

Investigation of Annealed Gold Nanoparticles Self-Assembled on Solid Surface for Surface-Enhanced Raman Spectroscopy

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The control of nanostructure morphology (size and shape) is of great interest in nanotechnology because it can tune the intrinsic chemical and physical properties. Due the unique scattering and absorption properties, gold nanoparticles have many applications in biological sensing [1] and surface-enhanced Raman scattering (SERS) [2, 3].

In this work, we report morphological and size changes induced by annealing gold nanoparticles self-assembled on solid surface and correlate these changes with their surface plasmon and SERS properties. The self-assembled gold nanoparticles were characterized before and after annealing by transmission electron microscopy (see Fig. 1), UV-VIS absorption spectroscopy and X-ray diffraction. We employed the p-aminothiophenol as probe molecule to compare the Raman enhancement factor in visible and near-infrared spectral region of two as prepared samples. The comparison has been done by using 532, 633 and 830 nm laser excitation lines. According to the experimental results, the surface plasmon and SERS properties correlate with the structure of self assembled gold nanoparticles on solid substrate.

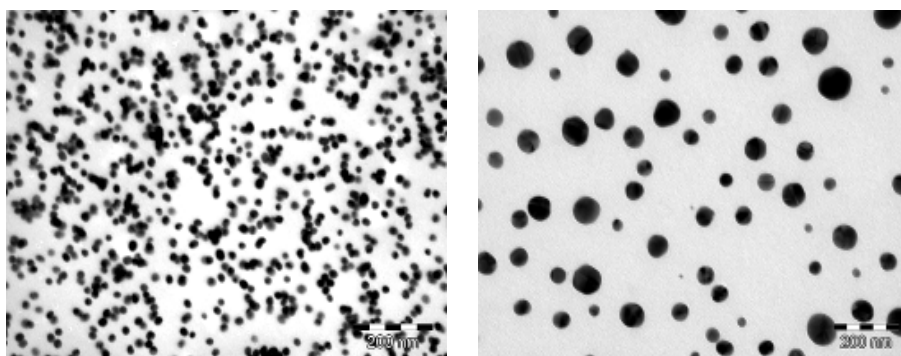


Fig. 1: Transmission Electron Microscopy of self-assembled colloidal gold nanoparticles on solid substrate (a) before annealing and (b) after annealing at 500°C

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