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New electrochemical immunosensor based on recombinant protein A for determination of total concentration of IgG

V.N. Pyeshkova[1,2], O.Y. Dudchenko[2], A.O. Bakhmachuk[1], A.E. Rachkov[1], S.V. Dzyadevych[1,2]

[1] *Laboratory of Biomolecular Electronics, Institute of Molecular Biology and Genetics of NAS of Ukraine, Zabolotnogo Street 150, 03143 Kyiv, Ukraine.*
E-mail: victoriya.p@gmail.com

[2] *Institute of High Technologies, Taras Shevchenko National University of Kyiv, Volodymyrska Street 64, 01003 Kyiv, Ukraine.*

Measurement of the serum level of immunoglobulins is very important for the diagnosis of different autoimmune and immunodeficiency diseases. The conventional methods for IgG detection are electrophoresis, radial immunodiffusion, agglutination test, enzyme-linked immunosorbent assay (ELISA) and immunoblotting. Compared with existing analytical methods, the biosensors have several advantages: they are simple, accurate, specific, highly sensitive, fast, convenient, rather cheap and small devices without the need of extensive sample pretreatment and large sample volumes consumption. Thus, the development of new sensitive, simple and accurate immunosensor can facilitate IgG determination for health care.

Staphylococcal protein A is known to bind various classes of immunoglobulins of many organisms. In this work, the bioselective element of biosensor was formed by immobilization of the recombinant staphylococcal protein A with the introduced C-terminal cysteine residue (SPA-Cys) on the gold nanofilm surface of electrode. The interactions of the immobilized SPA-Cys with IgG conjugated with gold nanoparticles were investigated by using the electrochemical impedance spectroscopy (EIS). As a result, the prototype of simple electrochemical immunosensor for IgG detection was developed. Analytical characteristics of the immunosensor (sensitivity, linear range, reproducibility, response time) were studied.