A redox activity of the diazo dye acting as an exogenous mediator of electron transfer

Eleonora Hubenova[1,2], Mina Todorova[2], Mario Mitov[3], Rumyana Bakalska[2], Yolina Hubenova[1,2]
[1] *Institute of Electrochemistry and Energy Systems " Acad E. Budevski", Sofia, Bulgaria*
[2] *Paissi Hilendarski University of Plovdiv, Bulgaria*
[3] *South-West University of Blagoevgrad, Bulgaria*

Microbial fuel cells (MFCs) are devices that can convert the chemical energy of naturally available organic substrates directly into electricity by using different microorganisms as bio-microreactors. The organic matter is oxidized through the catabolic processes of the microorganisms and a part of the gained electrons are transferred to the anode. The number of electrons transferred and/or the rate of their transmission can be adjusted using artificially added substances passing through the membranes, which is supposed to improve the theoretical thermodynamic limitations. In this study, the photophysical (Fig. 1A) and electrochemical properties (Fig. 1B) of the diazo dye Ponceau S were investigated. The highest occupied molecular orbital (HOMO) and lowest unoccupied molecular orbital (LUMO) energy levels of the dye were estimated based on experimental data. The putative mechanism of electrochemical oxidation/reduction of Ponceau S is proposed based on the established data that HOMO is equal to -3.87 eV, LUMO is equal to -1.73 eV, and E_g^{opt} = 2.14 eV.

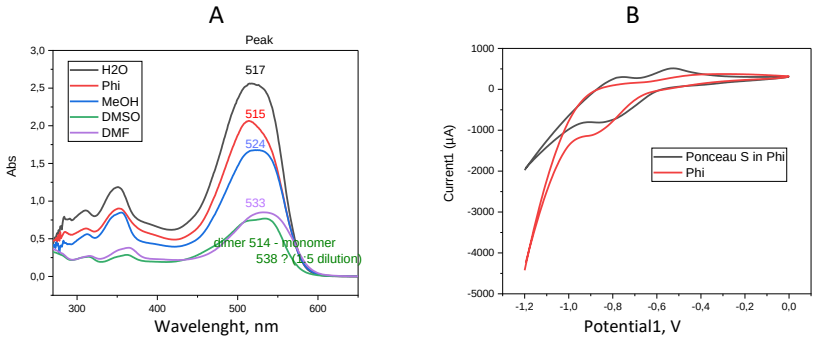

Figure 1. A- absorption measured in different solvents
B - CV of Ponceau S diluted in phosphate buffer (Phi) compared to the buffer as control

Acknowledgement: This study is supported by the Bulgarian Science Fund through the contracts KP–06-COST/4 /2022 as a co-financing project of the Cost Action CA20130 and KP -06-H67/2022 – "Bioelectrochemical systems for purification of organic pollutions".

References

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