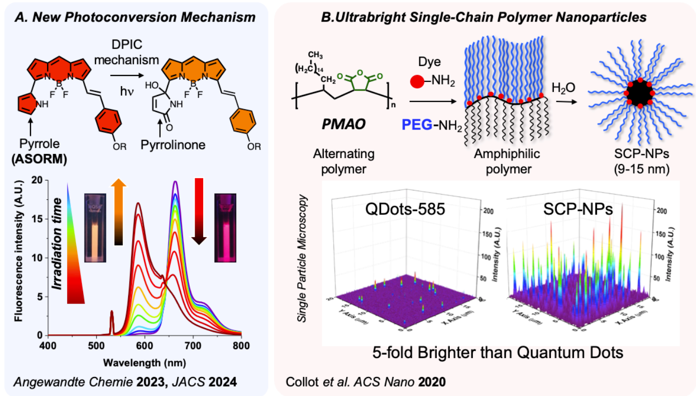
**Master 2 Internship Offer in Organic Synthesis, Fluorescence, Bioimaging**

Photomodulable fluorescent systems capable of modifying their photophysical properties upon light irradiation such as photoconvertible and photoactivatable ones are gaining an increasing attention due to their fascinating properties and their applications in a wide range of fields. Nanostructuring these systems allows for higher levels of brightness and efficiency compared to molecular ones.[1]




We recently introduced a new mechanism of photoconversion called Directed Photooxidation Induced Conversion (DPIC).[2] This approach allowed us to develop dual-color photoconvertible fluorophores based on the conjugation of a dye to Aromatic Singlet Oxygen Reactive Moieties (ASORM).[2] Upon irradiation, the obtained red-shifted dye produces singlet oxygen ($^1O_2$) through deexcitation of its excited triplet state, that reacts on the ASORM in a directed manner to disrupt its conjugation with the fluorophore leading to a hypsochromic shift in emission (Figure 1A). Importantly, we recently showed that this mechanism was applicable to BODIPYs, a brighter class of fluorophores, enabling advanced bioimaging and 3D-live super-resolution microscopy.[3]

Prior to this discovery we developed ultrabright self-folding Single-Chain Polymer nanoparticles (SCP-NPs).[4] The latter are simply obtained by reacting amino functionalized dyes and amino-PEG on the commercially available alternating polymer, PMAO (Figure 1B). When exposed to an aqueous environment, the obtained amphiphilic polymers self-fold into small single chain polymer nanoparticles (9-15 nm) possessing a hydrophobic core and a PEG shell conferring a stealth nature to the SCP-NPs.[4] Using appropriated fluorophores, the NPs can reach a high brightness up to 5 times that of quantum dots of similar emission color and size (Figure 1B).

**We herein propose to combine these two technologies to develop small and bright nanosystems with efficient photomodulation properties.** The candidate will synthesize amino-functionalized photoconverters that will be incorporated into the PMAO amphiphilic polymer. The polymer will then be easily formulated as SCP-NPs, which will be characterized by spectroscopy (DLS, absorbance, fluorescence).

**References:**

(1) Abdollahi *et al. ACS Nano* **2020**, *14* (11), 14417–14492. https://doi.org/10.1021/acsnano.0c07289.
(2) Saladin *et al. Angew. Chem. Int. Ed* **2023**, *62* (4), e202215085. https://doi.org/10.1002/anie.202215085
(3) Saladin *et al. J. Am. Chem. Soc.* **2024**. https://doi.org/10.1021/jacs.4c05231.
(4) Collot *et al. ACS Nano* **2020**, *14* (10), 13924–13937. https://doi.org/10.1021/acsnano.0c06348.

## Requirements & Application

We are looking for a highly motivated, curious, and hardworking master student capable of handling organic synthesis, characterization (NMR), and spectroscopy. Microscopy training will be provided on-site.

Please address your application to Dr. Mayeul Collot mayeul.collot@unistra.fr
Website: https://cbst.unistra.fr/en/teams/chemistry-of-photoresponsive-systems