

Excellent Biofouling Resistance of Triclosan-Immobilized Polyamide Thin Film Composite Membranes

박상희, 전성권, 박성준, 권순진, 신민규, 이정현[†]
고려대학교
(leejhyyy@korea.ac.kr[†])

Polyamide (PA) thin film composite (TFC) used in the desalination process critically suffer from biofouling, which enhances the hydraulic resistance of the membrane, leading to its flux decline. In this work, to improve biofouling resistance of a PA TFC membrane, we propose a strategy to covalently immobilize a broad-spectrum organic biocide (triclosan, TC) on the membrane surface. TC was first functionalized with an aminopropyl group to improve its reactivity with the membrane surface and thus facilitate covalent attachment of TC. Then, the TC-immobilized TFC (TC-TFC) membranes were fabricated by the amide formation reaction between the amine groups of the aminopropyl-functionalized TC and the acyl chloride groups on the membrane surface, which was verified by XPS analysis. Although the hydrophobic nature of TC resulted the slightly reduced separation performance of the TC-TFC membrane, it still maintained a satisfactory RO performance level. Importantly, the TC-TFC membrane exhibited the strong antibacterial activity against both gram negative and gram positive bacteria and effectively retarded the biofilm formation on the membrane surface.