

Proposition de stage Master

Synthesis of conjugated polymers for doped electronic applications

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Since the Nobel Prize in Chemistry awarded to Heeger, MacDiarmid and Shirakawa on conducting polymers in 2000, conjugated polymers are the focus of intense research for their application in organic electronics, and in particular the realization of lightweight, flexible and low-cost devices.

Good charge transport properties arise from the self-assembly of π -conjugated polymers, achieved by microsegregation between conjugated polymer backbones and the presence of flexible side chains [1]. The addition of doping molecules to these polymers considerably amplifies the electrical conductivity of these systems [2]. However, the doping process and its mechanisms are still poorly understood. In particular, it is difficult to control the localization of dopants and avoid the destruction of self-assemblies.

The aim of the internship project is multidisciplinary and consists of synthesizing new high-performance π -conjugated polymers for doping. The molecular engineering work involves tailoring the side chains to (i) control the position of the dopant and (ii) stabilize the organization of the polymers in the solid state as thin films. Two applications in particular are targeted: electrochemical organic transistors [2] and thermoelectric devices [3,4].

The main focus of the internship is the organic synthesis of π -conjugated monomers and their polymerization. The candidate will be part of a team and will interact closely with various team members (chemists, physicochemists, and physicists) from the [STELORG](#) consortium at the Cronenbourg campus.

Sélection de publications de l'équipe dans le domaine : [1] N. Kamatham et al. *Adv. Funct. Mater.* **2021**, *31*, 2007734. [Link](#); [2] O. Bardagot et al., in Review in *Nature Materials*, **2023**. [Link](#); [3] P. Durand et al. *Adv. Energy Mater.* **2022**, *12*, 2103049. [Link](#); *Adv. Mater.* **2025**, *37*, 2420323 [Link](#). [4] V. Vijayakumar et al. *J. Mater. Chem. C* **2020**, *8*, 16470. [Link](#); Brinkmann et al. *Small*, **2025**, *21*, 2410073. [Link](#).