Superhydrophilic in situ-Cross-Linked Zwitterionic Polyelectrolyte/PVDF-Blend Membrane for Highly Efficient Oil/Water Emulsion Separation

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1. Related chemical reactions for fabricating zwitteironic PVDF/PSH-blend membrane

(1) to (3) are the related chemical reaction for preparing superhydrophilic zwitterionic PVDF/PSH-blend membrane. As shown as reaction (1), a typical radical polymerization process is employed to synthesize the hydrophilic copolymer poly (DMAEMA-co-HEMA). To avoid the ester exchange reaction of polyHEMA, water and ethanol mixture solution with volume ratio 1:1 is used. As shown in (2), aldol reaction occurs between PDH polymer chain and glutaric dialdehyde during the phase separation process. Sulfobataine zwitterionic polymer is prepared via addition reaction between tertiary amine group and 1,3-propanesultone as shown in reaction (3).



2. The calculation of PDH content in PVDF membrane

The chemical structure of PDH is shown in Figure S1. The side chain of

polyHEMA is marked by a circle dot line in the structure. At 330 °C, the degration of the side chain occurrs according to literatures.^[1, 2] Thus, the content of PDH in PVDF membrane is calculated according to the following equation:

$$\mathbf{w(\%)} = \frac{\mathbf{m}_{a}}{\mathbf{w}_{a}\mathbf{w}_{HEMA}} \times 100\%$$

where w(%) is the weight fraction of PDH in PVDF membrane, m_a is the weight loss of the side chain measured by TG, w_a is the weight ratio of side chain in the unit of polyHEMA and w_{HEMA} is the weight fraction of polyHEMA in PDH.



FigureS1.Chemicalstructureofsynthesizedcopolymerpoly(DMAEMA-co-HEMA).

Reference

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