Antifouling Poly(vinylidene fluoride) Ultrafiltration Membranes Containing Amphiphilic Comb Polymer Additive

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An amphiphilic comb polymer consisting of poly (vinylidene fluoride-co-chlorotrifluoroethylene) [P(VDF-co- CTFE)] main chains and poly(oxyethylene methacrylate) (POEM) side chains was synthesized using direct initiation of the chlorine atoms in CTFE units through atom transfer radical polymerization, as confirmed by 1H NMR and FTIR spectroscopy. The P(VDF-co-CTFE)-g-POEM comb polymer was introduced as an additive to prepare poly(vinylidene fluoride) antifouling ultrafiltration membranes. As the contents of comb polymer increased, the mechanical properties of membranes slightly decreased due to the decreased crystallinity of the membranes, as revealed by universal testing machine and X-ray diffraction. However, water contact angle measurement and X-ray photoelectron spectroscopy showed that the hydrophilic POEM segments spontaneously segregated on the membrane surfaces. As a result, the antifouling property of the membranes containing P(VDF-co- CTFE)-g-POEM comb polymer was considerably improved with a slight change of water flux.