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Synthesis, optical and morphological characterization of different sizes gold nanoparticles for the development of viromimetic particles

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Nanoparticles have gained significant interest in various scientific fields due to their unique physicochemical properties, adjustable size and potential for targeted functionalization.
In comparison to bulk materials, these particles exhibit different characteristics, such as quantum effects, large specific surface area and enhanced optical, magnetic and mechanical behavior.

The aim of this work is the synthesis of gold nanoparticles (GNPs) for the development of cargo loaded viromimetic nanoparticles, followed by their characterization and assembly with target biomolecules. Virus like particles (VLPs) are engineered to be used in medical applications such as targeted drug delivery or gene therapy.

We report results of the studies regarding the influence of fabrication parameters, namely the size and shape of the gold nanoparticles, on the optical and morphological properties. The particles were synthesized using different concentrations of tannic acid leading to a shift in the nanoparticles'sizes. Thus, stable gold nanoparticles (Au NPs) obtained by this method were found to have average sizes between 8 and 20 nm, depending on the reducing agent's concentration. The optical properties were evaluated using UV-Vis absorption spectra of gold nanoparticles solutions and the morphological evaluation was made by using scanning electron microscopy (SEM) technique.
For determination of physical parameters associated with virus shell self-assembly process, the method initially used was Surface Plasmon Resonance (SPR) for gold nanoparticles and protein in order to monitor the molecular interactions of the assembly process in real-time.

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