

## Proposition M2 2023 – Equipe CASYEN

**Title:** Design and synthesis of new theranostic Au complexes with a built-in fluorescent BODIPY.

**M2 supervisors** Dr. Ludivine Jean-Gérard – [ludivine.gerard@univ-lyon1.fr](mailto:ludivine.gerard@univ-lyon1.fr)

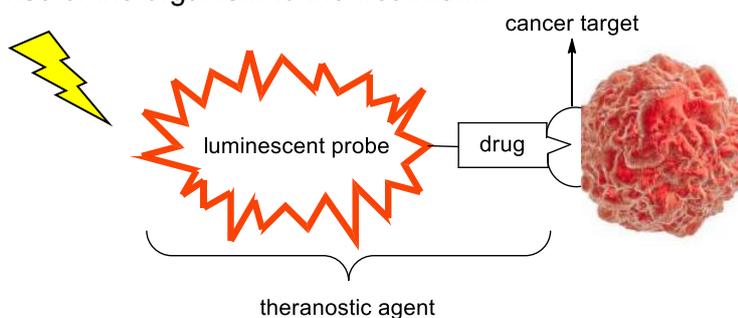
Dr. Eric Framery – [eric.framery@univ-lyon1.fr](mailto:eric.framery@univ-lyon1.fr)

Dr. Catherine Goux-Henry – [catherine.goux-henry@univ-lyon1.fr](mailto:catherine.goux-henry@univ-lyon1.fr)

**Key words:** anti-cancer drugs, theranostic agents, organic and organometallic synthesis, fluorescence.

**Acquired skills:** organic and organometallic synthesis, carbene chemistry, use of Schlenk lines, NMR spectroscopy, fluorescence spectroscopy.

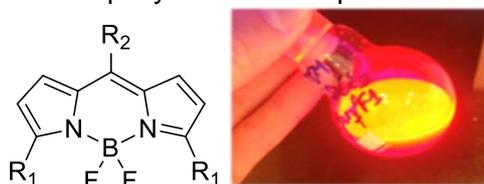
**Main context:** “Theranostic” is a contraction between “therapy” and “diagnostic”. Theranostic agents are built-in with a therapeutic agent and a luminescent molecule to allow for a real-time monitoring of the drug delivery and its release at the targeted cells (**Figure 1**). Today, the idea is to track the anticancer drugs in the organism, to follow their distribution and to monitor the response of the organism to the treatment.



**Figure 1** Theranostic agent

**Project:** We want to develop a theranostic agent composed of a BODIPY (BOron DIPYrrromethene) as the imaging probe and a gold-based drug. BODIPYs are fluorescent dyes composed of a dipyrromethene core complexed with a disubstituted boron center (BF<sub>2</sub> in our case) (**Figure 2**). In our group, we have developed some expertise in the design and the preparation of novel BODIPY structures<sup>1,2</sup> that will be beneficial for the development of this project.

The recent interesting results obtained in the team combined with the research that will be conducted by the M2 student will rapidly lead us to a publication.



**Figure 2** BODIPY structure and example of fluorescence

All the synthesized metal-BODIPY molecules will be fully characterized using classical analysis like NMR, mass spectroscopy and also fluorescence spectroscopy.

<sup>1</sup> Guérin, C.; Jean-Gérard, L.; Octobre, G.; Pascale, S.; Maury, O.; Pilet, G.; Ledoux, A.; Andrioletti, B. *RSC Adv.* **2015**, *5*, 76432-76345.

<sup>2</sup> Jean-Gérard, L.; Vasseur, W.; Scheminski, F.; Andrioletti, B. *Chem. Commun.* **2018**, *54*, 12914-12929.