ELECTROCHEMICAL IMMUNOSENSOR BASED ON GOLD NANOSTRUCTURES FOR THE DETECTION OF ANTIBODIES AGAINST SARS-COV-2 SPIKE PROTEIN

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Electrochemical immunosensors have become fundamental tools in various fields, including biomedical diagnostics, disease progression monitoring, environmental surveillance, food quality control, forensic analysis, and biomedical research. These highly specific analytical systems demonstrate exceptional sensitivity and efficiency, enabling precise identification of analyte presence and its concentration in a sample [1].

The principle operation of an electrochemical immunosensor is based on the electrochemical signal recording after the specific interaction between immobilized antigen and antibodies present in the solution. Essential requirements for immunosensors are their selectivity, sensitivity, repeatability, accuracy, and reproducibility. To enhance the sensitivity of the immunosensor, the surface of the electrode is frequently modified with nanomaterials, known for their unique physical, chemical, and optical properties. Compared to traditional immunosensors, nanomaterial-based immunosensors are more specific and sensitive, allowing the detection of lower analyte concentration [2].

In this study, an electrochemical immunosensor was developed for investigation of the interaction between immobilized SARS-CoV-2 virus S protein and specific monoclonal antibodies. The impact of various gold nanostructures formed on the electrode on the performance of the immunosensor was evaluated. Additionally, the influence of non-specific interactions on the analytical signal was investigated, along with methods used to reduce such effect. This research contributes valuable insights into the optimization and application of electrochemical immunosensors for biomedical diagnostics.

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