

Post-doctoral position 2019

Autonomous microfluidic oscillators for continuous flow colorimetric analysis of water samples



In the context of increasing anthropic pressure on coastal and marine areas, strong needs exist for compact, robust chemical sensors, with the capability to operate in-situ in remote places without human intervention for long periods of time¹. Some promising advances have recently been made by the oceanographic community to create millifluidic continuous chemical analyzers based on colorimetric assays, for nitrates, nitrites, ammonia, or dissolved heavy metals among others^{2,3}.

Our project aims at simplifying and miniaturizing these macroscopic systems by taking advantage of some inherent qualities of microfluidics, mainly integration density for parallel operations and reproducible reactions due to laminar conditions. At the heart of the project is the use of microfluidic oscillators^{4,5}. We recently developed an alternative to the classic multilayer soft lithography method to create such pressure-driven actuators at the wafer scale level⁶. Our method offers a superior stability and repeatability on the actuators performance, while being suitable to mass-scale production, thus offering a very cost-effective solution.

The project will consist in the development of an autonomous microfluidic oscillator for the continuous determination of nitrate levels by a colorimetric assay. Experimental validation for nitrate quantification will be performed in synthetic and natural waters. The study, development and fabrication of the system will be performed at the LAAS-CNRS, while the laboratory and field validations will be performed in close collaboration with the GET laboratory.

We're looking for an open-minded, highly motivated candidate, able to work on a multi-disciplinary topic, with a PhD in microfluidics, microsystems, engineering physics, materials science, applied physics or other related disciplines. A background in electrical engineering will be appreciated as the microfluidic oscillator design will be based on fluidic/electric analogy. The candidate will be assisted in the fabrication process, so experience in micro-fabrication will be welcome but is not mandatory. However, some knowledge in experimental microfluidic device characterization will be highly appreciated. This project is supported by the STAE network.

Starting: as soon as possible.

Duration: 12 months.

Gross salary: approximately 36 000€ / year.

How to apply:

Please send:

- CV (including your publications).
- A cover letter describing yourself, your research interests and your motivations.
- Name and contact of two references.

Contact:

Vincent Raimbault (vraimbau@laas.fr). Phone number: +33 (0) 5 61 33 63 65. Other people involved in the project are Laurent Malaquin (LAAS-CNRS), Rémi Courson (LAAS-CNRS) and David Point (GET-IRD).

References:

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