

Development of ferritin electrochemical immunosensor based on modified GCE platform

Lueda Kulla

Nevila Broli, Sadik Cenolli, Majlinda Vasjari

Department of Chemistry, Faculty of Natural Science, University of Tirana, Bulevardi Zogu I, 1001 Tirane, Albania

Nano-Alb, Academy of Sciences of Albania, Sheshi "Fan Noli", No 7, 1001 and Tirana, Albania (Calibri 10)

majlinda.vasjari@fshn.edu.al

Ferritin is a clinically important biomarker which reflects the state of iron in the human body. In this study has been proposed an electrochemical immunosensor for the determination of ferritin in serum of human blood. The glassy carbon electrode was used as platform for immunosensor construction. The immobilization of ferritin antibody (FeAb) can be effectively improved by using a thin film of surfactant, trimethyl-tetradecylammonium chloride (TTDC), onto the GCE platform. The modification procedure of the immunosensor is optimized and characterized by cyclic voltammetry (CV) and differential pulse voltammetry (DPV). The quantitative determination of ferritin is based on the change in DPV response before and after antibody-antigen reaction. All measurements are done in pH = 7 phosphate buffer saline (PBS) at room temperature. The optimal antibody immobilization was found to be obtained using 0.1 g/L FeAb incubation solution. Calibration method of the immunosensor was based on the reduction of the DPV peak (%) in relation to the ferritin concentration. The thin layer of surfactant (TTDC), improves the process of antiferritin immobilization, which affects the increase of sensitivity and improve the analytical performance of the immunosensor (sensitivity 107.01 L/mg, R2 0.9992, LOD 0.011 mg/L).

References

- [1] World Health Organization. Serum ferritin concentrations for the assessment of iron status and iron deficiency in populations Geneva: World Health Organization, 2011
- [2] Garg, Christensen, Iles, Sharma, Singh, Pamme, Biosensors, MDPI, 2020
- [3] Zhang Z., Wang Sh., Hu M., Xiao Y., Biosensor and Bioelectronics 21 (2006) 2180-2183
- [4] N. Broli, L. Vallja, M. Vasjari, A. Shehu, S. Duka; Asian Journal of Chemistry; Vol. 33, No. 5 (2021), pp.1001-1005