

Non-Biofouling Membranes Fabricated with Three-Dimensional Inverse-Opal Structures Decorated with PAA-g-PEG

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In membrane system, the prevention of biofouling problem is significant for maintaining high flux. As a representative functional moiety for non-biofouling, derivatives of poly(ethylene glycol) functional group have been widely studied, where they can form the hydration layer on the surface for repelling the protein adsorption. However, most of non-biofouling studies have been reported two-dimensional surfaces, which is far from the three-dimensional characteristics used membrane structures. In order to gain better result on this system, we employed 3D structured membranes based on inverse-opal (IO) structures. We functionalized the internal walls of IO frame with layer-by-layer deposition of polyelectrolyte multilayers and then decorated the outermost layer with attaching chains of poly(acrylic acid)-graft-poly(ethylene glycol) (PAA-g-PEG). Finally, non-biofouling characteristics were compared with varying surface functional groups, resulting in that protein adsorption of bovine serum albumin on the PAA-g-PEG modified structure is outstandingly low even inside the 3D membrane structures and flux is also remained high value.