



Preparation and characterization of polyurethane (PU)/polyvinylidene fluoride (PVDF) blending membrane

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ABSTRACT

In order to improve the hydrophilicity and mechanical properties of polyvinylidene fluoride (PVDF) membrane, polyurethane (PU) was blended into PVDF casting solution and then PU/PVDF blending membrane was prepared via the method of thermally induced phase separation (TIPS). The properties and surface structure of the blending membrane were characterized by means of contact angle test, mechanical properties test, Fourier transform infrared spectroscopy (FTIR), atomic force microscope (AFM), and differential scanning calorimetry (DSC). The results showed that the contact angle of PVDF membrane was decreased from 85.71° of pure membrane to 66.46° of PU/PVDF blending membrane (PU of 2 wt.%), indicating that the hydrophilicity of blending membrane was significantly improved with the addition of PU. FTIR tests showed that the C=O stretching vibration absorption peak in aldehyde group (hydrophilic group) of PU/PVDF blending membrane was stronger than that of pure PVDF membrane, which can explain the increase in hydrophilicity of blending membrane. Moreover, mechanical properties test indicated that the mechanical strength of PU/PVDF blending membrane was increased remarkably when compared with that of pure PVDF membrane. The AFM results showed that the PU/PVDF blending membrane had lower roughness, manifesting its improved anti-fouling properties. In addition, DSC results indicated that the crystallinity of PVDF polymer matrix decreased with the introduction of PU.

Keywords: PVDF; PU; TIPS; Blending membrane; Hydrophilicity; Surface roughness

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