

Immobilization and stabilization of enzymes on functionalized nanostructures for enzymatic antifouling in membrane reactor

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Enzymes has attracted an attention due to its great potential in developing environmentally friendly antifouling strategy. Acylase (AC) is a quorum quenching enzyme that can hydrolyze the signal molecules in cell-to-cell communication. However, the poor stability of acylase has limited its uses as an effective antifouling tool. Nanobiocatalytic approaches has demonstrated its great potential for the development of enzyme system with high enzyme loading and stability for a long-term operation in various applications. AC was immobilized and stabilized on carboxylated polyaniline nanofibers via covalent attachment (CA), enzyme coating (EC), and magnetically separable enzyme precipitate coating (Mag-EPC). The antifouling of highly loaded and stable Mag-EPC against the biofouling/biofilm formation of *P. aeruginosa* was tested under both static- and continuous-flow conditions. The biofilm formation in the presence of Mag-EPC under static condition was lower than that under control condition with no addition of Mag-EPC. Under continuous membrane filtration, Mag-EPC delayed the increase of transmembrane pressure more effectively as the concentration of added Mag-EPC increased.