Supporting information

Thermally Stable Polysulfone Nanofiltration/Reverse Osmosis Membranes via Amino Grafting

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S1 Surface density of amino group

The surface amination reaction was carried out following a nucleophilic substitution mechanism[1]. The dye adsorption method was used to measure the surface density of amino group (–NH$_2$) on substrates prepared under different amination conditions[2]. In detail, a substrate sample (3 × 3 cm^2) was immersed into an aqueous solution of acid orange 7 (500 μmol/L, pH=3) at 25°C for 24 h to ensure adequate adsorption. The dissociative acid orange 7 was removed by thoroughly washing with HCl solution at pH=3. The adsorbed acid orange 7 was desorbed in NaOH solution at pH=12 at 25°C for 24 h. The absorbance of acid orange 7 in elution was measured by UV spectrophotometer (UV-1800, Shimadzu, Shanghai, China) and the concentration of acid orange 7 was calculated from standard curve illustrated in Figure S1 and Eq.* MERGEFORMAT (1). The surface density of amino group (C$_{NH2}$) was determined by Eq.* MERGEFORMAT (2),

$$y = 0.0096x \qquad \text{* MERGEFORMAT (1)}$$

$$C_{NH_2} = \frac{C_{dye} \times V_{elution}}{A} \qquad \text{* MERGEFORMAT (2)}$$

where C_{dye} is the concentration of acid orange 7 in the elution, $V_{elution}$ is the volume of elution, and A is the surface area of the substrate sample.
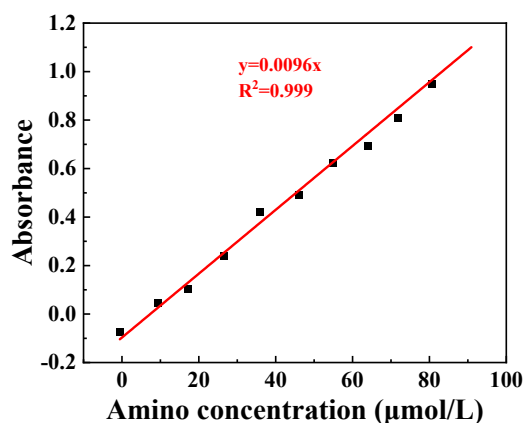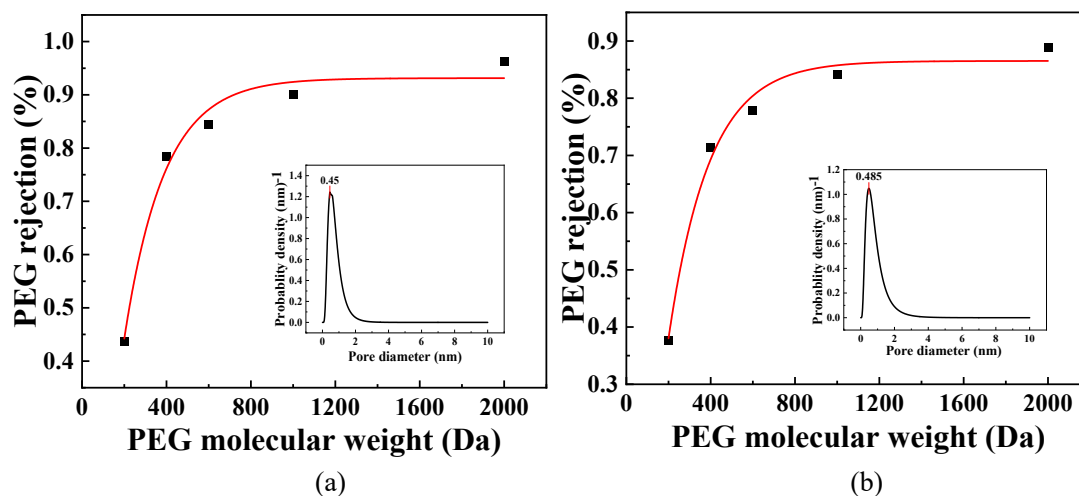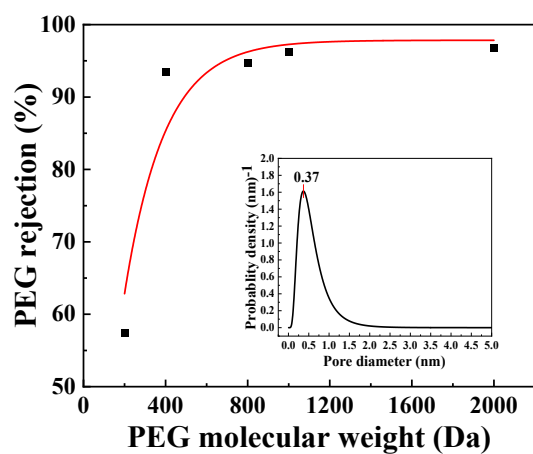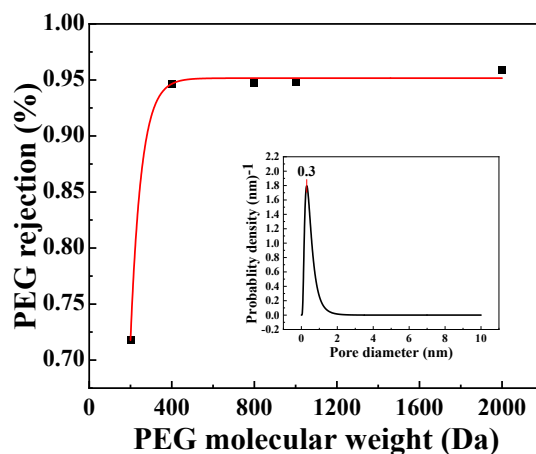

