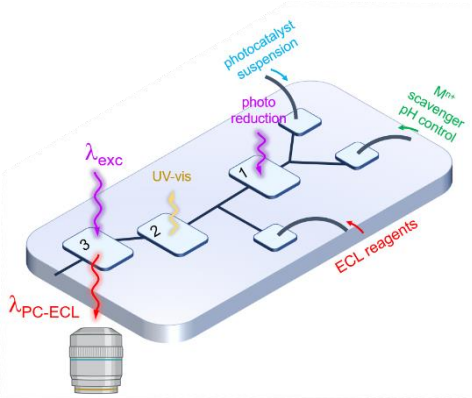
Revealing Photocatalysis by Electrogenerated Chemiluminescence

I2M – Arts et Métiers Bordeaux – France

Context

The conversion of light into chemical bonds powers life on Earth via natural photosynthesis. However, the deployment of human-made artificial photocatalytic systems to achieve a reliable synthesis of solar fuels has so far been unsuccessful. The reason for that is that photocatalytic systems are extremely challenging to study as, often, the only output data that can be extracted to apprehend their mechanisms is the final analysis of the products. This significantly limits our ability to elucidate the mechanisms occurring within the photocatalyst and at the photocatalyst/liquid interface. Furthermore, a major bottleneck in photocatalyst development is the almost infinite combination of experimental conditions that must be tested, making optimization and screening a daunting task.



The project aims to develop a new imaging method to accelerate developments in photocatalysis and solar fuel production. Specifically, we will develop versatile analytical methods for the in-situ characterization and high-throughput screening of suspended or surface-immobilized photocatalytic systems by combining electrochemiluminescence (ECL) microscopy and photocatalysis.

Planned Activities

(Documents and reports will be produced in English)

- Install and design the imaging setup
- Software development under LabVIEW to control the instruments
- Image the photocatalyst using the microscope
- Process the images using big data analysis

Require skill

- Strong skills in electrical and industrial engineering, image processing and big data analysis. The strong taste for experimental work is required.

- Communication and reporting. The results will be presented to the teams during the internship.

Contact

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The candidate will have some contacts with the members of the chemical lab team in Bordeaux.

Working conditions

The student will be paid according to French regulation on internship.
The work will be done in Bordeaux Arts et Métiers Campus