Lithuanian chemists conference

Chemistry & Chemical Technology

Vilnius University Press

IMMUNOSENSOR FOR HUMAN GROWTH HORMONE DETECTION BASED ON INDIUM TIN OXIDE ELECTRODE WITH GOLD NANOSTRUCTURES

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Immunosensors are a type of biosensors based on immobilized antibodies (or antigens) and a signal transducer that converts the affinity interaction with the analyte to a signal that is proportional to analyte concentration [1]. Electrochemical signal transducers possess many advantages over optical and piezoelectric signal transducers such as the ease of miniaturization and versatility – a change in current, voltage or resistance can be measured [2]. Scientific and industrial impact of nanoscience and nanotechnology in analytical chemistry, medicine and pharmacy has been growing in recent years. In this field, gold nanostructures are the most widely used nanostructures due to their unique physical and optical properties [3]. Application of nanotechnology for immunosensor design results in higher stability of the sensors and increased analytical signal [4]. Human growth hormone (hGH) also known as somatotropin is essential for normal human development, therefore, a reliable quantitative detection of hGH is crucial [5].

The main aim of this study was to explore an immunosensor for human growth hormone detection based on indium tin oxide (ITO) coated glass electrode with electrochemically deposited gold nanostructures and covalently coupled antibodies against human growth hormone (anti-hGH). Nanostructurized ITO electrode was characterized using scanning electron microscopy, X-ray diffraction and various electrochemical methods. Furthermore, anti-hGH were covalently coupled onto gold nanostructures using the self-assembled monolayer. The immunosensor based on this design was investigated for the direct detection of hGH using square wave, differential pulse and cyclic voltammetry methods.

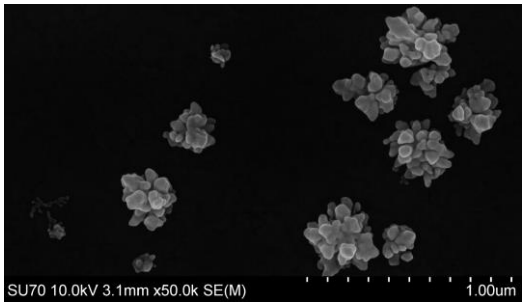

Fig. 1. Scanning electron microscope image of gold nanostructures on ITO coated glass electrode.

Acknowledgments

This research is/was funded by the European Social Fund under the No 09.3.3.-LMT-K-712-10-0168 "Development of Competences of Scientists, other Researchers and Students through Practical Research Activities" measure.

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