Figure S1 Standard curve of acid orange 7.

S2 Pore Size of Membranes Under Different Amination Conditions
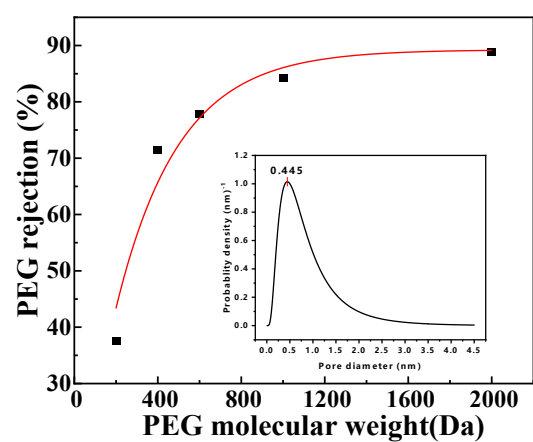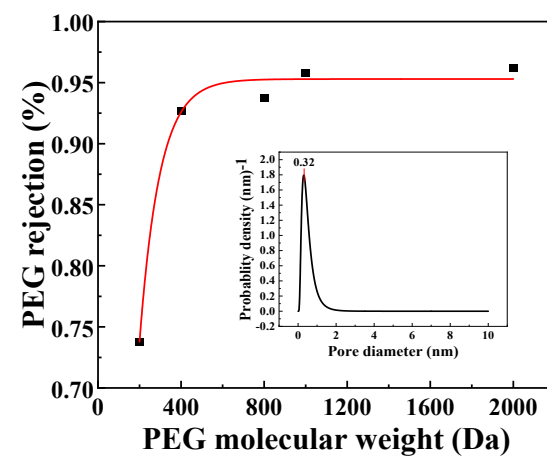

(a)

(b)

(c)

(d)

(e)

(f)

Figure S2 Pore Size of Membranes Under Different Amination Conditions. (a-c): The amination time was set at 24 h, with DETA concentrations of 20 wt.%, 30 wt.%, and 40 wt.% respectively, (d-e): The DETA concentration was fixed at 25 wt.%, while the amination time was set at 12 h, 24 h, and 36 h respectively.

References

1. L. Wang, Y. Cui, N. Wang, H. Zhang, B. Zhu, L. Zhu and Y. Xu, Polymer Degradation and Stability, 2014, 103, 69-74.
2. V. Hoseinpour, A. Ghaee, V. Vatanpour and N. Ghaemi, Carbohydrate Polymers, 2018, 188, 37-47.