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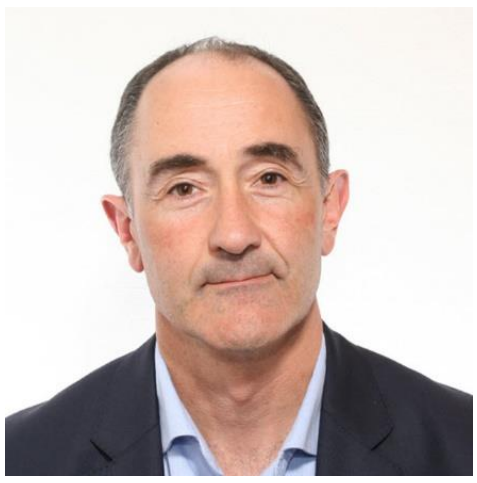

Friday, November 12, 2021 | ZOOM | 9:00 AM (ET)

Title | **Chiral Growth and Assembly of Gold Nanoparticles**

Abstract | The field of chirality has seen a strong rejuvenation due to the observation of nanoscale chirality in plasmonic nanoparticles. This lecture will highlight recent advances in the field of plasmonic chirality, including novel methods for the synthesis of optically active plasmonic nanomaterials. The focus will be first directed toward chiral nanostructures formed using biological templates, proteins in particular. After demonstration of the directed self-assembly of gold nanorods on amyloid fibers, as well as the mechanistic understanding of chirality at the nanoscale, a potential application for such nanomaterials will be presented. We propose that plasmon-enhanced chiral signals have great potential for use in the detection and therapy of neurodegenerative disorders.[1]

The second part of the lecture will deal with the seeded-growth of chiral features on colloidal nanoparticles. A novel approach will be introduced, comprising the self-organization of surfactant micelles into chiral structures on nanoparticle seeds. This simple concept opens a wide range of possibilities, by playing around with the huge variety of chiral co-surfactants, seed morphologies and metal compositions, which have been studied in the context of the seeded-growth of metal nanoparticles. We demonstrate that the addition of chiral co-surfactants leads to supramolecular interactions with CTAC, resulting in chiral helices that can wrap gold nanocrystals and template the seeded growth into chiral features. The resulting chiral nanoparticle colloids display high morphological and optical handedness, which can be tuned through the visible and the near IR. This approach provides a reproducible, simple and scalable method toward the fabrication of nanoparticles with high chiral optical activity.[2]

References

1. J. Kumar, H. Eraña, E. López-Martínez, N. Claes, V.F. Martín, D.M. Solís, S. Bals, A.L. Cortajarena, J. Castilla, L.M. Liz-Marzán, “Detection of Amyloid Fibrils in Parkinson's Disease Using Plasmonic Chirality”, Proc. Natl. Acad. Sci. USA 2018, 115, 3225-3230.
2. G. González-Rubio, J. Mosquera, V. Kumar, A. Pedrazo-Tardajos, P. Llombart, D. M. Solís, I. Lobato, E. G. Noya, A. Guerrero-Martínez, J. M. Taboada, F. Obelleiro, L. G. MacDowell, S. Bals, L. M. Liz-Marzán, ” Micelle-Directed Chiral Seeded Growth on Anisotropic Gold Nanocrystals”, Science 2020, 368, 1472-1477.

Bio | Luis Liz-Marzán is Ikerbasque Professor and Scientific Director of the Center for Cooperative Research in Biomaterials, CIC biomaGUNE, in San Sebastián (Spain), since September 2012. He graduated in chemistry from the University of Santiago de Compostela in 1992, was postdoc at Utrecht University and Professor at the University of Vigo (1995–2012). He has also been Invited Professor at various institutions worldwide. Professor Liz-Marzán has earned numerous awards, including 2 prestigious ERC Advanced Grants. He is also member of the Royal Spanish Academy of Sciences, the European Academy of Sciences and Academia Europaea. He is co-author of over 500 publications and 9 patents and has delivered over 500 invited lectures and seminars. Liz-Marzán has supervised over 30 PhD students and 50 postdocs, many of them currently holding academic positions worldwide. He is associate editor of ACS Nano and serves in the editorial boards of various other journals, including Science. His major research activity is devoted to understanding the growth mechanisms of metal nanocrystals, tailoring their surface chemistry, and directing their self-assembly into organized nanostructures. He also works on the design of biomedical applications based on the plasmonic properties of well-defined metal nanoparticles and nanostructures, including surface enhanced Raman scattering and chiral plasmonics.

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