

Glucose Oxidase based Biocatalyst Consisting of Enzyme Cluster Composite and Its Effective Utilization to Bioelectrical Device

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Terephthalaldehyde (TPA) crosslinkers are used to fabricate the chemical bonding with glucose oxidase enzyme (GOx) and create (TPA/GOx) enzyme cluster composite. Carbon nanotubes (CNTs) used as the catalyst support due to its superior chemical, mechanical and electrochemical properties. The inter-GOx crosslinking links that is formed by (TPA/GOx) composite create the large and porous enzyme cluster structure and also crosslinking with PEI/CNT supporter. [TPA/GOx]/PEI/CNT catalysts formed by this two-step crosslinking have superior properties: (i) increase electron transfer due to electron delocalization of π conjugation bonding that facilitate electron transfer (ii) alleviate GOx denaturation due to formation of strong chemical bonds. Based on several electrochemical evaluations, such as cyclic voltammogram (CV), polarization curve measurement, enzyme activity measurement and X-ray photoelectron spectroscopy (XPS); these catalysts show excellent catalytic activity and enzymatic biofuel cell (EBC) performance. The result representing the superiority of (TPA/GOx) enzyme cluster composite fabricated by two-step crosslinking bondings.