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Improved SERS nanodumbbells design for femtomolar-sensitive screening disease-associated biomarkers

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Highly sensitive and quantitative biomarker detection is a hot-topic for the technological development of next generation diagnostics. Certainly, potential utilization of biomarkers as identifiers for early detection, diagnosis and prognosis in a variety of diseases has drawn important high demand in the development of protein-based detection techniques. Among the various techniques for high-throughput protein screening, optically-encoded beads combined with local enhancements of Raman scattering signals of molecules near metallic nanostructures have great advantages. This presentation discusses the analytical strategy of identifying α-Thrombin, a specific serine protease involved in the coagulation cascade and inflammation regulatory processes at the vessel wall, on plasmonic bead-based platforms at femtomolar sensitivity; two orders of magnitude higher than commercially available bioassays, such as ELISA, by properly controlling NPs assembly and ligand exchange on plasmonic nanodumbbells. The strong binding specificity of antibody-antigen pairs make them useful tools in biochemical and biomedical analysis, clinical diagnosis, sensor design, and also food safety and environmental monitoring.

Biography

Nekane Guarrotxena has completed her PhD from the University of Complutense, Madrid, Spain and is a Post-doctoral Researcher at the Ecole Nationale Superieured´Arts et Metiers (ENSAM), Paris (France) and the University of Science II, LEM-Montpellier (France). From 2008-2011, she was visiting professor in the Department of Chemistry, Biochemistry and Materials at the University of California, Santa Barbara (USA) and the CaSTL at the University of California, Irvine (USA). She is currently research scientist at the Institute of Polymer Science and Technology (ICTP), CSIC-Madrid (Spain). Her research interest focuses on the synthesis and assembly of hybrid nanomaterials, nanoplasmonics, and their uses in nanobiotechnology applications (bioimaging, biosensing, drug delivery and therapy).

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