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Modification of polysulfone membranes via surface-initiated atom transfer radical polymerization

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Abstract

Hydrophilic poly((poly(ethylene glycol) methyl ether methacrylate) (P(PEGMA)) and poly(glycidylmethacrylate) (PGMA) brushes were grafted from chloromethylated polysulfone (CMPSF) membrane surfaces via surface-initiated atom transfer radical polymerization (ATRP). Prior to ATRP, chloromethylation of PSF was performed beforehand and the obtained CMPSF was prepared into porous membranes by phase inversion process. It was demonstrated that the benzyl chloride groups on the CMPSF membrane surface afforded effective macroinitiators to graft the well-defined polymer brushes. ^1H NMR was employed to confirm the structure of CMPSF. The grafting yield of P(PEGMA) and PGMA was determined by weight gain measurement. Attenuated total reflectance Fourier transform infrared (ATR-FTIR) spectroscopy and X-ray photoelectron spectroscopy (XPS) confirmed the grafting of P(PEGMA) and PGMA

chains. Water contact angle measurements indicated that the introduction of P(PEGMA) and PGMA graft chains promoted remarkably the surface hydrophilicity of PSF membranes. The effects of P(PEGMA) and PGMA immobilization on membrane morphology, permeability and fouling resistance were investigated. It was found that P(PEGMA) and PGMA grafts brought higher pure water flux, improved hydrophilic surface and better anti-protein absorption ability to PSF membranes after modification. And evidently, macromonomer P(PEGMA) brought much better properties to the PSF membranes than PGMA macromonomer.



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Keywords

Polysulfone; Hydrophilicity; Protein absorption resistance; Surface-initiated ATRP

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