

Fabrication of micropatterned hydrogel membrane for the application of enzyme immobilization

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In this study, we described the photolithographical techniques to fabricate microporous hydrogel membrane and its application to the enzyme immobilization. Precursor solution for the hydrogels were composed of acrylated poly(ethylene glycol) macromer and photoinitiator. Patterns of micropores were generated by exposing UV light through the photomask. After UV exposure, only exposed region underwent free radical polymerization resulting in crosslinked hydrogel while masked region remained in the liquid state. Size of micropore was ranged from 50 μm to 500 μm and microscope image proved that generated micropores were connected from top to bottom of hydrogel membrane. To immobilize enzyme onto microporous hydrogel membrane, hydrogel surfaces were modified with 5-Azido-2-nitrobenzoyloxy-N-hydroxysuccinimide which is bifunctional linker having an azide group at one end and a N-hydroxysuccinimide (NHS) group at the other. Surface analysis proved that azide group was covalently bind to hydrogel surface and enzymes were successfully conjugated with NHS group. Enzyme-catalyzed reactions were carried out using glucose oxidase immobilized on hydrogel membrane.