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Enhancing the anti-fouling property of the SWRO membrane through the surface coating with the styrene-PEGA copolymer

Hyoungwoo Choi[a], Youngnam Kwon[b], Jihye Park[a], Sungpyo Hong[a,c], Taemoon Tak[a]*

[a]*Department of Biosystems and Biomaterials Science and Engineering, Seoul National University, 599 Gwanangno, Gwanak-gu, Seoul 151-921, Korea*
Tel. +82 (2) 880-4621; Fax +82 (2) 873-2285; email: tmtak@snu.ac.kr
[b]*School of Urban and Environmental Engineering, Ulsan National Institute of Science and Technology, Bangyeon-ri, Eonyang-eup, Ulju-gun, Ulsan Metropolitan City 689-100, Korea*
[c]*Woongjin Chemical Co Ltd., R&D Center, Korea*

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ABSTRACT

Polyamide-based reverse osmosis membranes have been used as a wastewater treatment process in recent years. However, natural organic materials present in the filtration medium cause severe membrane fouling problem, which makes the system less competitive. It is well known that membrane fouling can be influenced by the surface property of the membrane — surface morphology, chemical composition, surface charge, etc. To introduce hydrophilic materials on the membrane is one of the promising modification methods to mitigate membrane fouling. In this study, we investigated the effect of amphiphilic comb polymer coating layer on anti-fouling property of seawater reverse osmosis (SWRO) membranes. Styrene–PEGA amphiphilic copolymer was synthesized by a free radical solution polymerization method. The chemical structure and properties of the synthesized styrene–PEGA copolymer were determined by Fourier transform-infrared spectroscopy (FT-IR), atomic force microscopy (AFM), and ξ-potential. Obtained copolymer was coated on the membrane surface via a simple dipping method. The performance of the coated membrane was evaluated in a cross flow mode. The anti-fouling property of the surface coated membrane was investigated using model foulant solution filtration. Bovine serum albumin was used as a model foulant. The modified membranes were less fouled than pristine RO membranes, and recovered 95% of its initial flux after hydraulic cleaning.

Keywords: Styrene–PEGA copolymer; Desalination; Bio-fouling; Surface modification; Anti-fouling.

* Corresponding author.