

일반강연 II-7

Preparation and Characterization of PP-*g*-Ploxamer Membranes by UV Irradiation Methods and their Solutes Permeation Behaviors

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1. Introduction

Polypropylene(PP) membrane is widely used in the field of microfiltration and ultrafiltration. However, the hydrophobicity of PP causes the adsorption of hydrophobic and amphoteric solutes in the feed. Surface modification techniques of membrane through the treatment of hydrophilizing agents, coating of hydrophilic compounds, UV, plasma and high energy irradiation, etc. can have a great effect on propensities to prevent the protein from staining membranes. Among them, the modification to hydrophilize membrane surface using UV is very simple and effective.

Recently many studies for more effective surface modification have been conducted. Iwata et al. prepared membranes by grafting polyethylene glycol diacrylate macromer(PEGDA) onto polysulfone with plasma using a glow discharge reactor which prevent the oil from staining the membrane. The primary mechanism contributing to the membranes is preventing the oil from directly contacting the surface of the membrane as the PEGDA chains dissolved into emulsion.

To evaluate their feasibility for use as a anti-fouling separation membrane, we prepared hydrophilic membranes by UV irradiation method and investigated their characteristics.

2. Experimental

In this study, anti-fouling ultrafiltration membrane was prepared by grafting Poloxamer(polyethylenepolypropylene glycols) acrylate macromer onto PP membrane with UV irradiation technique. Poloxamer was reacted with acryloyl chloride. PP membranes grafted with Poloxamer acrylate were prepared by UV irradiation with varying macromer concentration and irradiation time. These membranes were washed with deionized water to remove unreacted monomers and homopolymers.

Their temperature-sensitive properties based on Poloxamer were investigated.

Their structural properties and surface morphology were investigated with FT-IR spectrum, FE-SEM, ESCA and NMR spectroscopy. To characterize the hydrophilicity of membrane surface, the contact angles were measured.

3. Result and Discussion

This study showed that Poloxamer with acrylate functional group was synthesized and Poloxamer acrylate was successfully grafted onto the membrane surface using a UV pre-irradiation method. The hydrophilicity increased as Poloxamer was grafted onto the membrane surface. The flux of modified membrane decreased above the cloud point of grafted Poloxamers. It means we can control the permeate flux and rejection rate depending on the operating temperature.

4. References

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