Supplemental Material

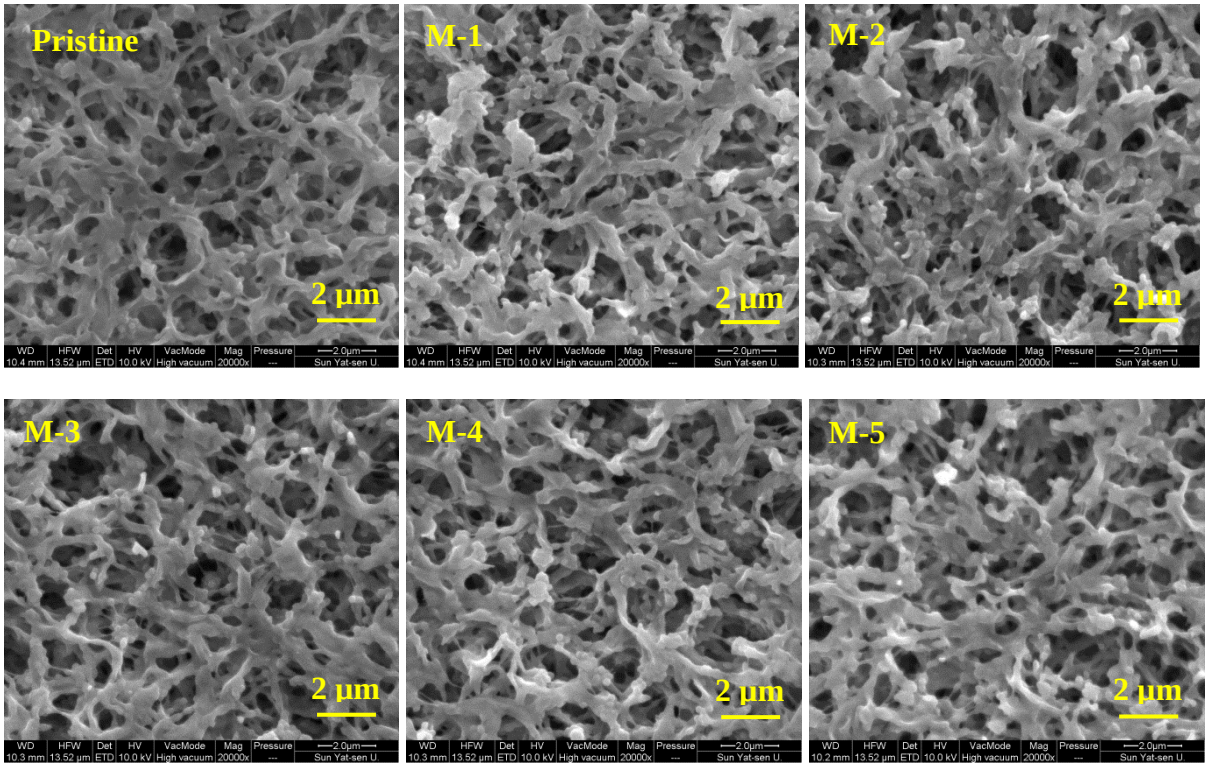

Fig. S1. FESEM images of the surfaces of the pristine PVDF and the modified membranes. The scale bars are 2 µm in all images at a magnification of 20000×.

M-1 M-2 M-3 M-4 M-5

Fig. S2. Digital photos of modified membranes (Freeze dried membranes).

