**Effect of silver nanoparticles on optical extinction spectra of colloidal solutions and flexible substrates**

*Evgeniy A. Ryabov, Daniil N. Bratashov, Ekaterina S. Prikhozhdenko*

Saratov State University, Saratov

**Abstract**

Plasmon resonance nanoparticles (NPs) are currently used in such diverse fields as drug delivery, development of antibacterial coatings, and sensors based on the surface-enhanced Raman spectroscopy (SERS).

The influence of metallic NPs on the optical properties of the medium is determined by the presence of plasmonic oscillations of electron density. These oscillations distort the local electromagnetic field near the surface of the samples. For a number of applications, it is of interest to obtain flexible SERS substrates using nonwoven materials as a matrix. The functionalization of fibers with silver nanoparticles provides an efficient approach for selective adsorption of biomolecules and their accurate detection by SERS. In this work, the systems of colloidal solutions with NPs and polymer films with NPs located on the surface are considered.

Using the PyGDM mathematical package, the extinction spectra of silver nanoparticles at diameters of 10÷30 nm located in a medium or on a substrate with different refractive indexes were calculated. When the refractive index of the either medium or substrate increases, the peak of the extinction spectrum, which corresponds to the plasma resonance, shifts to the region of longer wavelengths. The influence of the refractive index of the medium on the position and profile of the plasmon resonance is also demonstrated.