Ultrathin and uniform L-CO_2 based coating on the surface and pores of hydrophobic polyvinylidene fluoride (PVDF) membrane for improving the antibiofouling properties

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The ultrathin and uniform coating on the surface and in the pores of the hydrophobic polyvinylidene fluoride (PVDF) membrane was produced due to the extremely low surface tension and low viscosity of liquid carbon dioxide (l-CO_2) which was used as a solvent agent. Polyethylene glycol diacrylate (PEGDA) was used as an l-CO_2 soluble hydrophilic monomer source and azobisisobutyronitrile was used as a radical initiator to induce the crosslinking reaction on the surface and in the pores of hydrophobic PVDF membrane. Long-term flux test using bovine serum albumin (BSA) shows that the modified membranes exhibits higher protein solution flux compared to the virgin membrane and to a commercial "low protein binding" hydrophilic PVDF membrane. This observation indicates that coating in l-CO_2 can be very promising solution to reduce membrane biofouling in microfiltration and ultrafiltration water treatment plants.