

## **SYNTHESIS OF MONODISPERSE GOLD AND GOLD-SILVER CORE-SHELL SPHERICAL NANOPARTICLES**

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### **Abstract**

Synthesis of metal nanoparticles is a rapidly expanding area of research. However, only few among the many papers on this topic are dedicated to the synthesis of monodisperse and non-aggregated nanoparticles, which is crucial to their further reliable and reproducible usage. In our work, we synthesized monodisperse spherical gold nanoparticles in the size range from 20 to 45 nm, and the gold-silver core-shell nanoparticles in the size range from 60 to 220 nm. We used modified step-by-step method for the synthesis of gold nanoparticles after Bastus et al. [1], which is suitable for the preparation of monodisperse gold sols providing thorough temperature control of the reaction mixture. The monodisperse gold nanoparticles obtained by this method were used as cores in the preparation of the gold-silver core-shell nanoparticles. Size and shape of the synthesized core-shell nanoparticles can be controlled by core nanoparticles concentration, core nanoparticles size, and Ag/Au molar ratio. Varying these factors, one can easily obtain gold-silver core-shell nanoparticles in the size range from 60 to 220 nm with the defined core-shell ratio. The nanoparticles were characterized by UV-Vis spectroscopy, dynamic light scattering (DLS) and transmission electron microscopy (TEM). Gold-silver core-shell nanoparticles were compared to random silver sols in surface-enhanced Raman spectroscopy (SERS) experiments and showed enhancement factors higher than Lee-Meisel [2] and Leopold-Lendl [3] sols.

**Keywords:** nanoparticles, core-shell, synthesis, monodisperse, SERS

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