

PhD opportunity:

Biosourced encapsulation solutions for organic photovoltaic cells and modules

Project description:

This PhD project is part of the BioFlexPV (<https://www.pepr-tase.fr/projet/bioflexpv/>) project which aims at developing novel efficient encapsulation solutions from bio-based resources to reduce the environmental impact of the different PV technologies. With a combination of polymers derived from the biomass and of inorganic dense layers from abundant resources, we aim at fabricating encapsulation films with high gas barrier properties. These novel encapsulation materials will be integrated in PV modules from different technologies (c-Si, CIGS, perovskite, organic). Combining this approach with life cycle assessment methodology, the main goal of the project is to develop encapsulation strategies with low environmental impact.

The PhD candidate will be part of this project with the main objective of integrating the newly designed encapsulation films and adhesives in organic photovoltaic cells and modules. The work will be divided in the following successive tasks:

- 1) Development of innovative characterization tools to investigate water vapor transmission rate (WVTR) and oxygen transmission rate (OTR).
- 2) Investigation of the barrier properties of the different encapsulation solutions composed of a biosourced substrate and newly designed dense hybrid/inorganic thin layers. Ageing of the barrier properties of the films will also be studied under different conditions using various kinds of environmental chambers (damp heat, full sunlight exposure, ...). The evolution of the barrier properties will be correlated with the evolution of the film structure.
- 3) Integration of the newly designed barrier films in organic photovoltaic devices (cells and modules). Photovoltaic properties and mechanical robustness of the devices will be fully characterized using advanced characterization techniques. Stability of the encapsulated devices will be studied, taking into account the intrinsic (UV, thermal) and extrinsic (O₂, H₂O) stresses. In particular the changes in adhesion between the OPV device and the barrier films will be carefully evaluated. Failure mechanism investigation will allow feedback loops to the partners of the project in the aim of improving the properties of the encapsulation solutions.

Candidate profile:

Materials scientist, Chemist and/or Electrical Engineering holding a master degree. The candidate will deal with materials, thin films, device fabrication, characterization, spectroscopy, and organic photovoltaic devices. The candidate needs to be an experimentalist ready to develop new characterization tools and to explore various fabrication and characterization techniques.

Location: The student will be part of the [Organic Electronics team at IMS laboratory](#) (CNRS UMR 5218), located inside the ENSMAC graduate school (16 avenue Pey Berland, 33607 PESSAC, France).

Duration: 36 months

Starting: Oct-Nov 2025

Gross monthly salary: 2200-2300 €

Net monthly salary: 1780-1870 €, social insurance included

Supervisors: Sylvain CHAMBON and Marie GUEUNIER-FARRET

Application should be sent to marie.gueunier-farret@u-bordeaux.fr and sylvain.chambon@u-bordeaux.fr will include a CV, a cover letter and two recommendation letters.

Application deadline: June 15th, 2025