Minicolloque n°2 ⊗ **Oral** □ **Poster**

Bio-inspired compartments based on liquid-liquid phase separation

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Compartmentalization is a central hallmark of living cells that allows them to perform complex tasks by dynamically coordinating matter and energy fluxes in space and time. Recent years have witnessed growing interest in the bottom-up assembly of synthetic micro-compartments to reproduce the cellular organization. Liquid-liquid phase separation in dilute aqueous polymer solutions, such as complex coacervation, provides new approaches to generate bio-inspired compartments as condensed, membrane-free microdroplets [1]. In this talk, I will show how stimuli-responsive complex coacervates are being exploited to create dynamic synthetic cells and organelles. I will in particular discuss our recent studies on the spatiotemporal control of biomolecule localization via the design of enzyme- and light-responsive coacervate droplets (Figure 1) [2-4]. Recent directions towards the stabilization of these membrane-free droplets against coalescence will also be discussed.

[1] N. Martin, *ChemBioChem* **20**, 2553 (2019)
[2] H. Karoui, M.J. Seck, N. Martin, *Chem. Sci.* **12**, 2794 (2021)
[3] N. Martin *et al. Angew. Chem. Int. Ed.* **58**, 14594 (2019)
[4] S. Lafon, N. Martin, *Methods Enzymol.* **646**, 329 (2021)

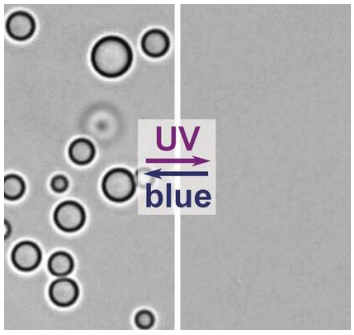

Figure 1: Optical microscopy image of photoswitchable coacervates able to be formed and dissolved in response to light irradiation.