TWENTY-FIRST YOUNG RESEARCHERS' CONFERENCE
MATERIALS SCIENCE AND ENGINEERING

November 29 – December 1, 2023, Belgrade, Serbia

Program and the Book of Abstracts

Materials Research Society of Serbia
&
Institute of Technical Sciences of SASA

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Aim of the Conference

Main aim of the conference is to enable young researchers (post-graduate, master or doctoral student, or a PhD holder younger than 35) working in the field of materials science and engineering, to meet their colleagues and exchange experiences about their research.

Topics

Biomaterials
Environmental science
Materials for high-technology applications
Materials for new generation solar cells
Nanostructured materials
New synthesis and processing methods
Theoretical modelling of materials

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Results of the Conference

Beside printed «Program and the Book of Abstracts», which is disseminated to all conference participants, selected and awarded peer-reviewed papers will be published in journal "Tehnika – Novi Materijali". The best presented papers, suggested by Session Chairpersons and selected by Awards Committee, will be proclaimed at the Closing Ceremony. Part of the award is free-of-charge conference fee at YUCOMAT 2024.

Sponsors

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13-4

Dependence of alumina/ascorbate oxidase biosensor electrocatalytic activity on alumina type

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Biosensors have emerged as indispensable tools across various disciplines, facilitating real-time monitoring of specific biomolecules. Within this context, a biosensor system integrates alumina, a versatile material, with ascorbate-oxidase, enabling the electrocatalytic detection of ascorbic acid. This study investigates the influence of different alumina types on the electrocatalytic activity of alumina/ascorbate-oxidase biosensors. The electrocatalytic performance of these biosensors critically hinges on the properties of the alumina substrates. Specifically, two distinct alumina variants were examined: aluminum oxide trihydrate (referred to as "T") and anhydrous (referred to as "G"). Biosensors were meticulously constructed by immobilizing ascorbate oxidase onto these designated substrates. Electrochemical experiments unveiled marked disparities in the electrocatalytic performance of the biosensors, contingent on the type of alumina used. Cyclic voltammetry and square wave voltammetry were employed to assess electrocatalytic activity. The outcomes demonstrated that G alumina exhibited the highest electrocatalytic activity. In contrast, T alumina displayed diminished electrocatalytic activity due to its reduced surface area, mainly ascribed to the presence of surrounding water molecules. Besides electrochemical characterization, the alumina substrates underwent analysis via Fourier Transform Infrared Spectroscopy and Electron Paramagnetic Resonance. After determining the more favorable alumina variant, an optimization test was initiated, and the calibration curve generation process commenced. This investigation underscores the pivotal role of alumina in shaping the electrocatalytic performance of biosensors, exerting significant influence over sensitivity, selectivity, and stability. An understanding of these effects is imperative for optimizing biosensor design and enhancing their utility in diverse fields. Future research endeavors may further explore alternative alumina modifications and their repercussions on biosensor performance.