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UMR 7197-LRS

Laboratoire de Réactivité de Surface

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12 months post-doctoral fellowship at LRS, Paris

Gold-based plasmonic biosensors for small-sized analytes

Biosensors are analytical devices incorporating a biological material (bioreceptor) intimately associated with a physicochemical transducer. These devices aim at detecting a target, specifically and rapidly, even at trace amounts and even in a complex environment. One of the greatest challenges in the field of Biosensors is the sensitivity. This is particularly true in the case of small-sized target analyte (drugs, toxins, and odorants) sensing, as the response of classical detection techniques is generally not in the range of the required detection limit. Many progresses have been made in increasing the avidity/affinity of bioreceptors, such as antibodies, aptamers, or specific “selectors” designed to recognize and bind small-sized targets. In addition, recent developments of nanostructuring processes opened the way to reproducible and reliable benefit from optical enhancement of spectroscopic transduction techniques.

In this context, we envision combining Quartz Crystal Microbalance with dissipation monitoring (QCM-D) measurements with plasmonic measurements and/or surface enhanced Raman spectroscopy (SERS) on a nanopatterned QCM gold electrode. The objective of this combination is twofold: (i) at the fundamental level, we aim at getting a detailed understanding of the molecular interactions occurring upon the molecular recognition and the binding event, while (ii) at the applied level we intend to design highly sensitive biosensors for small-sized analytes.

The offered post-doctoral position is funded by a joint French-Austrian ANR-FWF program: NanoBioSensor. The consortium brings together skills in vibrational spectroscopies, surface nanopatterning and controlled chemical functionalization of surfaces.

We are looking for a candidate with a strong background in planar surface functionalization and/or colloidal gold nanoparticles. A good knowledge of the chemistry of biomolecules is also desired. The candidate will be in charge of the controlled grafting of the bioreceptors on gold surfaces and assessing the biosensor performances on nanostructured plasmonic substrates and/or on colloidal gold nanoparticles. Motivation, initiative and autonomy are required as well as good communication skills. English is mandatory. The position is open for 12 months from March/April 2018 with possible extension.

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