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Electroconducting π -conjugated N-nonylaryl oligomers as a matrix in the construction of laccase biosensors

Agnieszka Jedrychowska, Joanna Cabaj and Jadwiga Soloduch

Wroclaw University of Technology, Poland

Biosensors found the extensive applications in monitoring of atmospheric pollution and contamination of soil and water, medical diagnostics, analysis of food products. Although, for many years extensive research have been carrying out in the field of sensors, there is still a great need to develop low-cost and efficient diagnostic equipment, enabling fast and accurate detection of the analyte. The crucial issues in the design of enzymatic electrodes are: To ensure the efficient charge transfer between the active site of the biocatalyst and the electrode surface and to provide strong and long-lasting binding between the matrix and the enzyme, without a negative impact on the catalytic activity of the protein. Since the use of electroconducting materials in construction of biosensors improves the devices performance, the purpose of the researches was the chemical modification of substrates with new π -conjugated oligomers and the efficient immobilization of laccase to the prepared semi-conducting matrices. The thin layers of heterocyclic N-nonylaryl polymers based on 2,5-pyridine were prepared on glassy substrates by spin-coating and visualised by atomic force microscopy. The measurements of the catalytic activity of the immobilized enzyme were carried out using a colorimetric method. The presented studies show prospective application of developed systems with immobilized laccase for biosensing purposes, i.e. for the detection of phenolic compounds in food products or for the environment monitoring.

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Biography

Agnieszka Jedrychowska is pursuing his PhD in Faculty of Chemistry at Wroclaw University of Technology. Her research interests include "Properties of well-ordered, thin films built of a new class of heterocyclic conducting compounds for the construction of simple sensors". Her most important scientific field concerns the efficient immobilization of oxidoreductases onto chemically modified substrates and the measurement of the catalytic activity and determination of the stability of the immobilized enzymes in such systems. She is a co-author of 11 publications, six patents and five patent declarations.

agnieszka.jedrychowska@pwr.edu.pl

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