New chemical routes to Biocompatible Gold Nanoparticles: a cheap two steps approach.

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In recent years, the development of Nanotechnology opened new perspectives for the synthesis of highly versatile materials of nanometric dimensions [1]. Among others, Gold Nanoparticles (AuNP) have obtained an outstanding outcome in a huge variety of biomedical applications like radioenhancers for radiotherapy, or chemotherapeutic carrier for drug delivery [2]. Although the extraordinary success of AuNP in these frameworks, great challenges for new generation of nanoscience chemists are still open. Above all, the tuning of nanostructure chemical proprieties in order to obtain specific delivery in the tumor site still remains a critical aim [3]. Glucose functionalization of AuNP surface leads to an increased uptake in tumor cells and offers an interesting chance to face the tumor delivery problem [4]. In this context, we are developing a new cheap synthetic procedure to synthetize Glucose functionalized gold nanoparticles (GNP). Our approach consists of two synthetic steps. In the first step, a two phase the synthesis of AuNP stabilized by means of very cheap thiolated Glucose precursor, 1-Thio-β-D-glucose tetraacetate, is performed. In the second step, an in situ deacetylation of the hydroxyl protected groups will lead to the final glucose exposure on AuNP surface.

In this research work we will discuss some preliminary results concerning the synthesis and the characterization of new kind of stable AuNP (Figure 1) functionalized with 1-Thio-β-D-glucose tetraacetate molecule. The AuNP formation and its chemical surface integrity was assessed by means UV-Vis spectroscopy and X-Rays Photoelectron Spectroscopy (XPS). The UV-vis spectrum shows the typical gold nanometric plasmonic absorption profile with a maximum at 527 nm (Figure 1, c). Moreover, ultrastructural study were performed by means Trasmission Electron Microscopy (TEM) and confirmed a very small AuNP diameter of 5 ±1 nm.

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