Surface modification of poly(vinylidene) fluoride ultrafiltration membrane via coating in liquid carbon dioxide

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Various surface modification techniques have been proposed to enhance the hydrophilicity of commercially available hydrophobic ultrafiltration membrane. Preparation of antifouling ultrafiltration membrane by coating in liquid carbon dioxide is a new hydrophilization method. Because of beneficial physical properties of liquid carbon dioxide such as low viscosity and low surface tension, it can be possible to have uniform coating of the surface and pores of the membrane. In this study, hydrophilic coating has been carried out by inducing crosslinking reaction of poly(ethylene glycol) diacrylate (PEGDA) on the surface/pore of the poly (vinylidene fluoride) UF membrane in L-CO2 with azobisisobutyronitrile (AIBN) as radical polymerization initiator. The effect of PEGDA concentration on the surface composition was characterized in detail using XPS, FT-IR spectroscopy, and EPMA. The results were compared with pristine PVDF. Static protein absorption, water and protein solution permeation measurements were carried out to understand the efficiency and protein-resistance of the coated PVDF membrane.