SYNTHESIS OF GOLD COATED MAGNETIC NANOPARTICLES AND MODIFICATION WITH ANTIBODIES AT OPTIMAL CONDITIONS

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Nowadays gold nanoparticles are widely used in many areas such as electronics, photonics, catalysis, chemical and biochemical sensing. These nanoparticles are biocompatible, have unique optical and electromagnetic properties, good conductivity, and can be easily functionalised and modified with biomolecules. Gold coated magnetic nanoparticles (Au-MNPs), besides the above-mentioned properties characteristic to gold nanoparticles, interact with magnetic fields and their position in space can be controlled with the use of magnets. This property can be successfully applied for the collection and bio-separation of nanoparticles after each step of modification [1-3]. The use of Au-MNPs is advantageous for the development of electrochemical and optical biosensors and immunosensors. The existing scientific data does not allow us to select the most efficient concentration of immobilized antibodies and the optimal conditions for effective modification of nanoparticles in order to develop a sensitive immunoassay or immunosensor [4].

The main aim of this study was to synthesise Au-MNPs by reducing Au^{3+} with hydroxylamine hydrochloride in the presence of cetrimonium bromide (CTAB), to determine their size and to select the optimal conditions for Au-MNP modification by antibodies, finding the lowest sufficient antibody concentration for the selective and sensitive detection of analyte. In this work sodium borohydride was used for the reduction of CTAB present on the surface of nanoparticles [5]. Then different antibody concentrations and various methods (adsorption, covalent immobilization and others) were used for modification of Au-MNPs. The Au-MNPs before and after modification were characterized spectroscopically, using transmission electron microscopy and gel electrophoresis.

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