

Modification of Gold Nanoparticles with Human Serum Albumin

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ABSTRACT

Gold nanoparticles (AuNps) have been widely employed due to unique optical and electronic properties, and their excellent stability and low toxicity makes AuNps very interesting tool for be modified with biomolecules and applied on medicine. Albumin is one of the most important proteins present in blood, with the main function of transporting ions into the bloodstream. The AuNps preparation stabilized with human serum albumin (HSA), besides confer a great stability, makes a material with low body rejection, allowing transporting it into the cells. With this goal, this work aimed to finality to synthesize and characterize stabilized AuNps-HAS and subsequently be applied in the transport of radiopharmaceuticals. AuNps were synthesized by the Turkevich / Frens method, where 20 mg of tetrachlorouric acid, dissolved in 100 ml of water, are heated, and after boiling, 3 ml of sodium citrate (1% m:m)). This method generates AuNps with 13 nm diameter, characterized by MET and UV-Vis spectroscopy analyzes show a presence of AuNps spectrum with absorption peak from 520nm due to the localized surface Plasmon resonances (LSPR). The citrate reduces gold and stabilizes the nanoparticles formed, and can be replaced by mercaptans such as 3-mercaptopropionic acid, a stabilizing agent capable of forming a self-assembled monolayer (SAM) that makes it possible to conjugate biomolecules on the surface of AuNps. This modification occurs after its synthesis and this occurs through the EDC / NHS coupling reagents, which activates the groups present in the reaction and increases the binding rate of the mercapto-acid carboxylic groups to the amine groups present in the albumin. In this way, a solution of HSA (at a final concentration of 0.25 mg / mL) and an EDC / NHS solution in a concentration of 1µM is added to the AuNps suspension. Confirmation of this modification occurs by the displacement of the LSPR band at lower energies (from 524 to 528 nm) and by means of dynamic light scattering measurements, increasing from 30 nm to 40 nm.

Keywords: Nanoparticles. Human Serum Albumin. Biomaterials. Gold Nanoparticles.