FINAL MASTER PROJECT PROPOSAL

Title

Microfluidic SERS platforms based on Au-SiO_2 Plasmonic Nanostructures for SERS Detection of Neurotoxic Agents in Gas Phase

Supervisor(s)

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Summary of the project

There are a number of competing technologies for the detection and identification of chemical agents. All detection and sensing systems deviate from the ideal in their limited capacity to optimise factors such as size, cost, sensitivity, speed, specificity, accuracy, reversibility and reusability. On the contrary, Surface Enhanced Raman Scattering (SERS) outstands as one of the most interesting and rapidly developing analytical tool for label-free ultrasensitive vibrational fingerprinting of a variety of molecular compounds. Nowadays, instrumentation needed for SERS are becoming progressively better, smaller and cheaper.

The final aim of this Master Thesis is the incorporation of stable Au-SiO2 Plasmonic Nanostructures on microfluidic chips for continuous SERS detection of neurotoxic agents in gas phase. In particular, core-shell nanostructures based on mesoporous SiO2 and Au nanoparticles will be fully studied. The main contribution of this work would rely on the development of microfluidic SERS platforms comprising Au-SiO2 based nanostructures with adequate plasmonic and adsorption properties for ultrasensitive SERS detection of neurotoxic agents in gas phase.

This master thesis project is within the framework of the national research project “AS3: Advanced Sorption, SERS detection and CatalySis for chemical Warfare Threats” co-led by the two supervisors. Both of them have recognized experience in the synthesis and characterization of plasmonic nanostructures, microfabrication technologies and Raman-SERS methodologies for gas phas detection; key domains for the purposes of the work herein proposed. Thus, the learning outcomes and practical training of the student will be greatly enriched.