

Development of fouling-resistant RO membranes using PEGA macromer

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ABSTRACT

Reverse osmosis membranes are widely used in many industrial fields including seawater desalination, ultrapure water production, medical and food processing. But the decrease in performance of RO membranes in water reuse and purification systems due to fouling is one of the concerns. In this study we investigated the anti-fouling property of PEGA homopolymer-coated RO membranes. PEGA homopolymer was synthesized by a free radical solution polymerization method. PEGA-coated membrane was prepared via a simple dip-coating method. Glutaraldehyde was used as a cross linker in our experiment. After chemical modification, membrane surface properties were characterized using X-ray photoelectron spectroscopy (XPS), water contact angle measurement, atomic force microscopy (AFM). Surface modified membranes showed lower roughness, more hydrophilicity compared to unmodified RO membranes. Fouling tests were conducted in the cross-flow mode using various foulants, including bovine serum albumin (BSA), humic acid, and *E. coli* broth. As a result, surface modified membranes exhibited better anti-fouling properties compared to unmodified RO membranes. After physical cleaning, the modified membrane recovered almost 100% of its initial filtration performance.

Keywords: Polyethylene glycol acrylate (PEGA); Reverse osmosis; Biofouling; Surface modification; Anti-fouling

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