proceedings

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Abstract

Surface Area Enhancement Through Electrochemical Oxidation of Ferricyanide at a Carbon Paste Electrode Modified with Zr-Based MOF †

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† Presented at the 3rd International Electronic Conference on Processes—Green and Sustainable Process Engineering and Process Systems Engineering (ECP 2024), 29–31 May 2024; Available online: https://sciforum.net/event/ECP2024.

Keywords: surface area; electrochemical; oxidation; Zr-MOF; carbon paste electrode; ferricyanide

This study investigates the surface area enhancement achieved through the electrochemical oxidation of ferricyanide at a carbon paste electrode (CPE) modified with a Zr-based metal/organic framework (MOF). The utilization of MOFs in electrode modification has gained significant attention due to their unique properties, such as a high surface area, tunable pore size, and excellent stability. In this research, a Zr-based MOF was synthesized and characterized for its structural and morphological properties. The MOF-modified CPE was prepared by incorporating the synthesized MOF into a carbon paste matrix. The electrochemical behavior of ferricyanide at the MOF-modified CPE was investigated using cyclic voltammetry. The results showed an enhanced electrochemical response compared to the unmodified CPE. The increase in the surface area of the MOF resulted in higher analyte accessibility and improved electron transfer kinetics. The electrochemical oxidation of ferricyanide at the MOF-modified CPE exhibited well-defined oxidation peaks with higher current densities and lower peak potentials, indicating enhanced electrocatalytic activity. The enhancement of the surface area achieved through the incorporation of MOFs into electrode materials has significant implications in various electrochemical applications. The reported approach can improve the sensitivity and selectivity of electroanalytical techniques, as well as the performance of energy storage devices, and enable efficient catalysis for different chemical reactions.

Author Contributions: Conceptualization, S.H.; methodology, M.G.; formal analysis, S.H. and M.G.; writing—original draft preparation, S.H. and M.G.; writing—review and editing, B.B.N., M.A.H. and I.H.; supervision, M.G.; project administration, M.G. All authors have read and agreed to the published version of the manuscript.

Funding: This research received no external funding.

Institutional Review Board Statement: Not applicable.

Informed Consent Statement: Not applicable.

Citation: Gojeh, M.; Hayat, S.; Nyakuma, B.B.; Hilal, M.A.; Hashim, I. Surface Area Enhancement Through Electrochemical Oxidation of Ferricyanide at a Carbon Paste Electrode Modified with Zr-Based MOF. *Proceedings* **2024**, *105*, 153. https://doi.org/10.3390/proceedings2024105153

Academic Editor: Blaž Likozar

Published: 28 May 2024

Data Availability Statement: No new data were created.

Conflicts of Interest: The authors declare no conflicts of interest.