

Electrochemistry of certain Fe complexes in solution and on the surface of electrode

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Aminoferrocene is a simple derivative of ferrocene with one amino group attached directly to one of its two cyclopentadienyl rings of ferrocene. The proximity (and conjugation) of the amino group means that the basicity of the group is greatly influenced by the oxidation state of the Fe ion and vice versa, the redox potential of Fe ion is changed upon protonation of the amine.^[1] This alone leads to quite interesting electrochemical results, but we tried to leverage this behaviour by modifying the original molecule with labile imine bond, that could be broken upon oxidation of Fe ion in the molecule. We probed four imino derivatives (two with boronic acid in the *ortho* position and two *para* derivatives) for their electrochemical behaviour and tested them on cell viability to judge whether these could be used as ROS (reactive oxygen species) sensitive prodrugs.^[2]

This contribution would also like to address how the surface of the electrode can sometimes complicate electrochemical measurements, but also how the sensitivity to surface changes can be employed in impedance based biosensing. Poly-L-lysine served as a base for modification of electrodes and through several simple steps electrodes can be provided with antigen which can then later bind our target analyte (usually antibody).^[3] Proteins, which are the most common target analyte, are very diverse class of molecules, despite being made from the same building blocks. While most proteins found in blood are of negative charge, notably antibodies (natural or manufactured) often possess a slight positive charge to promote binding to negatively charged cell structures and proteins. Depending on measuring conditions this charge can lead to erroneous results, where the capture of analyte is unnoticed by the negatively charged ferrocyanide probe, which is routinely used in immunosensing due to its stability and availability.^[4]

[1] J. Věžník, M. Konhefr, L. Trnková, P. Skládal, K. Lacina, *Electrochim. Acta* **2019**, *318*, 534–541.

[2] J. Věžník, M. Konhefr, Z. Fohlerová, K. Lacina, *Journal of Inorganic Biochemistry* **2021**, *224*, 111561.

[3] J. Sopoušek, J. Věžník, P. Skládal, K. Lacina, *ACS Appl. Mater. Interfaces* **2020**, *12*, 14620–14628.

[4] J. Sopoušek, J. Věžník, J. Houser, P. Skládal, K. Lacina, *Electrochimica Acta* **2021**, *388*, 138616.