Controlling the coupling in Au and Al nanowires and nanoparticles for applications in nanooptics, biosensing and metamaterials

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The investigation of surface plasmon modes of nanoparticles and nanowires has become a subject of considerable interest due to the possibility to achieve novel optical effects such as negative permeability at optical frequencies allowing metamaterials as well as near-field enhancement effect enabling increased sensitivity of optical detection and sensing methods. The strong near-field coupling of the nanoparticles/nanowires leads to hybridization of plasmon modes. The spectra of a plasmonic lattice are strongly influenced by the direct interference of the hybridized modes, resulting in Fano-like line shapes. In addition, breaking the symmetry of the structure leads to emergence of new modes which are optically inactive in a symmetric structure. In this talk, an experimental and theoretical study of the localized surface plasmon modes in closely-spaced Au and Al nanowires and nanoparticles is presented.