

Faraday rotation enhancement for colloidal Au and Ag spherical nanoparticles and their mixtures

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Ag-metallic nanoparticles (AgNPs) along with AuNPs are intensively researched nanomaterials. The magneto-optical (MO) properties of AgNPs have been described mainly by magnetic circular dichroism (MCD) spectroscopy for a very wide range of dimensions from 7.5 nm to 200 nm [1]. Compared to AuNPs, AgNPs plasmonic extinction spectra are shifted to the low-wavelengths part of the spectrum by about 100 nm, and MCD spectra have a symmetrical shape in contrast to asymmetric one of AuNPs, also the magnitude of MCD is higher for AgNPs. It may be noticed that Ag and Au are also prepared as core-shell hybrid nanostructures showing an enhancement of MO properties [2]. In the presented work, we test the enhancement of Faraday rotation (FR) in a mixture of colloidal solutions of both NPs with different concentrations. The Au and Ag spherical NPs of similar dimensions were synthesised independently as colloids in aqueous solution and then mixtures of different proportions were prepared. The FR of single NPs are consistent with available data [1,3]. For the mixtures, weak enhancement of FR is observed owing to the additivity of the contribution of plasmonic modes. The obtained FR spectra have been converted to MCD one using Kramers-Kronig relations and simultaneous deconvolution of absorption and MCD spectra were discussed.

References:

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