

## TOWARDS ARTIFICIAL BACTERIOPHAGES

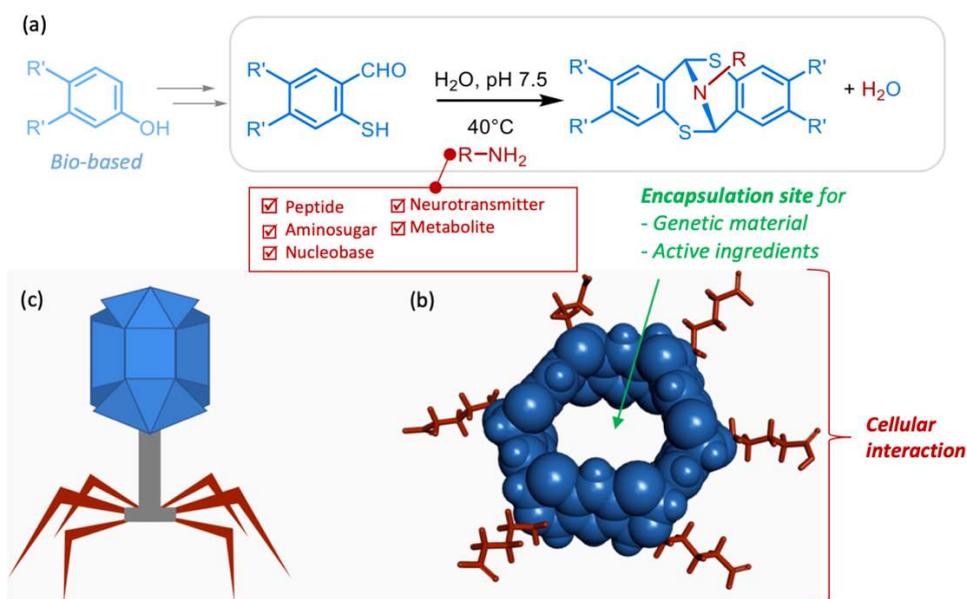
**Laboratory:** Institut de Chimie et de Biochimie Moléculaires et Supramoléculaires (UMR 5246)

**Team:** Chimie Supramoléculaire Appliquée

**Supervisors:** Laurent Vial ([laurent.vial@univ-lyon1.fr](mailto:laurent.vial@univ-lyon1.fr)) et Florent Perret ([florent.perret@univ-lyon1.fr](mailto:florent.perret@univ-lyon1.fr))

**Doctoral school:** École Doctorale de Chimie de Lyon - ED 206

*This booming project focuses on the preparation and study of a new family of receptors for molecules of biological interest.*



**Research topic:** Contemporary **organic synthesis** is essentially oriented towards two major challenges: developing new **bio-compatible** or even bio-orthogonal reactions, and proposing **eco-compatible alternatives** to major chemical transformations. It is in this context that the Applied Supramolecular Chemistry team has co-discovered a new reaction meeting these two criteria: the condensation between 2-mercaptobenzaldehydes and primary amines leading to **1,5-dithiocines** (figure a). On the basis of our preliminary work validating the efficiency and flexibility of this reaction, which can involve numerous bio- and eco-sourced reagents, we now propose to explore the synthesis of polyfunctional molecular building blocks (R' = SH and CHO) leading by spontaneous assembly under physiological conditions to the first supramolecular receptors of **poly-dithiocine type** (figure b). This project, which focuses on **eco-efficient and biocompatible organic synthesis**, supramolecular chemistry and the chemistry-biology interface, is **both fundamental and applied**. It is an academic work involving **innovative concepts** (multi-component reaction, chirality transfer, self-organization, molecular recognition and therapeutic chemistry), but also proposes to study new architectures that carry external arms for **biochemical communication**, and **active ingredients** in their cavity. This new profile makes them similar to viruses infecting bacteria, called **bacteriophages** (figure c). Their activity towards these pathogens, as therapeutic and/or diagnostic agents, will be studied in the framework of this project. Such an interdisciplinary project will involve our already well-established network of national and international collaborators.

**Candidate profile:** As the proposed topic is in the field of supramolecular chemistry, the recruited candidate will have a research master's degree or equivalent in organic chemistry and a solid knowledge of organic physical-chemistry.

**Keywords:** Organic synthesis, Supramolecular chemistry, Biomolecules, Diagnosis, Therapy.

**Our recent publications in the field:** (1) *Chem. Sci.* **2020**, *11*, 8151; (2) *ACS Med. Chem. Lett.* **2019**, *10*, 917; (3) *Chem. Sci.* **2019**, *10*, 277; (4) *Chem. Commun.* **2019**, *55*, 8935; (5) *Org. Lett.* **2018**, *20*, 2420; (6) *Chem. Commun.* **2016**, *52*, 14219; (7) *J. Org. Chem.* **2016**, *81*, 654.