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Creation of active-passive integrated mechanisms on membrane surfaces for superior antifouling and antibacterial properties

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Abstract

Antifouling mechanisms are critical to membrane structure-property relationship. Currently, most researches focus on either passive fouling-resistant, fouling-release mechanisms or active antibacterial mechanism, the integration of active and passive antifouling mechanisms is much less explored. In this study, a novel modifier bearing three functional segments was designed and utilized for antifouling and antibacterial membrane surface construction. In detail, a block-like copolymer comprising low surface energy poly(hexafluorobutyl methacrylate) (PHFBM), hydrophilic poly(poly(ethylene glycol) methyl ether methacrylate) (PEGMA) and antibacterial poly[2-(methacryloyoxy)ethyl trimethylammonium chloride] (PMTAC) quaternary ammonium salt segments was prepared via free radical polymerization. The copolymer was employed for fabricating PVDF membranes by non-solvent induced phase separation method. The surface enrichment of copolymer was confirmed by