

### Supplementary Materials

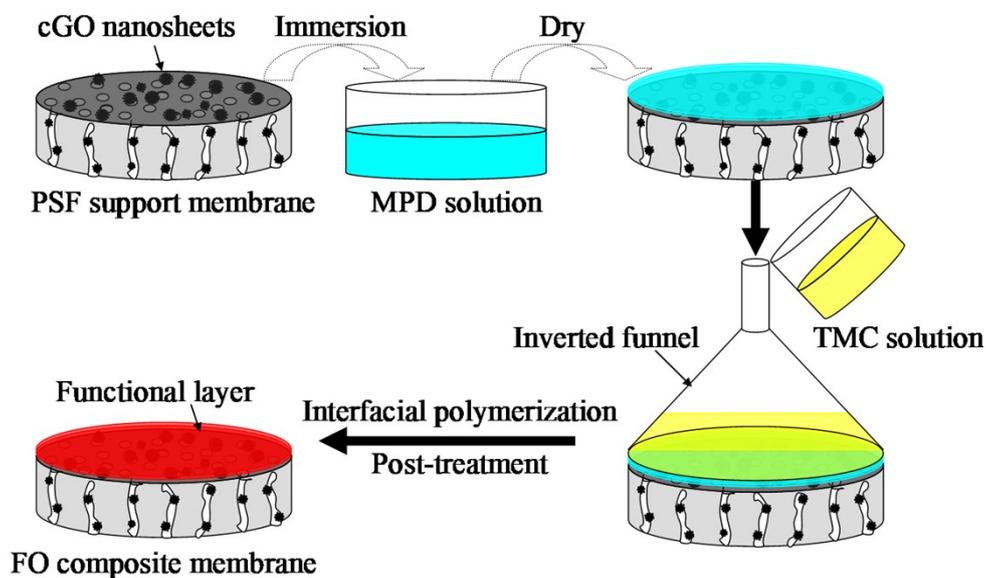


Fig. S1. Schematic diagram of FO composite membrane preparation process.

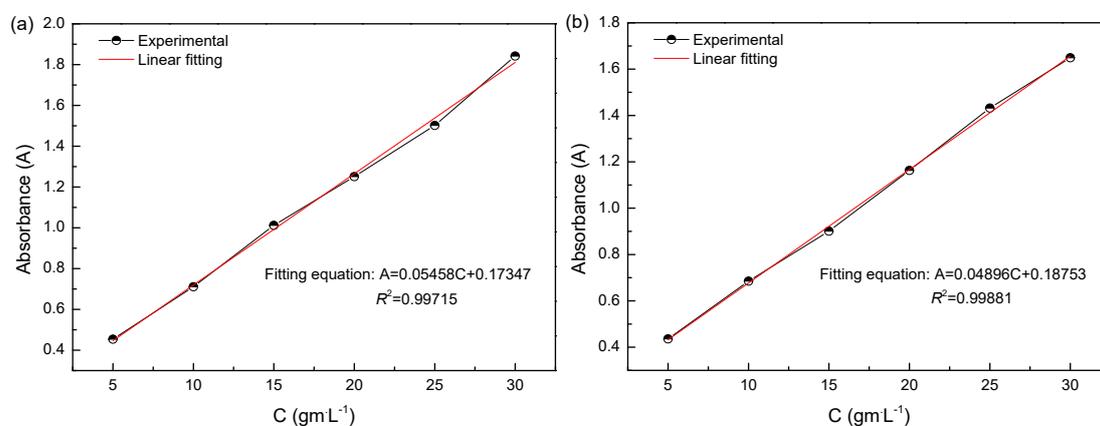
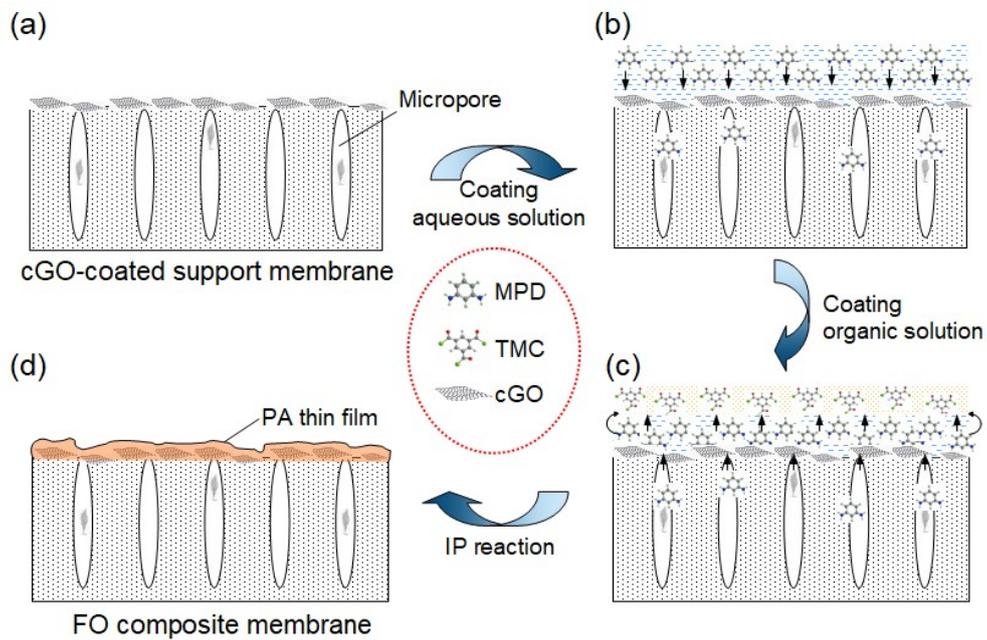


