



## CALL FOR APPLICATIONS POSTDOCTORAL POSITION

**2 YEARS POSTDOCTORAL POSITION AT CENTER FOR STRUCTURAL BIOLOGY (CBS) IN  
MONTPELLIER, FRANCE**

**Dr. Luca Costa**

Integrative Biophysics of Membranes (IBM) Team  
Biophysics and Bioengineering Department

<https://integrativebiophysicsofmembranes.wordpress.com/>

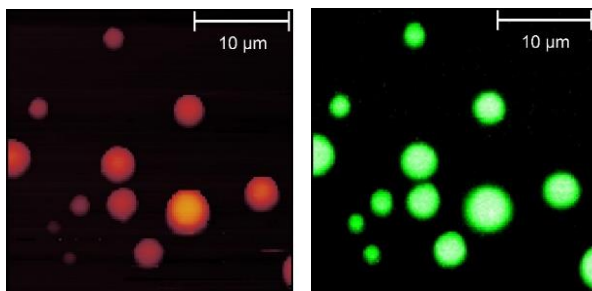
<https://twitter.com/MembranesBiophy>

### SCIENTIFIC PROJECT AND JOB DESCRIPTION:

ELF3 plant proteins have the ability to undergo phase-change in response to environmental signals, such as temperature, enabling these proteins to act as developmental switches<sup>1</sup>. Phase-change occurs through dynamic compartmentalization into biomolecular condensates during the formation of Liquid-Liquid Phase Separation (LLPS) droplets. Their structure and the associated dynamics are usually assessed by Fluorescence Correlation Spectroscopy (FCS), FRAP or SAXS. However, they are still poorly understood at the molecular level because nanometer-resolved images of the condensates are very challenging to obtain by means of conventional microscopy methods.

Our goal is to study the structure and the associated dynamics of LLPS condensates with high spatial-temporal resolution by **High-Speed Atomic Force Microscopy (HS-AFM)**, FCS and Fluorescence Lifetime Imaging (FLIM). With its minimal invasiveness, HS-AFM will be employed to catch single proteins diffusing at the LLPS interface, enabling the characterization of the intermolecular interactions. Results will be correlated with X-Ray (SAXS) and Electron Microscopy (EM) structural data, as well as with theoretical models and simulations performed by our collaborators.

In addition, the PostDoc will employ a recently developed<sup>2</sup> **Super-Resolution technique making use of the AFM tip to enhance/quench single fluorophores**. The technique will be used to image GFP-labelled ELF3 droplets, providing fluorescence images with nanometric resolution.



*Coupled AFM and confocal microscopy of ELF3-GFP constructs. AFM topography mapping is shown at left, confocal fluorescence of the same sample is shown at right.*

The PostDoc will work in close collaboration with Dr. Pierre-Emmanuel Milhiet, HS-AFM expert, and Dr. Alessandro Barducci, expert in computational and theoretical methods, both researchers at CBS. Additionally, he/she will closely collaborate with Dr. Chloe Zubieta (IRIG, Grenoble), LLPS expert (<https://www.nature.com/articles/s41586-020-2644-7>). He/she is expected to participate in ongoing in-house R&D team programs, mainly focused on biological membranes remodeling projects<sup>3,4,5</sup>.

Finally, he/she will have the opportunity to apply for internal CBS grants to develop his/her own research project and interests. This position is supported by an ANR 2022-2025 grant (“PROSPERO”).

#### References:

– **1.** JH. Jung et al. Nature, 585(7824), 2020. – **2.** T. Fernandes et al. Scientific Reports, 10(1), 2020. – **3.** O. Saavedra et al. Langmuir, 36(21), 2020. – **4.** A. Vial et al. Nanoscale, 13(29), 2021. – **5.** L. Costa et al. NanoLetters, 16 (9), 2016.

#### SCIENTIFIC ENVIRONMENT:

CBS (<http://www.cbs.cnrs.fr>) is an Institute dedicated to research at the forefront of structural biology and biophysics. It also proposes facilities in these fields. Montpellier is a stunning city on the French Riviera with a significant international community. The research of our IBM group is focused on the development and use of correlative advanced microscopies (AFM and single molecule fluorescence microscopy) to decipher the molecular mechanisms associated to the organization and remodeling of biological membranes. The group includes 18 people with 7 permanent researchers. The team has a longstanding record in the training of young apprentices and the activity of mentoring young people is part of the position.

More info on <https://integrativebiophysicsofmembranes.wordpress.com/research-themes/>

#### REQUIREMENTS:

Highly motivated and ambitious candidates are encouraged to apply. We require:

- **Excellent teamwork skills.**
- A recently obtained (< 2 years) PhD degree in physics or biophysics.
- **A high level of interest in instrumentation** and in the development of non-conventional protocols and techniques.
- Relevant scientific experience supported by publication record.
- Excellent English communication skills.

Previous experience in Atomic Force Microscopy, Fluorescence (confocal/TIRF/Super Resolution/FLIM) imaging, Optics, Electronics and Wet Lab. Computational skills (i.e. Labview, Python, Matlab) will be positively considered.

#### TERMS OF SALARY AND EMPLOYMENT:

Successful applicants will receive a salary according to CNRS rules (**flexible starting date, ranging from November, 1<sup>st</sup> 2022 to February, 1<sup>st</sup> 2023**).

#### APPLICATION PROCEDURE:

The application must be submitted in English to [luca.costa@cbs.cnrs.fr](mailto:luca.costa@cbs.cnrs.fr) and [pierre-emmanuel.milhiet@cbs.cnrs.fr](mailto:pierre-emmanuel.milhiet@cbs.cnrs.fr). They must include the following:

- Curriculum vitae with a list of publications,
- A report on previous research
- The names, addresses and contact details of 2 referees
- All relevant diplomas, including grades.

**Deadline for application is September 30<sup>th</sup>, 2022.** All applicants will be notified whether their application has been selected for an interview (seminar + personal visit or zoom chat).

