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## Supporting Information

Constructing zwitterionic ultrafiltration membrane surface *via* multisite anchorage for superior long-term antifouling properties

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Xiaochen Fan<sup>a, b</sup>, Yanyan Ma<sup>a, b</sup>, Yuan Liu<sup>a, b</sup>, Zhongyi Jiang<sup>a, b</sup>

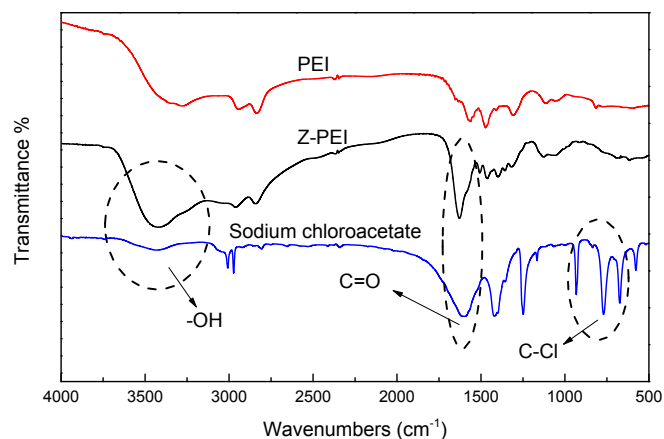
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## 1 Optical Measurements



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3 Fig. S1: FTIR spectra of PEI, Z-PEI and sodium chloroacetate. The peak at 3422 cm<sup>-1</sup> of Z-PEI  
4 and sodium chloroacetate was assigned to the stretching vibration of carboxylic -OH. The  
5 absorption peak at 776 cm<sup>-1</sup> correlated with C-Cl stretching vibration was disappeared in the  
6 spectrum of Z-PEI. The FTIR spectrum analysis indicated that the quaternary amination reaction  
7 really happened

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## 14 EDX analysis

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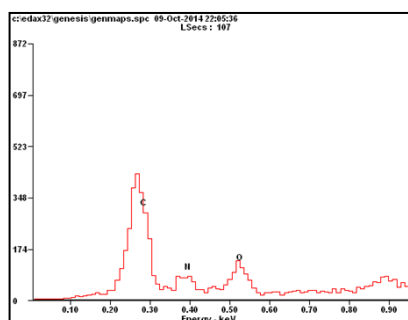
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Element	Wt%	At%
CK	50.78	60.68
NK	16.64	17.05
OK	18.46	16.56
ClK	14.12	05.72
Matrix	Correction	ZAF

25 Fig. S2: EDX analysis of Z-PEI. A certain concentration of chlorine (5.72 %) was detected which  
26 might arise from the electrostatic adsorption between chlorine and amino groups. Calculated from  
27 the EDX analysis, the content of amino groups which converted into zwitterionic groups was 48.9  
28 %.

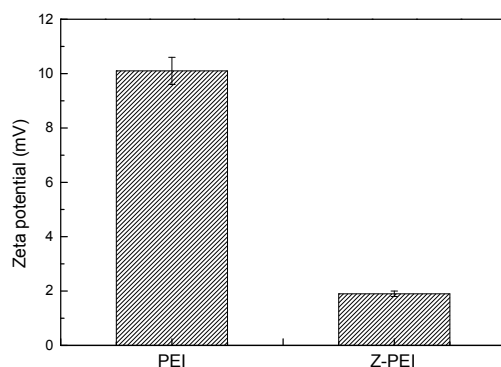
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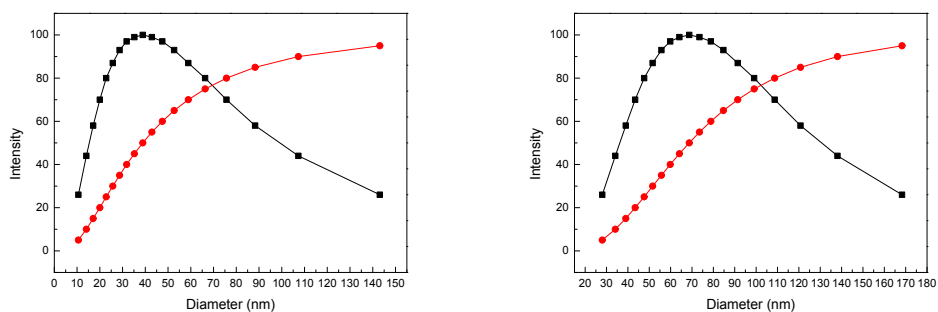
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## 1 Zeta potential and particle size measurements of PEI and Z-PEI



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3 Fig. S3: zeta potential of PEI and Z-PEI. The decrease of zeta potential indicated the grafting of  
4 carboxylate groups which was negatively charged.

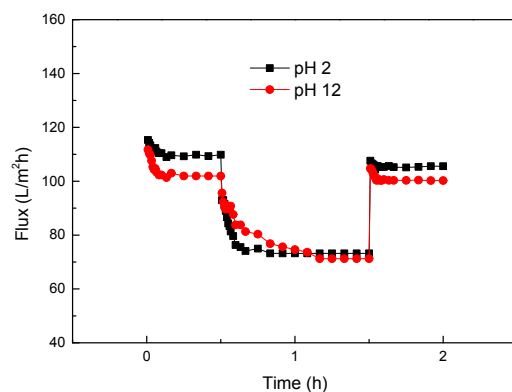
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7 Fig. S4: Particle size of PEI (left) and Z-PEI (right). The effective particle size of Z-PEI was  
8 enlarged from 40.0 nm for PEI to 69.0 nm (mean hydrodynamic diameter). It might be due to  
9 the hydrophilic Z-PEI binding more water molecule which might be benefit for the stretch of Z-  
10 PEI chains to increase its hydraulic diameter.

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## 1 Chemical stability experiment of Z-PAN-2 membrane



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3 Fig. S5: Time-dependent fluxes of zwitterionic Z-PAN-2 membranes during BSA solution  
4 ultrafiltration at pH 6.5 after immersion in water with pH of 2.0 and 12.0 for 24 h.. The  
5 ultrafiltration process included four steps: pure water filtration 0-0.5 h, BSA filtration 0.5-1.5 h,  
6 water cleaning, and pure water filtration of cleaned membrane 1.5-2.0 h. It could be seen that *FRR*  
7 values of Z-PAN-2 membranes were maintained at 96.3 and 98.4 % after acid or alkali treatment,  
8 respectively. The antifouling performance was not apparently changed after long term acid and  
9 alkali immersion.