

Seminar by Prof. Fabrice Mathevet

Date: Friday, February 28, 2025 - 13:00 to 14:00

Location: Seminar Room L5D23 (Lab5)

Description

Fabrice Mathevet, Research Director, Centre national de la recherche scientifique (CNRS)

Self-organized organic and hybrid materials for optoelectronic applications

Abstract: Organic and hybrid semiconductors have been intensively investigated during the last decades due to their potential for various applications in electronics and photonics. These materials are promising due to their exceptional electronic properties, low cost, versatility of functionalization, thin film flexibility, ease of processing. Particularly exciting is the role of the chemistry in enabling the synthesis of multifunctional materials with tunable energy levels and desired electronic or photonic properties. The design of such materials consists mainly on the combination of electron-donating (D) and electron-withdrawing (A) groups or units in molecular structures, resulting in materials with high charge mobility, ambipolar transport, narrow optical gap, or enhanced luminescence.

In this context, we will present several chemical engineering approaches based on nanostructured (macro)molecular pi-conjugated systems and organic-inorganic 2D perovskite systems that incorporate donor and acceptor units. These multi-lamellar, complex semiconducting materials, capable of producing distinct conductive channels for hole and electron transport, lead to ambipolar charge transport and highly luminescent materials. We will describe the design and synthesis of these self-organized multifunctional materials, along with their structural characterization, thin film morphology, and an assessment of their charge transport, photophysical properties and electroluminescence.

Biography: Dr. Fabrice Mathevet obtained his PhD in Materials Science in 2002 from the University of Strasbourg (France). He is currently a CNRS* Research Director at the Paris Institute of Molecular Chemistry (IPCM) in Sorbonne University (Paris). Recruited in 2007 as a CNRS researcher, his multidisciplinary research works focuses on chemical engineering approaches for the design and preparation of novel organic self-organized macro(molecular) or hybrid semiconducting materials for photonics and electronics. At the interface of chemistry, materials science, and physics, his research activities encompass organic and polymer synthesis with controlled architectures, surface chemistry, nano-patterning, self-assembly, and material characterization. His work aims to deepen the understanding of the structure/properties relationships of materials developed in the group. Since 2020, he has

been on secondment to Kyushu University as a part of an international collaboration between Sorbonne University, the CNRS and the Center for Organic Photonics and Electronics Research (OPERA). Since 2023, he is the co-director of the International Research Project LUX-ERIT, initiated by the CNRS in collaboration with the OPERA Center.

*The French National Centre for Scientific Research CNRS is the French state research organization and is the largest fundamental science agency in Europe.