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ORIGINAL PAPER

Enzyme immobilization in a photosensitive conducting polymer bearing azobenzene in the main chain

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Abstract A new photosensitive and thermosensitive monomer, namely bis(4-(3-thienyl ethylene)-oxycarbonyl)diazobenzene (TDAZO), was synthesized. The photochemical and thermal *cis–trans* isomerization of the monomer has been investigated. The rate constants of the photoisomerization of TDAZO in ACN and DCM were 0.195 and 0.308 min^{-1}, respectively. For spectroelectrochemical investigation and enzyme immobilization application, TDAZO copolymerized with thiophene and pyrrole. Electrochemical and spectroelectrochemical properties of P(TDAZO-*co*-Th) were investigated and invertase was immobilized in P(TDAZO-*co*-Py) copolymer. Immobilization of enzymes was carried out by the entrapment of the enzyme in conducting polymer matrices during electrochemical polymerization of pyrrole through thiophene moieties of the TDAZO. Optimum conditions for this electrode, such as pH, temperature, kinetic parameters (K_m and V_{max}) and operational stability were investigated. Kinetic parameters invertase-immobilized in copolymer were smaller than free enzyme. The optimum operational temperature was 10 °C higher for immobilized enzyme than that of the free enzyme. Due to

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