



POSTDOCTORAL POSITION

2 YEARS AT THE CENTER FOR STRUCTURAL BIOLOGY (CBS) MONTPELLIER, FRANCE

Luca Costa, PhD

Integrative Biophysics of Membranes (IBM) Team

SCIENTIFIC PROJECT AND JOB DESCRIPTION:

What is the smallest thing we can see on the surface of water?

The surface of water is the prevalent interface on our planet. Yet, even the most advanced microscopy techniques does not provide nanoscale images of its surface. Yes, reciprocal-space methods such as X-Ray or neutron scattering & reflectivity can provide an indirect structural information, but it is an averaged one.

This project aims to develop a novel microscopy approach capable of directly imaging the surface of water with nanometric resolution. We will design and construct an Atomic Force Microscope (AFM) integrated within a Langmuir trough, permitting high-resolution and real-time characterization of films directly on liquid surfaces.

The position lies at the intersection of physics and engineering, with applications spanning soft matter, chemistry, biophysics, and biology. Indeed, interfaces between air and water are crucial for the self-assembly of lipids, surfactants, pollutants, and peptides, playing central roles in multiple disciplines.

We have demonstrated the feasibility of AFM at *liquid/liquid* interfaces [1,2] and identified the formation of a capillary bridge between AFM probe and water as the key obstacle to imaging the *air/water* interface. Within this framework, we will design and assemble the AFM components, including a fast XYZ scanner, optical beam deflection system, photothermal excitation, and electronics. AFM integration within a Langmuir trough will be carried out in collaboration with the INSP (Paris, Sorbonne).

In this position, you will go beyond being a typical AFM user using a commercial microscope. Instead, you will contribute to advancing AFM and microscopy by designing and developing an instrument capable of observing phenomena that are currently impossible to visualize.

This position is supported by the ANR 2025-2028 grant "SLAM-AFM".

[1] Costa, Luca, et al. *Nano letters* 16.9 (2016): 5463-5468. <https://hal.science/hal-05772387>

[2] Costa, Luca, et al. *Advanced Materials Interfaces* 4.16 (2017): 1700203. <https://hal.science/hal-05550091>

SCIENTIFIC ENVIRONMENT:

CBS is a scientific Institute dedicated to research at the forefront of biophysics and structural biology. It offers cutting-edge facilities in these fields. The research of our **group** is focused on the development and use of correlative advanced microscopies (AFM with single molecule fluorescence microscopy and/or X-Ray microscopies and spectroscopies) to decipher the molecular mechanisms associated to the organization and remodeling of biological [3,4,5] and soft matter interfaces. The team has a longstanding record in the training of young apprentices and the activity of mentoring early career researchers is part of the position. Dr. Luca Costa has already designed and developed several Atomic Force Microscopes for diverse applications, spanning soft matter and coupled to fluorescence for Bio-imaging to integration with synchrotron beamlines for correlative X-Ray and AFM experiments [6,7,8].

REQUIREMENTS:

Motivated and ambitious candidates are encouraged to apply. We require:

- Experience in Scanning Probe Microscopy
- A Master & PhD degree in **physics, engineering, or biophysics**
- **A high level of interest in instrumentation**, protocols & techniques development
- Relevant scientific experience supported by publication record
- Excellent English communication skills

Experience in Optics, Electronics (especially, Lock-In Amplifiers, Phase-Locked Loops, PID controllers, Oscilloscopes, Function generators & Multimeters). Experience with FreeCAD or equivalent (i.e. Solidworks). Computational skills (i.e. Labview, Python, Matlab).

TERMS OF SALARY AND EMPLOYMENT:

Successful applicants will receive a salary according to CNRS rules (**ranging from ~ 3000 € to 4200 € gross salary depending on previous experience**). Flexible starting date.

APPLICATION PROCEDURE:

Applications will be evaluated as they are received. The application must be submitted in English to luca.costa@cnrs.fr. It must include the following:

- Curriculum vitae with a list of publications
- Motivation letter tailored specifically to the advertised position
- A report on previous research
- The names, addresses and contact details of 2 referees

[3] Hutin, Stephanie, et al. *PNAS* 120.28 (2023): e2304714120. <https://hal.science/hal-04212491v1>

[4] Santamaria, Andreas, et al. *Biophysical Journal* 123.19 (2024): 3366-3374. <https://hal.science/hal-04707061>

[5] Santamaria, Andreas, et al. *Advanced Materials Interfaces*, in press (2026).

[6] Gumí-Audenis, B., et al. *Journal of Synchrotron Radiation* 22.6 (2015): 1364-1371. <https://hal.science/hal-01572735v1>

[7] Vitorino, M. V., et al. *Journal of Synchrotron Radiation* 23.5 (2016): 1110-1117.

[8] Hafner, Aljoša, et al. *X-Ray Spectrometry* 54.4 (2025): 378-386. <https://hal.science/hal-04866609>