



## Random copolymer films as potential antifouling coatings for reverse osmosis membranes

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### ABSTRACT

Adsorption of biopolymers such as proteins and polysaccharides is known to expedite/facilitate microbial attachment and subsequent formation of biofilm on membrane surface that ultimately results in membrane biofouling. Therefore, surfaces that resist the adhesion of biopolymers can potentially block the irreversible attachment of microorganisms as well. Recently, it was shown that random copolymerization of the hydrophilic hydroxyethylmethacrylate (HEMA) monomer with the hydrophobic perfluorodecylacrylate (PFA) monomer leads to a surface that interferes with the adsorption of a representative protein, bovine serum albumin (BSA). In this work, we explore the feasibility of using these copolymer films as potential antifouling coatings on commercial RO membranes. The films were deposited using iCVD technique that allows good composition control, is solvent-free and can be done readily at room temperature. Characterization and performance evaluation of the coated membranes was carried out using different techniques. Scanning Electron Microscopy images showed the coatings to be conformal and continuous. The surface topology of the membranes was analyzed with Atomic Force Microscopy. The results confirmed that the copolymer film does not cause a significant increase in the membrane surface roughness (a crucial parameter in biofouling). Short-term permeation tests with DI water proved that copolymer films of 20 nm thickness did not cause any significant decline in permeate water flux.

*Keywords:* RO membranes; Surface modification; Initiated chemical vapor deposition; Biofouling resistant coatings; Permeation; Hydrophilicity

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