

Qualitative assessment of colloidal and planar SERS substrates performance

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Advanced techniques of preparation of nanostructured materials (predominantly silver and gold) in colloids or as planar substrates are being continuously developed to allow for better size and morphology control leading to more sensitive and reproducible Surface-enhanced Raman Spectroscopy (SERS) measurements. However, broader generalization of the relationship between physical and analytical properties of the SERS substrates with respect to different analyte types is still missing.

In our work we prepared series of silver and gold nanoparticle colloids with spherical and nanoprism (silver) or spherical and nanorod (gold) morphologies. In addition, we prepared nanostructured silver layers on doped silicon substrate using electrochemical method. Different inorganic compounds (halides, pseudohalides, sulfides, sulfates, etc.) were used for the activation of the nanoparticles and SERS spectra of selected standard dyes as analytes (Rhodamine 6G, crystal violet, brilliant cresyl blue, malachite green, etc.) were obtained.

For complex evaluation (baseline correction, peak recognition, cosmic ray removal, etc.) of the large amount of Raman spectra obtained from these experiments a software-based morphological filtering was used which will also be discussed.