

Multimodal imaging to decipher bacteria-microalgae interactions in multispecies photosynthetic biofilms

(Post-doctoral fellowship)

Microalgae have been identified as a promising biomass feedstock for the production of biofuels, feeds, foods and high-value with applications in markets such as cosmetics, pharmaceutical, nutritional, and aquaculture. They are mostly cultivated as planktonic cells suspended in liquid nutrient medium in open and closed systems, raceways and photobioreactors, respectively. Despite the great potential of microalgae to produce high-valuable products, these systems are generally characterized by low productivities, high energy demand and high operating costs. Lately an increasing interest in biofilm-based microalgae technology has been reported due to its potential to improve the sustainability and cost effectiveness of the bioprocess compared to those of suspended cultures. A biofilm is an assemblage of microbial cells that are irreversibly associated with a surface and enclosed in a matrix of extracellular polymeric substances. Biofilms are ubiquitous in nature and are highly used for bioremediation and industrial bioprocess purposes. In addition, new compounds can be produced by photosynthetic biofilms for health and cosmetics markets.

The aim of this position is to characterize multispecies photosynthetic biofilms mainly through multi-scale imaging (Confocal Laser Scanning Microscopy, CLSM; Optical Coherence Tomography) approaches in order to get a better insight into microbial interactions (microalgae/bacteria) and compounds production. The hired post-doc fellow will work in the context of the national project PhotoBiofilm Explorer (ANR) which is focusing on the production of antimicrobial metabolites in microalgae growing in biofilm-based reactors.

This project will be carried out in the MICALIS B3D (Biofilms and Spatially Organized Communities) team of INRAE/AgroParisTech/University Paris-Saclay, Jouy-en-Josas and the Laboratory of Chemical Engineering and Materials (LGPM, Bioprocess team), CentraleSupélec/University Paris-Saclay, Gif-sur-Yvette, and in close collaboration to the other partners of the ANR project.

Required skills: The candidate must have a PhD with recognized experience in microalgae cultures and/or biofilm analysis. Knowledge of laser scanning confocal microscopy and image analysis is highly appreciated.

Fellowship duration: 1 year starting in January 2023.

Contact: Please contact Filipa Lopes (filipa.lopes@centralesupelec.fr), Romain Briandet (romain.briandet@inrae.fr) for further information.

How to apply? Please send a CV, a cover letter and recommendation letters to Filipa Lopes and Romain Briandet using the above mentioned contact information.

References:

Fanesi, A., Martin, T., Breton, C., Bernard, O., Briandet, R., & Lopes, F. (2022). The architecture and metabolic traits of monospecific photosynthetic biofilms studied in a custom flow-through system. *Biotechnology and Bioengineering*.

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