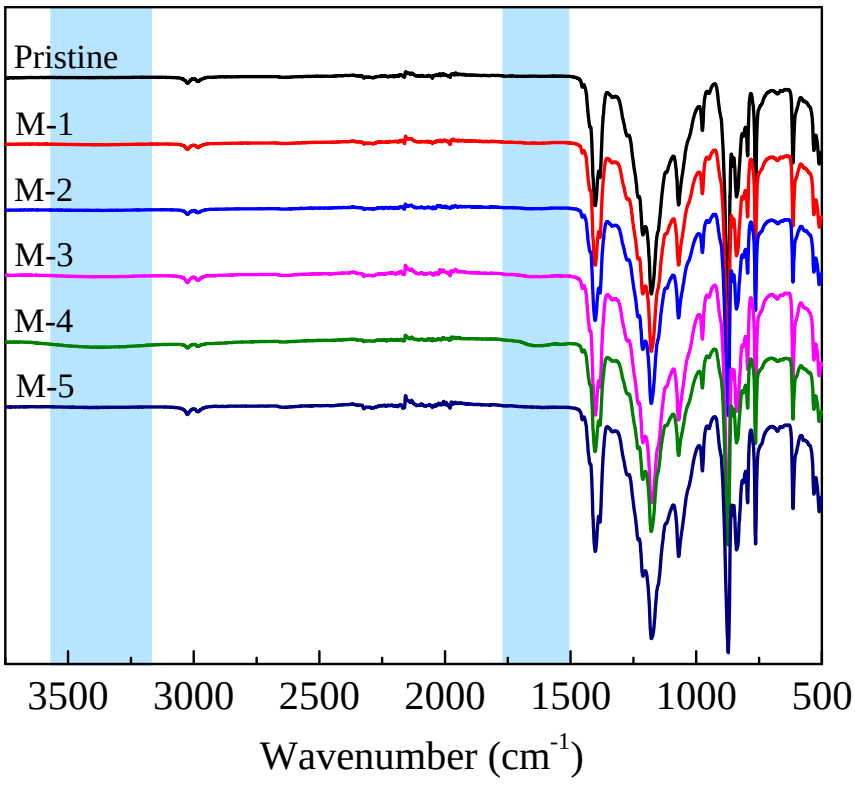

Fig. S3. ATR-FTIR spectra of pristine PVDF and modified membranes.

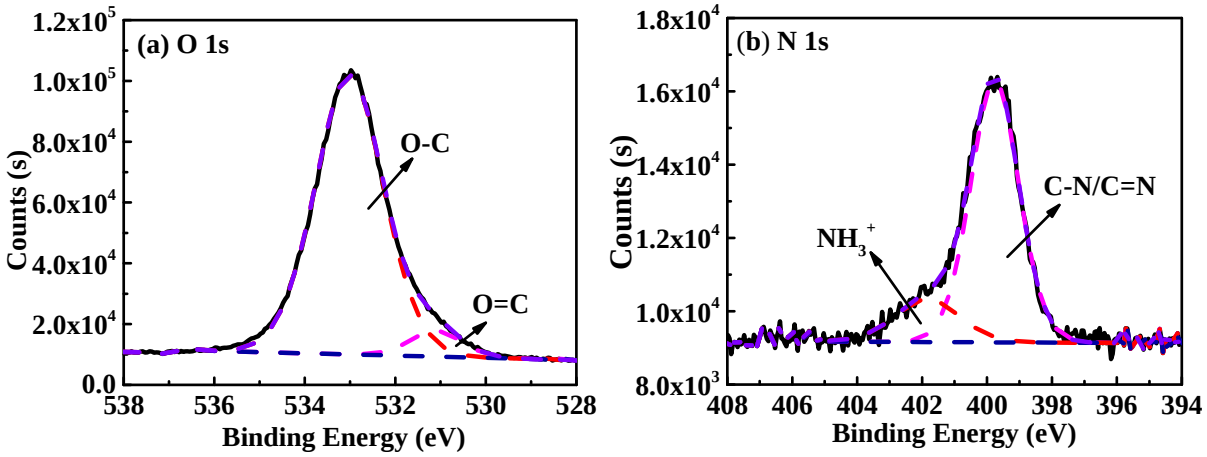

Fig. S4. Deconvolution of O 1s spectra (a) and N 1s spectra (b) of the M-4 membrane. (The peaks at 533.0 and 531.1 eV are corresponded to oxygen single bonded to carbon and oxygen double bonded to carbon, respectively. The peaks at 399.8 and 401.8 eV are assigned to unprotonated C-N/C=N and protonated primary amine group, respectively)

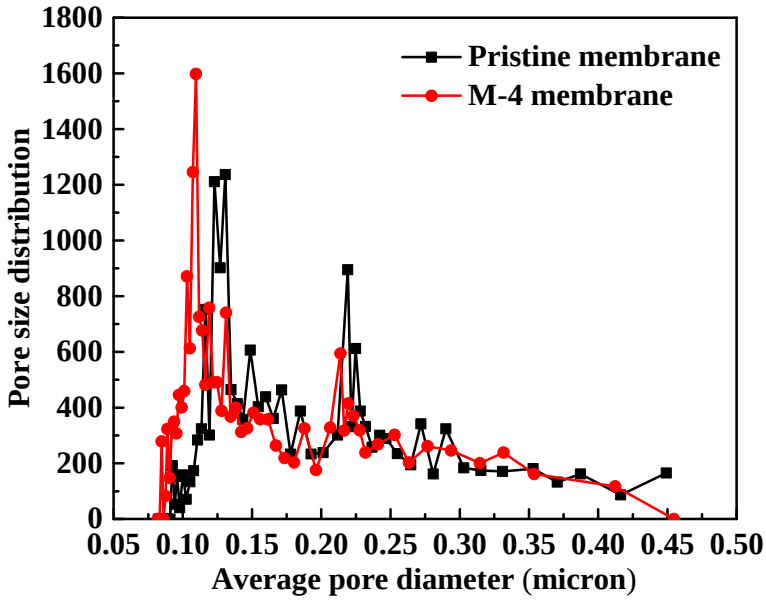

Fig. S5. Pore size distribution of the pristine PVDF and M-4 membranes. The pore sizes of the membranes were determined by a capillary flow porometer (CFP-1500-LP, Porous Material Inc., USA).

