

Thursday, 26th January, 12.00pm

Seminar Room

Host: Prof. Luis M. Liz-Marzán

Magnetic-plasmonic nanoparticles for multimodal bioimaging and hyperthermia

*Cristina de la Encarnación Bermúdez
BioNanoPlasmonics Lab
CIC biomaGUNE*

The term "theranostics" refers to the smart integration of diagnostics and therapeutics¹. This ability to simultaneously image and treat tumours with nanoparticles can be advantageous over conventional diagnostic and therapeutic techniques². Thus, an additional advantage for both imaging and treatment is the ability to study diseases in vitro using a variety of imaging methods and combining them with novel treatments³.

The synthesis and optimization of hybrid nanoparticles combining magnetic and plasmonic properties has been studied during this thesis. Furthermore, these nanostructures can be functionalized with additional molecules for imaging and hyperthermia applications. The use of these hybrid nanoparticles has been studied for their specific use as contrast agents for magnetic resonance imaging, surface-enhanced Raman scattering and fluorescence imaging in 2D and 3D cellular models and in ex-vivo models. In addition, the application of the hybrids for photothermal heating in 2D and 3D cell models and cell-specific labelling in 2D cell cultures has been evaluated.

References

- (1) Li, X.; Kim, J.; Yoon, J.; Chen, X. Cancer-Associated, Stimuli-Driven, Turn on Theranostics for Multimodality Imaging and Therapy. *Adv. Mater.* 2017, 29 (23), 1606857. <https://doi.org/10.1002/adma.201606857>.
- (2) de la Encarnación, C.; Jimenez de Aberasturi, D.; Liz-Marzán, L. M. Multifunctional Plasmonic-Magnetic Nanoparticles for Bioimaging and Hyperthermia. *Adv. Drug Deliv. Rev.* 2022, 189, 114484. <https://doi.org/10.1016/j.addr.2022.114484>.
- (3) Tomitaka, A.; Arami, H.; Raymond, A.; Yndart, A.; Kaushik, A.; Jayant, R. D.; Takemura, Y.; Cai, Y.; Toborek, M.; Nair, M. Development of Magneto-Plasmonic Nanoparticles for Multimodal Image-Guided Therapy to the Brain. *Nanoscale* 2017, 9 (2), 764–773. <https://doi.org/10.1039/c6nr07520g>.