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Magneto-plasmonics: a novel class of nanomaterials

César de Julián Fernández

Institute of Materials for Electronics and Magnetism, Italian Research Council, Parma, Italy

Magneto-plasmonic nanomaterials is a novel class to nanomaterials that exhibit simultaneously plasmon-driven optical and magnetic properties. Magneto-plasmonic systems are finding application in many scientific and technological areas, as in biomedical theranostics, sensoristics, recording, catalysis and optoelectronics. The research on these nanomaterials is founding an increasing interest due to their multifunctional capabilities but also their rich chemical-physical properties linked to the size and interface induced electronic, magnetic and optical correlations between the two different materials. In my presentation a general overview on the “magneto-plasmonic” concept will be done, with a particular analysis of the properties of magneto-plasmonics hetero-structures. These consist in Au and Fe oxide hybrid structures with core@shell or heterodimers morphologies. I will show the complex nature and structure of these nanosystems that determine a rich electronic, optical, magnetic and magneto-optical properties. In particular the interplay between the plasmonic and magnetic effects and the influence on the magneto-optical properties will be debated. I will show also one case regarding their application for magnetic hyperthermia biomedical application. Finally I will show that, due to interface and electronic hybridization, the Au electrons can be spin polarized introducing the concept of spin-plasmonics.