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SERS Plasmonic nanotags in biomedical sensing, imaging and therapy

Nekane Guarrotxena

Institute of Polymer Science and Technology (ICTP), Spain

Noble metal NPs, on account of the phenomenon of surface plasmon resonance, provides outstanding optical properties that can be used with a variety of techniques for labeling, imaging, sensing leading to both diagnostics and therapies. These optical excitations are extremely dependent on the NP-surface, -shape, -intergap, medium and ligands, which makes the basis for molecular recognition, imaging and sensing sensitivity. In recent years, surface-enhanced Raman scattering (SERS) has emerged as a versatile technique that can enhance the intensity of the vibrational spectra from molecules near the surface of plasmonic metal nanoparticles. Increased field enhancement (up to order of 10^8 - 10^{10}) can be achieved at the interjunctions of NPs "hot sites" via assembly of metallic NPs into dimers and small clusters. Moreover, SERS offers high spectral specificity, improved sensitivity as well as the multiplexing capability that makes it a most promising tool for many bio-analytical applications. The plasmon resonance can either radiate light (scattering), a useful applicability-process in optical and imaging fields, or be rapidly converted to heat (absorption) with potential application in therapeutics. So, no doubt, SERS plasmonic nanotags are among the most exciting nanomaterials with promising potentials in nanomedicine. Furthermore, their improvement through rational design and engineering of smart multifunctional nanomaterials that combine the attractive plasmonic properties with other functionalities (magnetism, photoluminescence) will lead toward the nano-theranostics in the near future. This presentation will highlight the usefulness of encoded SERS nanoparticles in surface plasmon resonance imaging and sensing, photothermal therapy and drug loading applications.

Biography

Nekane Guarrotxena is a PhD from the University of Complutense, Madrid-Spain in 1994 and has been post-doctoral research at the Ecole Nationale Supérieure d'Arts et Métiers, Paris-France (1994-1995) and the University of Sciencell, Montpellier-France (1995-1997). From 2008-2011, she was visiting professor in the Department of Chemistry, Biochemistry and Materials at University of California, Santa Barbara-USA and the CaSTL at University of California, Irvine-USA. She is currently Research Scientist at the Institute of Polymers Science and Technology, CSIC-Spain. Her research interest focuses on the synthesis and assembly of hybrid nanomaterials, nanoplasmonics, and their uses in nanobiotechnology applications (bioimaging, drug delivery, therapy and biosensing).

nekane@ictp.csic.es