Optical response of individual Au-Ag@SiO_2 hetero-dimers

Anna Lombardi[2], **Marcin P. Grzelczak[1]**, Aurélien Crut[2], Paolo Maioli[2], Isabel Pastoriza- Santos[1], Luis M. Liz-Marzán[3,4], Natalia Del Fatti[2] and Fabrice Vallée[2]

1) Departamento de Química Física, Universidade de Vigo, 36310 Vigo, Spain.
2) FemtoNanoOptics group, Université Lyon 1, CNRS, Institut Lumière Matière, 43 Bd du 11 Novembre, 69622 Villeurbanne, France.
3) Bionanoplasmonics Laboratory, CIC biomaGUNE, Paseo de Miramón 182, 20009 Donostia- San Sebastián, Spain.
4) Ikerbasque, Basque Foundation for Science, 48011 Bilbao, Spain

E-mail: marcin@uvigo.es

The optical response and local field enhancement effect associated to the Localized Surface Plasmon Resonance (LSPR) of metal nanostructures have been extensively investigated, both experimentally and theoretically, during the last decade. Though the LSPR spectral position, amplitude and light polarization dependence can be modified for specific applications through tuning the nano-object size, shape and composition.[1,2] This provide additional features not observed using objects formed by a single particle. The optical extinction response of individual Au-Ag@SiO_2 hetero-dimers is investigated using spatial modulation spectroscopy and compared to numerical simulations using the dimer morphology determined by transmission electron microscopy (TEM). The extinction spectra show two resonances spectrally close to the surface plasmon resonances of the constituting Au and Ag@SiO_2 core-shell particles. The inter-particle electromagnetic coupling is demonstrated to induce a large increase of the optical extinction of the dimer around its Au-like surface plasmon resonance for light polarized along its axis, as compared to that for perpendicular polarization and to that of an isolated Au nanoparticle.[3]

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