MASTER DE CHIMIE DE PARIS CENTRE - M2S2
Proposition de stage 2019-2020 / Internship Proposal 2019-2020

Spécialité(s) / *Specialty(ies) :*
☐ Chimie Analytique, Physique, et Théorique */ Analytical, Physical and Theoretical Chemistry* :
☑ Chimie Moléculaire / *Molecular Chemistry* :
☑ Matériaux / *Materials:*
☐ Ingénierie Chimique / *Chemical Engineering:*

Laboratoire d'accueil / *Host Institution*
Intitulés / *Name* : Institut Parisien de Chimie Moléculaire (IPCM), UMR 8232
Adresse / *Address* : Sorbonne Université, 4 place Jussieu, Paris
Directeur / *Director (legal representative) :* **Louis FENSTERBANK**
Tél / *Tel* : 01 44 27 38 47
E-mail : louis.fensterbank@upmc.fr

Equipe d'accueil / *Hosting Team :* Chimie des Polymères
Adresse / *Address :* (*à partir de décembre 2015*) SU, tour 43-53, 4ème étage, 4 place Jussieu, Paris
Responsable équipe / *Team leader* : **Laurent BOUTEILLER**
Site Web / *Web site :* http://www.ipcm.fr/article581.html
Responsable du stage (encadrant) / *Direct Supervisor :* **Fabrice MATHEVET** and David KREHER
Fonction / *Position :* CNRS Researcher / Associate Professor (HDR)
Tél / *Tel* : 01 44 27 50 32
E-mail : fabrice.mathevet@upmc.fr

Période de stage / *Internship period* * : janvier-juin ou juillet 2020 / january-june or –july 2020
Gratification / *Salary* : 554€/mois

Novel light-emitting polymers based on thermally activated delayed fluorescence (TADF)

Projet Scientifique (1 page maximum) / *Scientific Project (maximum 1 page):*

1. Subject

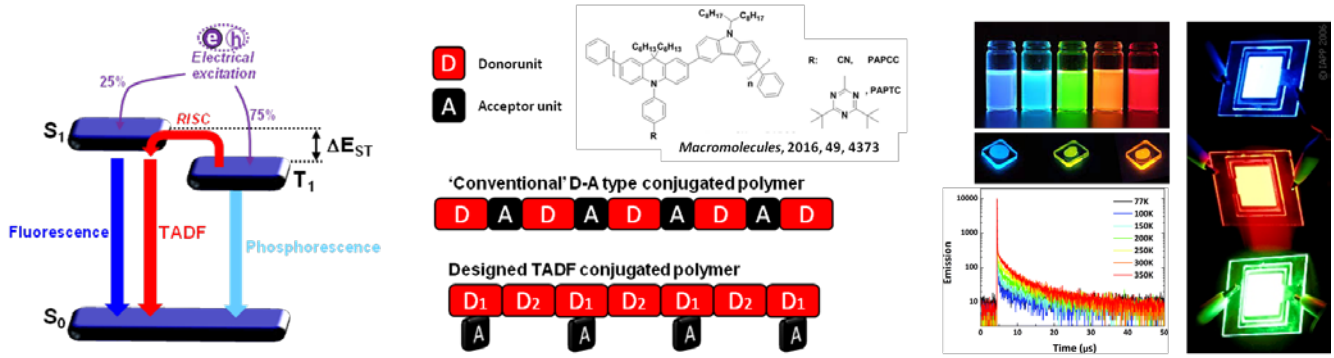
Since the first evidence of high-performance organic light emitting diodes (OLEDs) based on thermally activated delayed fluorescent (TADF) molecules in 2012,(1) the development of novel highly efficient TADF emitters represents an active area of recent research in the field of OLEDs.(2) The mechanism of TADF emission is based on an up-conversion from triplets to singlets using thermal energy, which enables the triplets to contribute to the electroluminescence without need of using rare and expensive heavy metals. The most successful design proposed so far is based on the introduction of electron donor and acceptor moieties in light-emitting molecular structures in an appropriate way to decrease the spatial overlap between the LUMO and the HOMO electronic distribution.

* 5 mois à partir du 26 janv 2020 / *5 months not earlier than January, 26th 2020.*
** Fin du premier semestre M2S1: 19/01/2020 ; Soutenances des stages M2S2, 1ere session du 29/6-3/7/2020 / End of the 1st semester M2S1: 19/01/2020. Master Defense (1st session of M2S2) from 29/06 to 3/07/2020.

Based on this molecular engineering concept, a large variety of TADF molecules has been reported in the last few years and these materials were successfully used in OLEDs with efficiencies equivalent to those achieved in phosphorescent devices.

Most TADF materials developed so far are small molecules that are vacuum-deposited to form thin films. Due to the advantages of solution-processing techniques for the fabrication of low cost and large area organic electronic devices, the realization of high performance solution-processed TADF OLEDs based on oligomers/polymers would represent an important breakthrough in the field.

In this work, we aim to design and characterize new solution-processable TADF polymer architectures based on an innovative macromolecular approaches in which the donor moieties are fixed in the conjugated backbone, and the acceptor moieties are directly grafted as side-groups.[3] These architectures should be able to exhibit high-performance electroluminescence properties in view of the elaboration of OLEDs.



2. Methods

The traineeship will contain the following tasks : (1) the synthesis and purification of a series of light emitting polymers (NMR, GPC, Maldi-TOF), (2) the study of their optical properties (UV-Visible and photoluminescence spectroscopy), (3) if time, the characterization of their electroluminescence properties in collaboration with Japanese partners..

3. Reférences

(1) H. Uoyama, et al., ***Nature***, **2012**, 492, 234.
(2) a) Y.Tao, et al., ***Adv. Mater.*** **2014**, 26, 7931. b) C. Adachi, ***Jpn. J. Appl. Phys.*** **2014**, 53, 060101. c) M. Y. Wong, et al., ***Adv. Mater.*** **2017, 29, 1605444.**
(3) a) Y. Zhu, et al., ***Macromolecules,*** **2016**, 49, 4373. b) Xie, et al., ***J. Polym. Sci. A: Polymer Chemistry*** **2017**, 55, 575.