

## Postdoctoral researcher position in Biophysics

**Institute of Chemistry and Biology of Membranes and Nanoobjects  
(CBMN, UMR 5248 CNRS)**

**ERC StG project - PUMBA - Physical and molecular underpinnings of the multifunctionality of bacterial peptide assemblies -**

The group “Methodological developments in AFM for biological applications” at the CBMN (Bordeaux) is currently seeking a motivated postdoctoral researcher to investigate the dynamics of bacterial peptide assemblies, and their interactions with cell membranes. This is a highly interdisciplinary project funded by the ERC StG 2024, at the frontier between soft matter, structural biology and biophysics. The postdoc will have access to state-of-the-art facilities at the CBMN, and evolve in a collaborative network of physicists (LOMA).

**Offer.** Post-Doc, 24 months, starting February 2025 (can be negotiated).

**Location.** CBMN, Institut de Chimie et Biologie des Membranes et Nanoobjets, UMR 5248, Université de Bordeaux (<http://www.cbmn.u-bordeaux.fr/>). CBMN provides a perfect, dynamic and stimulating environment for this project, as we significantly collaborate with different teams, experts in cellular / molecular biology, physical-chemistry, and front-end methodological developments to address major challenges in the field of peptide-membrane interactions.

**Supervisor.** Marion Mathelié-Guinlet (Permanent CNRS researcher, CBMN).

Amyloids proteins are widespread in nature, from humans to bacteria, and characterized by their ability to aggregate into ordered fibrils that are not only the hallmark of protein aggregation disorders (*e.g.* Alzheimer disease) but could also underlie bacterial infection diseases. To date, no consensus has been reached to comprehensively explain the cytotoxicity of some of these proteins, notably because of our lack of understanding and characterization of the different entities formed along the fibrillation pathway, and in interaction with cell membranes.

This project aims at characterizing the aggregation process of the phenol soluble modulins (PSMs) secreted by the pathogen *S. aureus* under conditions of increasing complexity: (i) *in vitro* at the interface of lipid membranes, and (ii) *in cellulo* in the presence of cells. The candidate will use and develop highly-resolved imaging and spectroscopic tools to disentangle how the physico-chemical properties of both interacting partners (PSMs and lipids/cells) lead to a specific mode of action of PSMs towards their cytotoxicity, and how the presence of specific membranes reciprocally alter the fibrillation process of PSMs. Notably, **we aim at coupling atomic force microscopy (AFM) to Total Internal Reflection Fluorescence (TIRF) or confocal microscopy to simultaneously assess the kinetics of fibrillation, and the deleterious morphological and structural impacts on membranes, at the molecular scale and with high temporal resolution.** Complementary biophysical approaches, from electron microscopy, to vibrational spectroscopies and viability assays will be used to further associate the formation of specific PSMs entities with their ultimate biological activities, thus revealing the underlying determinants of PSMs functions. The candidate will strongly collaborate with other members of the team for the production and characterization of controlled lipid membranes and with the Laboratoire Ondes et Matière d’Aquitaine (LOMA) for the physical investigation of PSMs self-assembly and motions near soft interfaces.

**Candidate profile.** We invite applications from innovative and motivated candidates with background in experimental biophysics, or closely related fields, who are intrigued by exploring and coupling cutting-edge methods to unravel the so far enigmatic structure-function relationship of bacterial functional amyloids. The candidate must have a strong expertise in fluorescence microscopies (TIRF, confocal), and atomic force microscopy. Previous experience in biomolecules (proteins / lipids) and/or cells is recommended as well as skills in imaging processes and particles tracking. We are looking for someone proactive, independent, with good organizational and communication skills, and ability to work in a team environment.

**Interested?** Applications should be sent, with the following documents, to Marion Mathelié-Guinlet ([marion.mathelie-guinlet@u-bordeaux.fr](mailto:marion.mathelie-guinlet@u-bordeaux.fr)):

- A full resume
- List of publications
- A short motivation letter (max. 1-2 p.)
- At least one letter of reference
- A copy of the PhD degree certificate (for PhD students at the end of their PhD, you may indicate when your PhD defense is scheduled).

Please do not hesitate to contact us if you need any information before applying.