Synthesis and functionalitation of nanoparticles for bio-applications

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Inmobilized antibodies have a broad variety of uses in areas as immunoassays or biosensors due to their high sensitivity and high specificity. For that, it is very important to know how the antibodies are attached to the surface to be used as a support, in order to determine if the antibody binding sites are accessible to the antigen that is willing to join. In the present work is aimed to develop a system for the immobilization of the biorecognition molecule using as support nanoparticles. Specifically, we have synthesized silver nanoparticles [1, 2], which have joined antibodies by passive adsorption. Modifications of the optical properties as consequence to specific ligand attachment are of great interest in the development of biosensors for biomolecules.

Specifically, silver nanoparticles have been synthesized by chemical reduction [3]. In order to meet their morphology they were characterized by Transmission Electron Microscopy (TEM) and UV-Visible spectroscopy. TEM images show that nanoparticles obtained by hydride reduction method have a spherical morphology with an average diameter of 35 nm. The UV-Visible spectra shows an absorption band at 400 nm, which corresponds to the absorption by surface plasmon resonance [4]. This band confirms the presence of silver nanoparticles. Also, it is noticed the existence of a single peak, indicating that the nanoparticles have a spherical morphology.[5]

After the characterization of nanoparticles, the immobilization of biorecognition molecules is carried out, designing a system for the immunochemical detection of rabbit immunoglobulin [6-9]. It also analyzes the specificity of the union for real sample.

The verification of the union has been carried out by immunochemical tests with colorimetric signal through the use of secondary antibodies conjugated to enzyme peroxidase. The technique used here is based in the conventional ELISA procedures [10]. It can be concluded that the biomolecule immobilization on the surface of silver nanoparticles is generally effective, enabling the development of a system for the detection of rabbit immunoglobulin samples with a high specificity.

References

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Figures

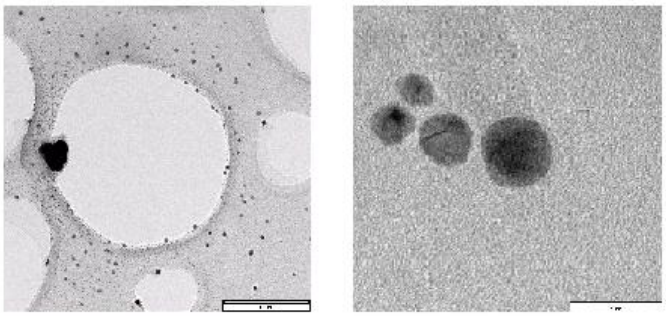

***Figure 1**. TEM images of silver nanoparticles. The scale bar corresponds to 300 nm and the right one to 30 nm.*

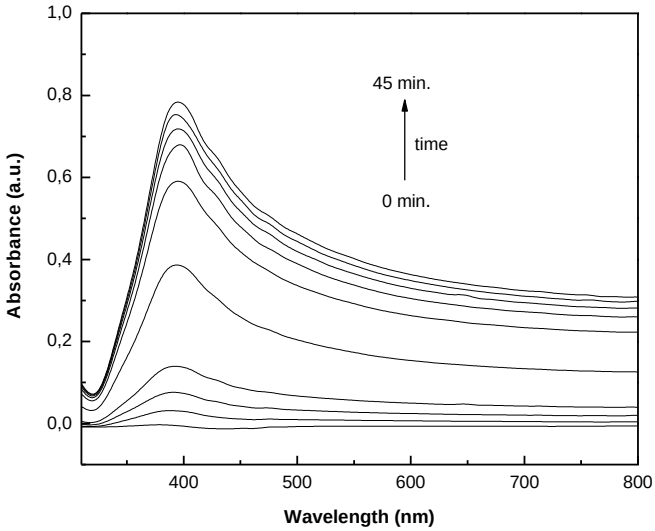

***Figure 2**. UV-Visible spectra of silver nanoparticles.*

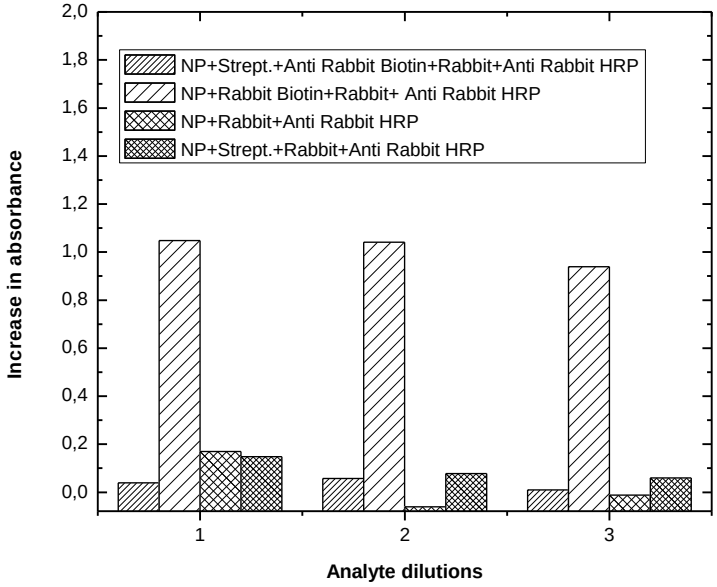

***Figure 3**. Absorbance values for four systems consisting of silver nanoparticles and different biomolecules. Stock dilution of the analyte to 1 mg · ml^{-1}. 1. Dilution 1:50, 2. 1:100 dilution, 3. 1:200 dilution.*