Some Designs and Applications of Antifouling Membranes

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Abstract

Antifouling membranes play a crucial role in numerous applications, from water purification to biomedical devices. In this study, we present a comprehensive investigation on the development of antifouling membranes in our group using polyethylene glycol-based (PEG) and zwitterionic copolymers. Leveraging grafting, coating, and *in situ* modification techniques, we aim to enhance the membranes' resistance to biofouling by proteins, bacteria, blood cells, etc., and improve their overall performance, particularly in biomedical applications (wound dressing, blood filtration/leukoreduction filters). We employ three different approaches to modify the membranes: grafting ("*from*" and "*onto*"), coating, and *in situ* modification (blending), and have tested various antifouling materials, including PEGylated (based on poly(ethylene glycol) methyl ether methacrylate) and zwitterionic (based on sulfobetaine methacrylate, carboxybetaine methacrylate or phosphobetaine methacrylate) or pseudo-zwitterionic materials. Through this presentation showcasing our group's studies, we also discuss the advantages and drawbacks of each of these approaches, as well as some molecular designs important to take into account in order to optimize the membranes' performances.

Keywords: Antifouling membranes, PEGylated copolymers, Zwitterionic copolymers, Grafting, Coating, *in situ* modification, Biomedical applications.