Nanostructured materials that present plasmonic resonances enable intense light focusing, mediating electromagnetic (EM) energy transfer from the far to the near field or vice versa. Thus, these nanostructures can be considered as optical nanoantennas and are key elements in the conversion of free-space light to evanescently confined modes in nanometre-scale volumes below the diffraction limit. After excitation, these localized surface plasmons can decay into energetic electron-hole pairs (hot-carriers) which, under certain conditions, can be transferred to molecules nearby. In recent years, increased attention has been paid to these loss mechanisms in plasmonic nanoparticles, leading to the extension of the concept of plasmonic nanoantennas not only as sub-diffraction light-focusing objects, but also as reactive elements in the interplay between light and molecules [1].

The possibility of mapping the reactivity of plasmonic antennas with nanometre resolution is critical, as it would guide the efficient design and fabrication of reactive nanoantennas for plasmon-induced energy conversion or photocatalysis. Here I will show some different approaches in order to map and exploit the confined photo-redox reactivity of plasmonic nanoparticles [2, 3, 4]. The shape of the nanoparticle as well as the polarization of the light have been found to be of utmost importance in the reactivity of these nanoscale photo-excited systems.

2- Cortés, E. Efficiency and Bond Selectivity in Plasmon-Induced Photochemistry. Advanced Optical Materials, 5, 1700191 (2017)