551f Enzyme Stabilization in Various Nanostructured Materials

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Efforts using nanostructured materials are an intriguing approach for developing composite of enzyme-nanomaterials since these materials can provide a large surface area, which can lead high volumetric enzyme activity. Recent advances in enzyme aggregation via cross-linking are promising for the development of highly stable catalytic composite of bio-nanomaterials. Significant enhancement of enzyme stabilization was realized as introducing cross-linked enzyme aggregates (CLEAs) via glutaraldehyde mediated coupling with various nanostructured materials such as nanofiber, carbon nanotube, or mesoporous silica. The enzyme stability of enzyme aggregated nanomaterials was greatly enhanced with essentially no measurable loss of activity over a month or several days of observation under rigorous shaking condition. This approach of enzyme aggregation with various nanostructure materials, yielding high activity and stability, creates a useful new biocatalytic immobilized enzyme system with potential applications in biosensor, bioelectrochemistry, bioremediation and bioconversion.