Open PhD position

Side-chain engineering in conjugated polymers for doped electronic applications

Beginning: Oct. 1st. 2024 (ANR TriPODE funding already available)

Locations:

IPCMS	and	ICPEES
CNRS, Univ. Strasbourg		CNRS, Univ. Strasbourg
23 rue du Loess,		25 rue Becquerel
67034 Strasbourg		67087 Strasbourg

Supervisors: Stéphane Méry (https://www.ipcms.fr/en/equipe/functional-molecular-materials/)
& Nicolas Leclerc (https://icpees.unistra.fr/ingenierie-des-polymeres/synthese/)

Conjugated polymers are today the focus of intense research for their application in organic electronics, and in particular the realization of lightweight, flexible and low-cost devices. Good conduction 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, it was observed that the insertion of dopants was to the detriment of the structural order of the solid-state polymer self-assembly, with poor control of dopant localization.

The PhD project offer 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 task will consist essentially on the synthesis of organic conjugated systems and on polymerization. If interested, the candidate could also participate in the characterization of the physicochemical, electrical and charge transport properties in collaboration with other teams involved in the project (all located on the same campus). Indeed, this research will be carried out as part of a project funded by the ANR, which also involves specialists in structure and device elaboration.

The candidate should be highly motivated with a good experience in organic synthesis of conjugated systems. Experience in polymers is an advantage. He/she should be a team player, show initiative and be open-minded with an enquiring mind.

Applicants should send a motivation letter + CV at
Stéphane Méry (mery@ipcms.unistra.fr) and Nicolas Leclerc (leclercn@unistra.fr)

Selected publications by the host teams in the field: [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; **[4]** V. Vijayakumar et al. *J. Mater. Chem. C* **2020**, *8*, 16470. Link.