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Surface modification of PVA hydrogel membranes with carboxybetaine methacrylate via PET-RAFT for anti-fouling

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Polyvinyl alcohol (PVA) has excellent biocompatibility, significant stability and similarity moisture content to human tissues. Hydrogels are considered as promising scaffolds for cell encapsulation and tissue regeneration. And PVA based hydrogel has promising applications in biomedical material, such as drug delivery system, biosensor, artificial cartilage, anti-coagulation materials, biomedical sponge, artificial cornea. Nevertheless, the formation of biofilm caused by the cells specific adsorption and the proteins nonspecific adsorption onto the implanted biomaterials is one of the common complications for these biomedical devices and limits its application. From bionics, surface modification with antifouling self-assembled monolayers (SAMs) or polymers is efficacious to resist nonspecific protein adsorption. Since 1998, reversible addition-fragmentation chain transfer (RAFT) polymerization has been widely used to prepare of high polymers and specific structural polymers, and surface modification. Researchers have utilized RAFT polymerization on surface modification, but only a little research has been reported about PET-RAFT. In this paper, we demonstrated the applicability of the oxygen tolerant PET-RAFT mechanism on the PVA modification. In this study, we immobilized the zwitterionic CBMA onto the surface of PVA hydrogel membrane via PET-RAFT to fabricate an antiadhesion and biocompatible surface. ATR-FTIR spectra was detected by an FTIR instrument with Quest ATR accessory. Primary Eyelid fibroblast cells were utilized in the Cytotoxicity and anti-fouling experiments. PET-RAFT has merits of low costs, easy realizable and low toxicity, and has a great potential to be used in introducing functional polymer brushes onto the surface of PVA hydrogel membrane and constructing functional membrane surfaces.

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