INDIUM TIN OXIDE COATED GLASS ELECTRODE WITH GOLD NANOSTRUCTURES FOR IMMUNOSENSOR DESIGN

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Immunosensors are biosensors predominantly based on antibodies immobilized on the signal transducer that converts the affinity interaction with the analyte to a signal proportional to analyte concentration. Many different types of signal transducers can be used for immunosensor design, such as electrochemical, piezoelectric and optical [1]. Electrochemical signal transducers are advantageous because they can be easily miniaturized and are versatile – a change in current, voltage or resistance can be measured [2]. Nanotechnology and nanoscience have a significant impact on analytical chemistry and is still growing every year. Gold nanostructures are one of the most widely used metal nanoobjects due to their desirable physical and optical properties [3]. Application of gold nanostructures in immunosensor design result in a bigger surface density of antibodies which yield a higher analytical signal [4]. Human growth hormone (hGH) also known as somatotropin is a polypeptide hormone secreted by the anterior pituitary gland. hGH is essential for normal human growth and development as it is involved in several biological processes, including activation of macrophages, lactation, somatogenesis and more, which is why quantitative detection of hGH is essential [5].

The main aim of this study was to investigate an immunosensor for human growth hormone detection based on indium tin oxide (ITO) coated glass electrode with gold nanostructures and covalently coupled antibodies against human growth hormone (anti-hGH). In this work ITO coated glass electrode was electrochemically modified with gold nanostructures and was characterized using scanning electron microscopy, cyclic voltammetry and X-ray diffraction methods. In addition, nanostructured electrode was covalently modified with anti-hGH through self-assembled monolayer. Developed immunosensor was used to directly detect hGH employing various electrochemical methods such as cyclic voltammetry, differential pulse voltammetry and square wave voltammetry. Furthermore, analytical parameters of this immunosensor were investigated.

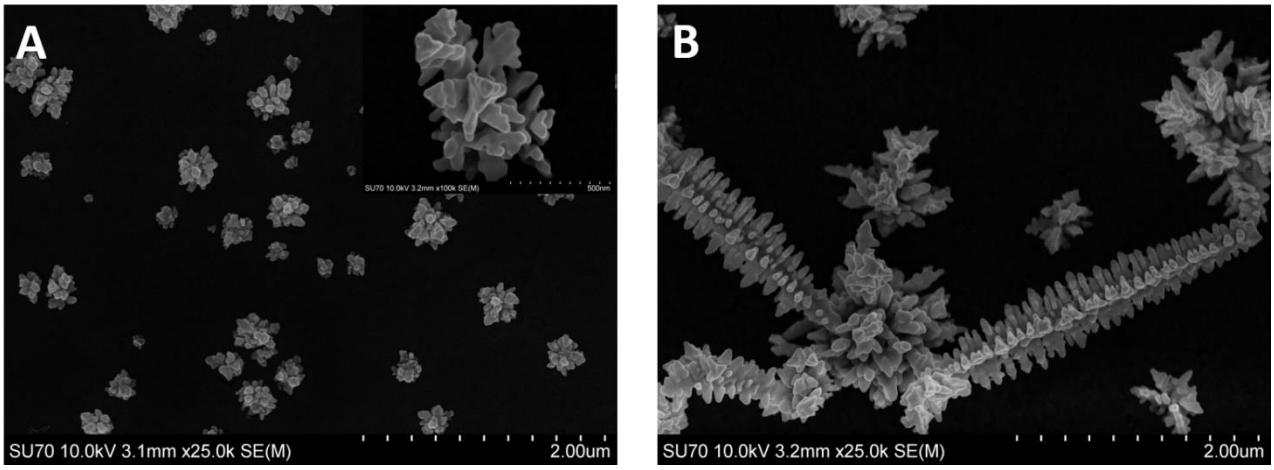

Fig. 1. Gold nanostructures electrochemically formed on ITO-glass electrode using different synthesis conditions (A-B).

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