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Abstract

In this study, a new facile and cost effective method is used to modify polysulfone membrane surface in order to improve the hydrophilicity, antifouling, and blood compatibility. This modification was performed by adding two functional monomers on the dialysis membrane. Polysulfone (PSF) membranes containing polyvinylpyrrolidone were prepared via phase inversion technique. In the next step, free radical polymerization combined with surface polymerization was used to introduce acrylic acid (AA) and 2-hydroxyethyl methacrylate (HEMA) onto the polysulfone membrane surface via circulation of initiator and monomer solutions across the membrane surface, respectively. Various monomer concentrations were selected to obtain an optimum condition. Field emission scanning electron microscope (FE-SEM), attenuated total reflectance-Fourier transform infrared spectroscopy (ATR-FTIR), and atomic force microscopy (AFM) confirmed that monomers were successfully grafted on the membrane surface. Water contact angle (WCA) results represented the enhancement of membrane hydrophilicity, which effectively improved water flux and alleviated protein fouling resistance. WCA decreased from 71℃ to 45℃ which corresponds to the negative charge of the membrane surfaces. When the AA concentration was 1 M, the flux recovery ratio reached up to 66% and total protein fouling resistance noticeably decreased to **38%**. Nevertheless, urea, creatinine, and vitamin B12 clearance experienced a slight increase. Biocompatibility of membranes was evaluated via activated partial thromboplastin time (APTT), prothrombin time (PT), and cytotoxicity experiments. The presented results indicated that APTT was enhanced by 35% for the best blood compatible sample.