SYNTHESIS OF SILVER NANOPARTICLES: STABILITY STUDIES FOR SERS APPLICATIONS

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Surface-enhanced Raman scattering (SERS) applied to living cells, allows real-time assessment of biological processes like drug distribution and cell division. To ensure cells viability, these experiments use an isotonic medium which causes the aggregation of metal nanoparticles (NPs). Nevertheless, several authors have observed an improvement of SERS effect after adding halide or sulfate ions to some silver nanoparticles (AgNPs) [1-3]. In order to get an idea of AgNPs behavior in SERS studies of living cells, the stability of two AgNPs colloids in the presence of salts was assessed. To accomplish this goal, spherical AgNPs were synthesized using two different methods. The AgNPs were stabilized using polyethylene glycol (AgNP1) or trisodium citrated (AgNP2). Dynamic light scattering, ultraviolet-visible spectroscopy and transmission electron microscopy, were used as characterization methods. NPs with a hydrodynamic diameter of 3.6 and 50 nm were observed in AgNP1 colloidal solution while in AgNP2 solution NPs of 3.0 and 20 nm were detected. AgNP1 were less sensitive to the salt aggregation effect than AgNP2. Raman assays in molecules and cells were performed using both AgNPs either in water or in the presence of salts. The Raman signal of living red blood cells was enhanced, after adding AgNP2. This effect is probably related to the formation of hot spots in the AgNP2 aggregates. Differences between spectrums signal at each evaluated condition were observed. The composition of AgNPs influences the SERS applications they are suitable for.

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References:


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