# Films Based on Colloidal Silver Nanoparticles for Surface-Enhanced Raman Scattering of Rhodamine 6G

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Films with colloidal metallic particles for Raman scattering are often used for studying vibrational structure of organic and bio-molecules. These films give a possibility to obtain significant amplification of the signal and to detect a small amount of the substance. In addition, they are cheap and very simple in preparation. Varying the parameters of synthesis of the colloidal particles results in formation of films with optimal thickness and size of the silver particles. These factors influence on plasmonic enhancement of SERS-substrates.

Colloidal Ag-nanoparticles with the density 20 $\mu m^{-2}$, 9 $\mu m^{-2}$ та 4 $\mu m^{-2}$ were prepared on the thin silicon substrate by a method of the "silver mirror reaction". Obtained SERS-substrates were immersed in solution of Rhodamine 6G with concentration $10^{-8}$ Mol/L.

In micro-Raman experiment laser with excitation wavelength $\lambda = 488$ nm was used. Figure 1 shows the Raman spectra of Rhodamine 6G adsorbed on colloidal Ag-nanoparticles. For Ag-nanoparticles with different densities the factors of SERS-enhancement $5.2\times10^6$, $1.3\times10^6$ and $7\times10^5$ were obtained.

Mechanisms of SERS-enhancement discussed.

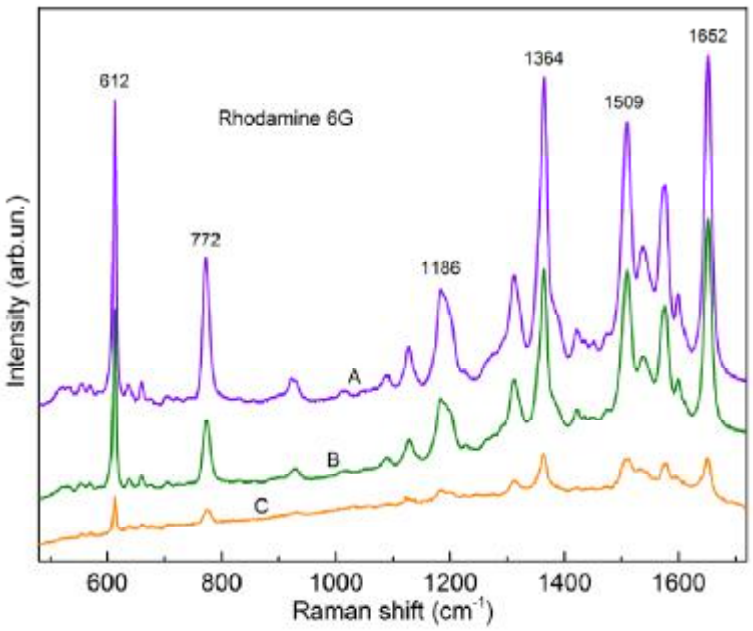


Figure 1. Micro-Raman spectra of R6G $10^{-8}$ Mol/L on SERS-substrates with density of colloidal nanoparticles 20 $\mu m^{-2}$ (A), 9 $\mu m^{-2}$ (B) and 4 $\mu m^{-2}$ (C).