Laboratoire des Solides Irradiés, UMR 7642

Séminaire – Mardi 9 décembre (10:30)

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Salle du laboratoire LLR (salle 05-2021)


10H00

Second-harmonic response of isolated ions-shaped metallic nanoparticles

The optical properties of metal nanostructures depend strongly on plasmonic resonances, which are sensitive to geometrical parameters of the nanoparticles (NPs) and the surrounding environment. The geometry is particularly important for second-order nonlinear effects, which require symmetry breaking. The metallic NPs give rise to strong local fields through plasmons leading to enhanced nonlinear optical interactions. A large number of studies have investigated the nonlinear optical properties of (LSPR) in isolated nanoparticle (NP). Most of these investigations have focuses with particular shape in one or different shape of NPs; further most of optical antennas demonstrated so far are two-dimensional (2D) planar devices. This is mainly due to the difficulties in fabrication three-dimensional (3D) NPs: perpendicular to the sample. The excitation field becomes even more important when truly 3D NPs with plasmonic oscillations in all spatial directions are considered. Which are offer additional degrees of freedom for engineering field distributions on the nanoscale. Indeed, an irradiation with ions beam was used to have multiple NPs geometries. This is particularly interesting because it allows for the experimental configurations nearly impossible to obtain with other methods always keeping the volume constant. This technique offers the possibility to control the size; the shape and orientation of NPs at nanometer scale with maintaining constant the volume of NPs.

Our strategy consists to study the strength of this nonlinear response from different metallic gold NPs keeping their volume constant. Knowing that second harmonic generation microscopy is highly sensitive to the symmetry of the structure, we investigated different shapes of NPs. Using two different polarizations: linear (LP) and radial polarization (RP) we realized a study on the efficiency of the nonlinear responses of out-plans gold NPs with different shapes.