

**Project title: LIGHT-ACTUATION OF SOFT COMPARTMENTS BY ARTIFICIAL NANOMOTORS**

The Optoflow group at the LOMA (Bordeaux) is looking for a motivated Postdoc candidate, to investigate experimentally the dynamics and mechanics of soft compartments driven by light-actuated nanomotors. This is a highly interdisciplinary project, at the frontier, between active and soft matter, optics and biophysics. The postdoc will have access to state-of-the-art facilities and laboratories at the LOMA, and evolve in a collaborative network of experts (LCPO, ICMCB).

**Offer:** Post-Doc, 18 months, starting July 2024 (*depending on the candidate, the starting date can be negotiated*). **Deadline: May 19<sup>th</sup>, 2024.**

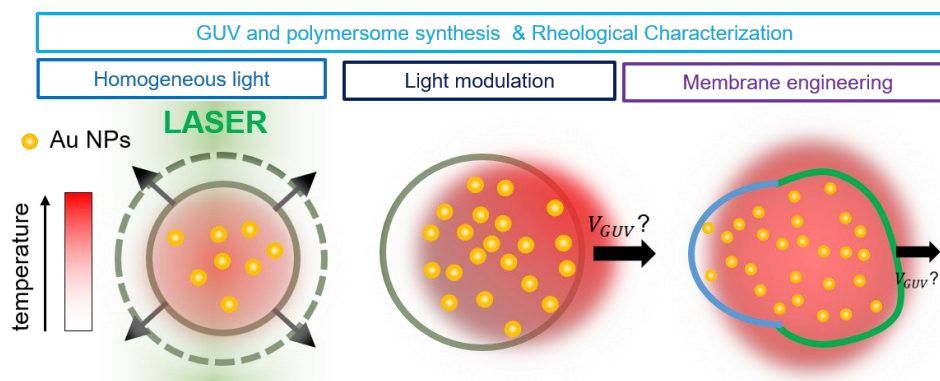
**Location:** LOMA, Laboratoire Ondes et Matière d'Aquitaine, UMR 5798, Université de Bordeaux

**Supervisors:** U. Delabre (Associate Professor, LOMA), A. Aubret (Permanent CNRS researcher, LOMA).

**Collaborations:** LCPO, ICMCB

**Context:** The development of synthetic cells, which could emulate elementary biocellular functions like the ability to move or evolve is a fundamental goal in biology, physics, and material science. While a variety of artificial cells have been developed up to now, a key step along this line is the development of tools to rationally control and program their dynamics [Fig.1].

The aim of this postdoc project is to develop a fully photo-controllable synthetic cell, following the programmed action of an integrated statistical ensemble of nanomotors inside a soft compartment (GUV, polymersome, hybrid vesicles). In particular, we use colloidal light-actuated nanotransducers to form the internal engine of closed, soft membranes with dedicated mechanical properties. We aim at exploiting light modulation to tailor internal signaling and stresses in space and time, and examine how the system can be set or reach a dynamical state following light signaling. The fundamental goal of this project is to provide a deeper understanding of the interplay between internal stresses, membrane mechanical properties, and the morphology of soft compartments to ultimately control and program the dynamics of artificial cells. The postdoc will strongly collaborate with the Laboratory of Chemistry and Organic Polymers (LCPO) for the synthesis of soft compartments, and with the ICMCB for aspects regarding nanomaterial science.



**Figure 1:** Scheme of the project, showing the different aspects that will be investigated.

**Objectives:** The main scientific objectives of this project are [Fig.1]:

- 1) Synthesize soft membranes with controlled mechanical and surface physico-chemical properties.
- 2) Incorporate light-actuated nanomotors inside the membrane, and use them to generate internal stresses.
- 3) Use the collective action and organization of nanomotors to control the dynamics and motility of the artificial cell by light.

**Candidate profile:**

- The candidate should have a PhD in physics, physical chemistry, or biophysics, with **strong expertise in experimental physics**.
- A background in optical physics and/or soft matter is required, and experience in physical chemistry of colloids and liposomes is preferred (but not mandatory).
- Skills in Matlab/Python (or equivalent) programming are highly recommended.
- Good organizational and communication skills.
- We are looking for someone proactive, independent, social, with an ability to work in a team.

**How to apply:** The candidate should send the following documents by email to U. Delabre and A. Aubret ([ulyссе.delabre@u-bordeaux.fr](mailto:ulyссе.delabre@u-bordeaux.fr), [antoine.aubret@u-bordeaux.fr](mailto:antoine.aubret@u-bordeaux.fr)) before **May, 19th, 2024:**

- A full resume.
- List of publications (pre-print or pending too).
- A short motivation letter (max. 1 page).
- One/Two names/contacts for reference.
- A copy of the PhD degree certificate, and if possible, transcript for Master degree (*for PhD students at the end of their PhD, you may indicate when your PhD defense is scheduled*).

**We welcome all applications, irrespective of gender, ethnicity, or any physical conditions. Our group, and in general the LOMA, strongly advocates for providing an inclusive and respectful environment favoring the well-being of its members.**

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

**Optoflow group:** <https://www.loma.cnrs.fr/thematique-optoflow/#tabpanel13>

**Antoine Aubret:** <https://www.loma.cnrs.fr/antoine-aubret/>

**Ulysse Delabre:** <https://www.loma.cnrs.fr/ulyссе-delabre/>