**Investigations on the Spin polarization in (magneto)plasmonics**

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**Abstract**

Spin plasmonics constitutes a novel discipline that considers the role played by the spin of electrons in the plasmonic phenomena. The application of the spin concept in electronics and recently in calorics have encouraged a considerable development of new research fields and technologies. However the application of the electrons' spin concept in plasmonics has not yet fully explored. The reason for this lack is easily ascribable to the diamagnetic response of the principal plasmonic metals, like Au and Ag, where a huge magnetic field is required in order to induce any magnetic effect. Moreover in the noble metals there is not any long-range magnetic correlation like in ferromagnetic materials what limit most applications.
The research in magnetoplasmonics focalized so far into hybrid nanostructures in which plasmonics and magnetism can coexist and influence each other. However a specific link to the spin polarization in the plasmonic resonant electrons has not yet been demonstrated.

Guided by the recent results in the spin polarization of Au-Fe oxide and AuFe alloy nanoparticles, investigated by X-ray Magnetic Circular Dichroism [1-3], we discuss in this contribution the conditions in the nanostructure and in the chemical composition which determine the spin polarization of the Au electrons. We focus on the critical role of the charge transfer mechanism to induce the spin polarization and present first results regarding magnetoplasmonics multilayers.

**References**

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