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Improvement on the Specific Activities of Immobilized Enzymes by Poly(Ethylene Oxide) Surface Modification

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Abstract : Covalent immobilization of enzymes on solid supports is an alternative approach to biocatalysis with the added benefits of simple enzyme removal, improved stability, and adaptability to automation and high-throughput applications. Nevertheless, immobilized enzymes generally suffer from reduced activities compared to their soluble counterparts. One major factor leading to activity loss is the intrinsic hydrophobic property of the supporting material surface, which could result in the conformational change/confinement of enzymes. We report a strategy of utilizing flexible poly (ethylene oxide) (PEO) moieties as to improve the surface hydrophilicity of solid supports used for enzyme immobilization. DNA modifying enzymes were covalently conjugated to PEO-coated magnetic-beads. Kinetics studies proved that the activities of the covalently-immobilized DNA modifying enzymes were greatly enhanced by the PEO modification on the bead surface.

Keywords : immobilized enzymes, biocatalysis, poly(ethylene oxide), surface modification
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