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Sensing Interactions of Chlorella Vulgaris and Model Lipid Membranes Using Gold and Carbon Screen-Printed Electrodes

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The main objective of this study is to evaluate electrochemical gold and carbon screen-printed electrodes (SPEs) as potential platforms to investigate interactions of lipids model systems with biologically important molecules.
The system under examination consists of model lipid membrane and *Chlorella Vulgaris* microalgae solution. Two types of working electrodes were used –gold and carbon, and their advantages and restrictions have been analyzed. The applied electrochemical methods were cyclic voltammetry and electrochemical impedance spectroscopy. The behavior of the model membrane system was studied in response to three different concentrations of Chlorella whole cell samples, as well as over time. Our investigations reveal that the *Chlorella Vulgaris* sample interacts significantly with the model membrane. The observed with cyclic voltammetry (CV) reduction peaks express a shift in voltage with different concentrations of the substance. The response of the membrane system differed significantly between the two electrode types. On the gold electrode, membrane disruption occurred and did not recover over time, indicating strong and possibly irreversible interaction.
In contrast, the carbon electrode allowed the system to gradually return to its original state, suggesting transient processes. This suggests that the lipids interact with the carbon electrode and the microalgae remains in the solution.
Those changes were confirmed by the electrochemical impedance data. Suitable electrochemical equivalent circuits were found to represent the processes on the electrodes interface. The reported results show that gold SPEs, compared to carbon ones, are more suitable for studying the interactions of lipid model systems and *Chlorella Vulgaris* solution.
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Primary authors: POPSTOYANOVA, Desislava (Medical University - Varna); Prof. NIKOLOVA, Krastena (Medical University - Varna); Dr VLADIMIROVA-MIHALEVA, Lilia (Department of Optics and Spectroscopy, Faculty of Physics, Sofia University "St. Kliment Ohridski")

Presenter: POPSTOYANOVA, Desislava (Medical University - Varna)

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