CIC biomaGUNE
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seminar

Wednesday, 8th September, 4.00pm, Online

Host: Prof. Luis M. Liz-Marzán

Plasmonics for Trace Detection and Imaging

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The Ohio State University

The identification and quantification of molecules in biological samples is key for understanding mechanisms associated with health and disease. Existing techniques focus attention on certain molecules that are readily characterized, leaving other molecules unexplored and questions unanswered. Investigating the interactions between light, molecules and materials enable techniques that permit new questions. In particular, the confinement and enhancement of light near plasmonic nanoparticles opens new approaches for molecular investigations. The enhancement of Raman signals by nanostructures, surface enhanced Raman scattering (SERS) and related techniques, provide sensitive and label-free methods of chemical analysis. Recent work from our lab indicates that energetic charge carriers, so called hot electrons, arising from excited plasmon resonances generate chemical effects that increase the Raman signals in biomolecules such as proteins. By leveraging these effects, we have developed methods to target and image protein receptors in living cells. In protein receptor experiments, our results show signals characteristic of the receptor's binding site, which enable investigations of ligand recognition by protein receptors that are important for drug targeting and virus detection. Furthermore, we have developed assays for the detection and quantification of biomolecules in complex samples. The effects enable approaches that obtain chemical, structural, and spatial information simultaneously, including super-resolution SERS imaging. In all these applications, understanding chemical interactions between molecules and nanoparticles are key. Overall, this presentation will focus on recent studies from laboratory into the origin and utility of enhanced Raman signals for ultrasensitive chemical analysis.