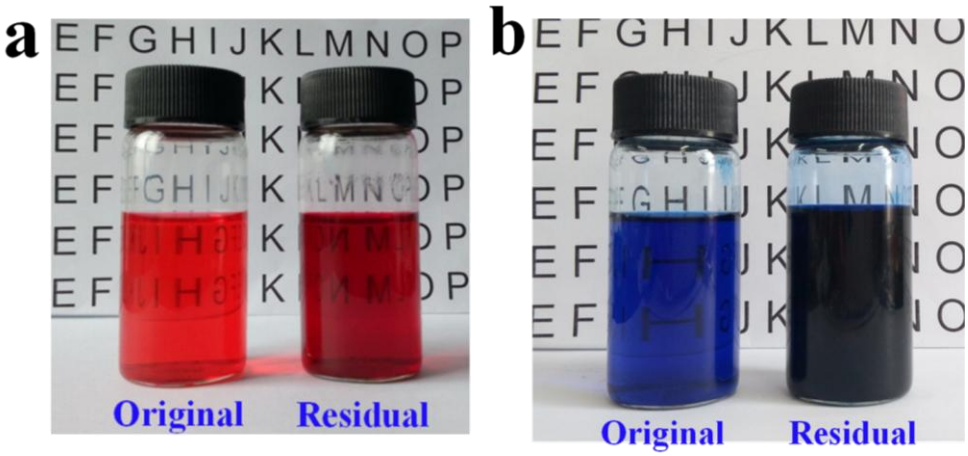

Fig. S7. Photographic images of the Direct Red 80 solution (a) and Acid Blue 90 solution (b) before (original) and after (residual) long-term filtration for 6 h.

References

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