Fig. S2. Standard curves of PEG concentration and absorbance of different molecular weights (a)

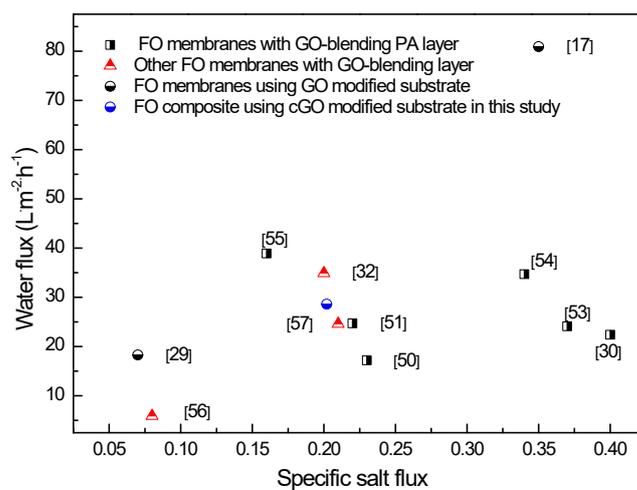
$M_w=10\ 000$ ; (b)  $M_w=20\ 000$ .



**Fig. S3.** The photograph of membrane shell in Fig. 1.



**Fig. S4.** Schematic diagram of polyamide thin film formation on cGO-coated PSF support membrane surface. (a) cGO-coated PSF support membrane prepared by vacuum suction filtration; (b) Aqueous solution coating on support membrane surface; (c) Organic solution coating on support membrane surface; (d) Polyamide thin film formed by IP reaction.



**Fig. S5.** Comparison of separation performance of different FO composite membranes modified by different GO nanosheets reported in literature.

Table S1 The porosity and mechanical properties of different PSF substrate membranes

Parameters	PSF-0	PSF-1	PSF-2	PSF-3	PSF-4
Porosity (%)	76.2±0.5	77.1±0.3	76.6±0.4	77.6±0.5	76.8±0.6
Tensile strength (MPa)	3.91±0.25	3.98±0.42	3.87±0.17	4.05±0.22	3.95±0.11
Elongation-at-break (%)	11.22±0.41	11.56±0.12	12.32±0.35	10.95±0.23	11.37±0.18