SENSITIVE AND MULTIPLEXED RESPONSE OF SERS-BASED PLASMONIC NANO-DUMBBELL PLATFORMS IN DISEASE BIOMARKERS DIAGNOSTICS

Nekane Guarrotxena

Institute of Polymer Science and Technology-Spanish National Research Council (ICTP-CSIC), Spain

A rapid, sensitive and accurate response of analytical techniques to resolve health issues, such as low limit identification in special biological environment (i.e. complex mixtures of proteins) remains to being a key aspect in modern proteomics. In fact, extensive efforts to obtain sensitivity enhancements with detection limits even down to the single molecule have been devoted in the nanotechnology framework. Recently, innovative approaches based on the properties of colloidal nanoparticle (NP) assemblies have led to the development of novel diagnostic methods with sensitivity enhancements for single molecule protein monitoring/identification/detection. Among them, surface-enhanced Raman spectroscopy (SERS) benefits from its higher detectable response to binding of a single protein (sensitivity) and also, very importantly, from its multiplexing capabilities due to the narrow nature of detected peaks from Raman reporter molecules. Since SERS retains the fingerprinting capabilities of Raman spectra, the internal modes of a reporter molecule brought at metallic NPs junctions, where strong field enhancement occurs, can be used as diagnostic tools. Specific attention has been given to SERS-based immunoassays. Indeed, the combination of the high sensitivity provided by SERS and the strong binding specificity of antibody-protein ensures that SERS-based detection platform are suitable tools for biomedical and biochemical analysis, clinical diagnosis and biosensor. Therefore, the superior capabilities of SERS readout strategy such as high sensitivity and simultaneous detection of a multiple proteins in complex matrices will be highlighted in this presentation.

Biography

Nekane Guarrotxena has completed her PhD in Chemistry from Complutense University, Madrid-Spain and Postdoctoral research positions from ENSAM, Paris-France and University of Science II, Montpellier-France. She was the Vice-Director of the Institute of Polymer Science and Technology (ICTP-CSIC) (2001-2005), a Visiting Professor in CPOS of University of California, Santa Barbara-US and CaSTL of University of California, Irvine-US (2008-2011). She has published in more than 60 papers in reputed journals, four books (also co-editor) and 24 book chapters, and has been serving as an Editorial Board Member of repute, an Organizing Committee Member of scientific and technological events, and an External Expertise Consultant on I+D+I Management and Policy for National and International Agencies. Her research interest focuses on the synthesis and control-assembling of hybrid nanomaterials, smart-stimuli nanostructures, nanoplasmonics and their applications in bio-imaging, drug delivery, therapy and sensing.

nekane@ictp.csic.es