

Nanoplasmonics and surface enhanced spectroscopy

Manifestation of surface plasmon resonance in transmission and scattering spectra of Ag nanoparticles

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We study the surface plasmon resonance (SPR) [1] in Ag nanoparticles by means of light transmission and scattering spectra for nanoparticles dispersed in water as well for those deposited on a gadolinium-gallium garnet substrate.

Our experiment shows that the absorption spectrum for water dispersion of Ag nanoparticles displays a broad band with its maximum at approximately 550nm, corresponding to the SPR. Experimentally measured angular diagram of light scattering indicates that at the wavelength of SPR maximum the scattering is higher for higher angles. Absorption spectra reveal that the deposition of the nanoparticles on the gadolinium-gallium garnet substrate leads to a hypsochromic shift of the light absorption band, such that the maximum shifts to the wavelength of approximately 450nm (compare to 550nm for nanoparticles in water dispersion). Experimentally measured absorption and scattering spectra can be analyzed in frames of Mie theory and/or quasi-static approximation method [2] and, in particular, the size of nanoparticles can be deduced.

1. V.V. Klimov Nanoplasmonics - 2nd ed. Corr. (*in Russian*) - M: FYZMATLYT, 2010. -480 p. ISBN 978-5-9221-1205-5
2. Mayer S. A. Plasmonics: theory and applications - (*in Russian*) - M. Izhevsk: NIC "Regular and chaotic dynamics", 2011. -290 p.