Table S1. Mean pore diameter and maximum pore diameter of the pristine PVDF and M-4 membranes (average value was shown). The pore sizes of the membranes were determined by a capillary flow porometer (CFP-1500-LP, Porous Material Inc., USA).

Membranes	Mean pore diameter (μm)	Maximum pore diameter (μm)
PVDF membrane	0.216	0.466
M-4 membrane	0.206	0.447

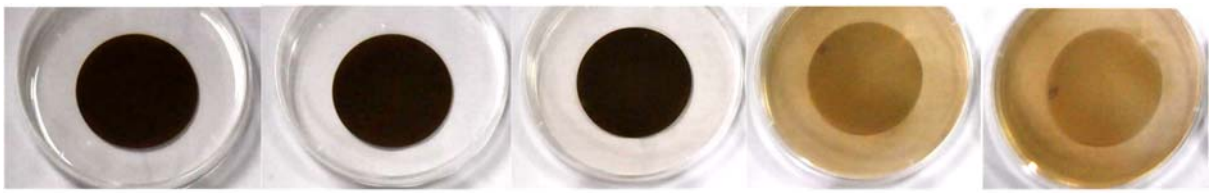

Fig. S6. Digital photos of the M-4 membranes after immersing in 25 mL different pH solutions for 24 h.

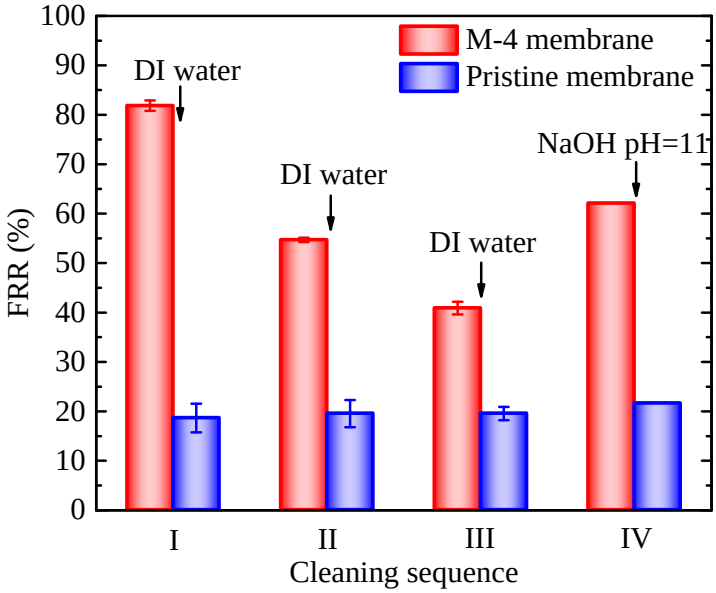

Fig. S7. Flux recovery rates (FRRs) of the M-4 membrane after various cleaning sequences.

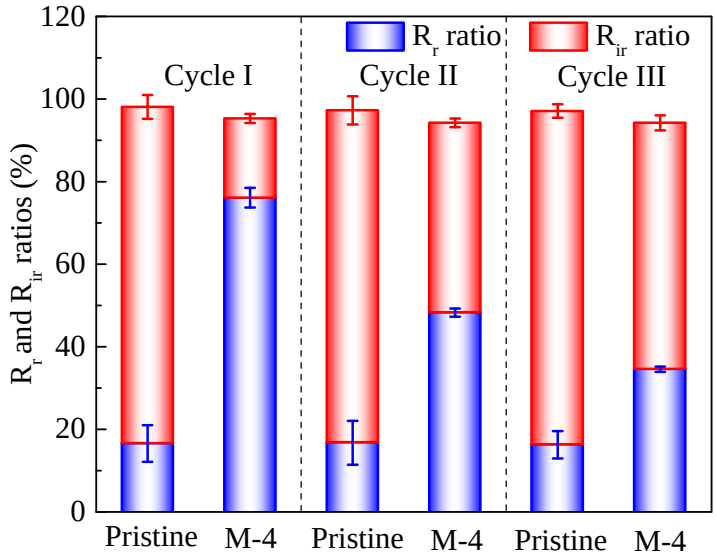

Fig. S8. Reversible and irreversible fouling ratios of the pristine PVDF and M-4 membranes during three cycles O/W emulsion separations.