

Postdoctoral Research Position (18 Months)

Development of Microfluidic Devices for the Electrochemiluminescence (ECL) of Functionalized Microbeads

Background. Electrochemiluminescence (ECL) is a highly effective detection technique for ultrasensitive analysis, particularly in biomedical diagnostics. Its integration into microfluidic devices offers promising opportunities through precise flow control, enhanced mass transport, and the possibility of performing measurements on individual micrometre-sized objects.

This 18-month postdoctoral position is part of the ANR-funded ECLiM project, which aims to develop new electrochemiluminescence-based detection strategies by combining microfluidics, microelectrodes, and functionalized micrometre-sized objects. The project notably relies on the hydrodynamic trapping of microparticles near transparent or semi-transparent electrodes to control and optimize light emission under flow conditions.

This research adopts an interdisciplinary approach combining electrochemistry, microfluidics, and optical imaging, with potential applications in medical diagnostics, food safety, and environmental monitoring.

Research Environment. The postdoctoral researcher will join the ElectroNanoBio team within the Department of Chemistry at École normale supérieure (ENS) in Paris.

The ANR-funded ECLiM project consortium includes two additional academic partners: the Analytical NanoSystems team at the University of Bordeaux and the CBEA team within the Department of Chemistry at ENS.

Objectives. The postdoctoral researcher will contribute to the design, fabrication, and experimental validation of microfluidic devices enabling the selective and reversible trapping of functionalized microbeads. They will also carry out quantitative characterization of the electrochemiluminescence emitted by these particles under flow conditions.

Experimental results will be compared with numerical simulations performed by the research team to improve the understanding of mass transport and light-generation mechanisms at the micrometre scale.

Methodologies.

- Cleanroom microfabrication techniques
- Electrochemical techniques using microfluidic devices
- Optical measurements and photoluminescence imaging
- Numerical simulations using COMSOL Multiphysics

Candidate Profile. Applicants should hold a PhD in electrochemistry, analytical chemistry, physical chemistry, or a closely related field, and have experience in experimental research.

Experience in electrochemistry and/or electrochemiluminescence is particularly desirable. Skills in microfluidics, microfabrication, optical microscopy, or image processing will be considered significant assets. The successful candidate should demonstrate independence, experimental rigor, strong analytical skills, and the ability to work effectively in a multidisciplinary team.

Application Procedure and Contact. Laurent Thouin, ElectroNanoBio team, CNRS UMR 8228 CPCV (*Chimie Physique et Chimie du Vivant*), École normale supérieure, Paris.

Applications should be submitted by email to Laurent.thouin@ens.psl.eu and should include:

- A detailed CV
- A cover letter
- A summary of previous research work
- Contact details for referees