Post-doctoral Position

18 months

Nanoparticles toxicity towards microalgae: a multiscale analysis using atomic force microscopy and confocal microscopy

Laboratoire Interdisciplinaire des Environnements Continentaux

Nancy-France

The project

The exponential use of nanoparticles (NPs) in consumer products entails their discharge in the environment, where their behaviour, fate and effects on the different biological organization levels remain potentially hazardous. In aquatic ecosystems, microalgae lie at the lowest trophic level therefore constituting the basis for food chains. They are largely employed in various industrial processes/products, such as aquaculture, human nutrition, animal feed, and biofuel. However, little is known about the **mechanisms behind nanoparticles toxicity on microalgae**. The aim of the postdoctoral project is to decipher these mechanisms via *in-situ* measurements at the nano- and micro-metric scales. Specifically, **AFM (in imaging and force spectroscopy modes) and confocal micro-spectroscopy** will be used to follow the dynamic **bio-physicochemical processes occurring at the surface and in the intracellular space of living microalgae**. The proposed methodology will allow to probe NP partitioning: adhesion to the biosurface, internalisation *i.e.* transport across the biological barrier, and compartmentalisation inside the cells. To better understand NPs mode of action, links will be established between algal changes induced by the NPs at the molecular levels, NPs deleterious impacts examined at the single-cell level and proxys of cell fitness measured at the algal population scale. Depending on the project evolution, the candidate may be involved in some other aspects of the study, including the application of label-free microscopy techniques to microalgae.

Expected skills

We are looking for a **2-7 years-experienced post-doc** but we are open to the possibility of a junior post-doc if autonomous and highly motivated.
The candidate is expected to have:

- Excellent skills in AFM, and more generally biophysics techniques
- Skills and knowledge in photonics
- Knowledge in physical chemistry, colloidal science
- Strong motivation to work on a multidisciplinary project, and ability to work and discuss with different scientific communities
- Skills in microbiology would be a plus but is not compulsory
- Fluent in English (written, spoken)

Starting date

The postdoc will start in **January 2022 for 18 months.**

The laboratory

The Laboratoire Interdisciplinaire des Environnements Continentaux (LIEC) (https://liec.univ-lorraine.fr/) is located on 3 geographic sites between Nancy and Metz. The missions of the postdoc will mostly take place on the Chamois site, 15 avenue du Charmois at Vandoeuvre-les-Nancy.

The primary objective of the LIEC is to understand the functionning of continental environments strongly impacted by human activity, in order to contribute to their rehabilitation. In this purpose, we implement an interdisciplinary research, allying the concepts and methods of environmental mineralogy, soil science, microbial ecology, colloidal physicochemistry, ecotoxicology, functional ecology.

The laboratory is now composed of five Research Teams :

- Cycles biogéochimiques dans les écosystèmes perturbés (CyBLE), Resp. P. Faure
- Physico-chimie et Réactivité des Surfaces et Interfaces (PhySI), Resp. J. Duval
- Écologie Microbienne des Milieux Anthropisés (EMMA), Resp. P. Bauda
- Toxicologie de l'Environnement (TEv), Resp. C. Cossu-Leguille
- Écologie du Stress (ECoSe), Resp. F. Guérold

This new structure allows the lab to continue disciplinary and interdisciplinary researches in the frame of environmental sciences.

The LIEC is administrated by two entities, the CNRS (National Scientific Research Center), and the University of Lorraine

The team

The candidate will be part of the PhySI team (https://liec.univ-lorraine.fr/content/page-thematique-2). She/he will be supervised by Audrey Beaussart (https://abeaussart.webnode.fr) and Jérôme F.L. Duval (https://duvaljfl.webnode.fr/). She/he will have access to all the facilities required for the project, especially the AFM (https://liec.univ-lorraine.fr/content/microscopie-force-atomique) and photonics plateforms (https://liec.univ-lorraine.fr/content/diese) present on site.

Application

Applications should be sent *via* the CNRS portal

https://emploi.cnrs.fr/Offres/CDD/UMR7360-CATPIE-007/Default.aspx

by the 4th of October 2021 and include:

- A motivation letter
- A *curriculum vitae* with complete list of publications
- The names and contact details of at least 2 referees

PROJET FINANCÉ PAR L'ANR - PROJECT FUNDED BY THE ANR