INCOME2022

10th INTERNATIONAL CONFERENCE ON MECHANOCHEMISTRY AND MECHANICAL ALLOYING

Book of Abstract

ORGANIZERS

UNIVERSITÀ DEGLI STUDI DI CAGLIARI

CO-ORGANIZERS

MechSustInd

cost EUROPEAN COOPERATION IN SCIENCE & TECHNOLOGY

Funded by the European Union

ENDORSED BY

EuChemS
European Chemical Society

Book of Abstracts

This *Book of Abstracts* contains the original abstracts of oral and poster presentations submitted to the *10th International Conference on Mechanochemistry and Mechanical Alloying 2022* (*INCOME2022*).

The *Book of Abstracts* is divided into three sections, namely *Invited Oral Presentations*, *Oral Presentations* and *Poster Presentations*.

Within each sections, presenting authors are listed in alphabetical order.

10th International Conference on Mechanochemistry and Mechanical Alloying 2022 (*INCOME2022*)

Cagliari, Italy, June 06 - 10 2022

10th International Conference on Mechanochemistry and Mechanical Alloying
www.income2022.it

Mechanochemical approach for non-enzymatic glucose sensing materials

Tihana MUDRINIĆ, [a]*

with

Biljana MILOVANOVIĆ, [a] Srđan PETROVIĆ, [a] Stefan PAVLOVIĆ, [a]

Predrag BANKOVIĆ, [a] Aleksandra MILUTINOVIĆ-NIKOLIĆ.[a]

*e-mail: tihana@nanosys.ihtm.bg.ac.rs, tihana.mudrinic@ihtm.bg.ac.rs

[a] University of Belgrade – Institute of Chemistry, Technology and Metallurgy, National Institute, Department of Catalysis and Chemical Engineering, Njegoševa 12, Belgrade, Republic of Serbia

Recently the focus of electrochemical glucose sensing is on the fabrication of enzyme-free electrodes based on non-precious transition metal oxides, especially cobalt oxide [1]. To our best knowledge, these materials were primarily prepared by conventional methods using solutions, while the solvent-free mechanochemical approach was scarcely reported. Therefore, in this work Co3O4 supported on alumina (Co3O4/Al2O3) were prepared by ball milling using different milling times (0.5, 1, and 2 h) and Co3O4 contents (4, 8, and 16 wt. %). Ball to powder ratio was 30:1 and rotation speed was 300 rpm. The electrodes based on the synthesized material were prepared in the form of carbon paste electrode (CP-Co3O4/Al2O3).

The particle size distribution, phase, and chemical composition of the obtained materials were determined using LDPSA, XRPD, and XRF, respectively. The electrochemical performance of the CP-Co3O4/Al2O3 electrode was tested in an alkaline solution containing glucose using cyclovoltammetry (CV) and chronoamperometry (ChA).

CV revealed that milling time affected the electrochemical response. The highest current response was obtained with material milled for 1 h. Both ChA and CV confirmed that the electrochemical performance was further improved by increasing cobalt content. The CP electrode-based mechanochemically prepared samples showed enhanced performance in comparison to hand mixed Co3O4 and alumina. The beneficial effect of ball milling was attributed to the high dispersion of cobalt oxides over alumina even for large cobalt loadings without agglomeration. The obtained experimental results proved that the solvent-free mechanochemical approach is a promising synthetic route for obtaining green and sustainable glucose-sensing material of the fourth generation.

References

[1] Hwang, D-W., Lee S., Seo M., Chung T.D.; Recent advances in electrochemical non-enzymatic glucose sensors – A review. *Anal. Chim. Acta.* **2018**, *1033*, 1–34.

Acknowledgment: This work was supported by CA18112 – Mechanochemistry for sustainable Industry and the Ministry of Education, Science and Technological Development of the Republic of Serbia, (Grant No. 451-03-68/2022-14/200026).