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MEMBER OF BASQUE RESEARCH & TECHNOLOGY ALLIANCE

seminar

Wednesday, 21st June, 9.30am, Online

Host: Dr. Susana Velasco

From nanoparticle heat generation to temperature determination: a day in the Bionanoplasmonics Lab

Dr. Carlos Renero Lecuna
BioNanoPlasmonics Group
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In recent years, research in nanomaterials for biomedical applications has attracted a huge interest, not only because of the unique properties of these nanomaterials, but also due to the new opportunities that arise when they are used for diagnosis and therapy in various diseases. Our group is an expert in tailoring the properties of plasmonic nanomaterials, such as gold nanoparticles, which present properties different from those of the bulk and strongly depend on their size and morphology. We intend to apply this knowledge to incorporate nanoplasmonic and other types of nanoparticles within biocompatible hybrid materials, for detection and measurement of different processes, such as metabolite production by cancer cells, presence of different pollutants and toxins in water, pH and temperature in biological media, etc. Plasmonic nanoparticles also display unique features that can make them suitable for therapy. When gold nanoparticles are excited with a wavelength that matches their localized surface plasmon resonance, part of the energy absorbed by the nanoparticle is released as heat, which may be enough to increase the surrounding temperature up to 46 ºC, at which cell death occurs. This optical feature can be tuned in such a way that it occurs in the near infrared (NIR), where biological systems present a low absorption coefficient, the socalled biological windows. These photothermal therapies (PTT) using gold nanoparticles are being currently investigated. One key parameter for a successful treatment is the precise determination of the temperature during heating, and this is where nanothermometers play an important role. We are specialized in NIR and Visible optical nanothermometers, in which the analysis of the photoluminescence gives an accurate value of the local temperature, with high spatial resolution, thereby improving traditional ways of measuring temperature and opening new possibilities for real-time monitoring of PTT.