

Post-doctoral position

Title: Photonic sensors for the detection of air pollutants

Research group: i-Lum

Main location: INSA de Lyon

Secondary location: Ecole Centrale de Lyon

Keywords: Nanophotonic device fabrication, Photonic crystals/metasurfaces, Ellipsometry, micro-reflectivity

Profile: Physics/Material Science, Optics/Photonics.

Duration: 18 months

Research Project

Context and objectives

This post-doctoral position is part of the "STACKPACK" project, which aims at developing an ultra-sensitive photonic sensor for pollutants contained in the ambient air (FEDER project in collaboration with an industrial partner). The project is motivated, on the one hand by the company demand for the development of a sensitive, high-performance and compact sensor, and on the other hand by the activities of the i-Lum team @ INL on the development of extremely-sensitive environmental sensors based on innovative photonic concepts.

The original approach carried out by the i-Lum team for the development of such sensors consists in the association of:

- Nanophotonic structures that are highly sensitive to the environment, and that are made of sensitive materials (polymers and/or catalytic metals)
- An optical phase detection system (interferometry), which allows to improve the limit of detection by an order of magnitude with respect to the current state of the art

In this context, the post-doctoral fellow will join the i-Lum team of INL and more precisely the "sensors" project group. During 18 months, he/she will be in charge of:

- 1- The characterization of optical and topographic properties of thin films of sensitive materials (polymers, catalytic metals) by AFM, SEM, ellipsometry.
- 2- The cleanroom micro-nanostructuring of thin films of sensitive materials, by usual fabrication techniques such as nano-imprint, electron-beam lithography, material deposition (metals, polymers).
- 3- The optical characterization of the fabricated devices by micro-reflectivity and interferometry. This step will include the implementation of a gas circulation system for sensing experiments.

For this work, the post-doctoral fellow will have access to the Nanolyon facilities for the fabrication and optical characterizations. She/he will work in close collaboration with other researchers of the team for the different experimental aspects of the project.

Profile

The nature of the proposed work being mainly experimental, the candidate must have a PhD in nanophotonics and/or material science, with experience in the fabrication of micro-nanostructures and in the optical characterization of the fabricated devices. Good writing skills, both for reports and publications, as well as scientific presentations are also expected.

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