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Abstract

Investigation of the Thermally Generated Au and Ag Nanoislands for SERS and LSPR Applications †

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Abstract: Gold and silver nanoparticles are widely used as signal amplification elements in various electrochemical and optical sensor applications. Although these NPs can be synthesized in several ways, perhaps one of the simplest methods of their preparation is the thermal annealing of pre-deposited thin metal films on glass. With this method, the parameters of the annealing process (time and temperature) and the pre-deposited thin film thickness influence and define the resulting size and distribution of the NPs on the surface. LSPR is a very sensitive optical phenomenon and can be utilized for a large variety of sensing purposes. SERS is an analytical method that can significantly increase the yield of the Raman scattering of target molecules adsorbed on the surface of metallic nanoparticles. In this work, the performance of Au/Ag nanoislands was investigated for SERS and LSPR applications. The nanoislands were generated by thermally annealing thin layers of silver and gold, which were previously sputtered onto glass surfaces. The sensitivity of LSPR and SERS-based devices were strongly dependent on the used material and the size and geometry of the metallic nanoparticles. By controlling these parameters, the plasmon absorption band can be tuned and the sensitivity can be optimized. This work was supported by the GINOP-2.3.2-15-2016-00041 project. ICs is grateful for the support of the János Bólyai Research Scholarship of the Hungarian Academy of Sciences.

Keywords: gold nanoparticles; silver nanoparticles; localized surface plasmon resonance; surface-enhanced Raman scattering; plasmonics; nanosensing devices

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