école normale supérieure paris-saclay

ENS-IISER Network | BIOSANTEXC Project
Internship Proposal Form

To be sent back to ri-incoming@ens-paris-saclay.fr by February, 2nd 2024
All fields are required

The subject is related to interdisciplinary life sciences (BIOSANTEXC) Yes
Field: Chemistry

Internship title: Photogeneration of organic catalysts for the controlled polymerization of biosourced monomers towards antimicrobial surfaces

Keywords related with the subject (minimum 3): organic chemistry, photochemistry/photophysics, catalysis, polymers, antimicrobial surfaces.

Name of the laboratory at ENS Paris-Saclay: PPSM (Supramolecular and Macromolecular Photophysics and Photochemistry)

Name of the internship supervisor(s): Nicolas BOGLIOTTI and Vitor BRASILIENSE

Email(s) of the supervisor(s): nicolas.bogliotti@ens-paris-saclay.fr and vitor.brasiliense@ens-paris-saclay.fr

Requested level: No preference

Prerequisites for the internship: Good theoretical and experimental background in synthetic organic chemistry, including common purification and characterization techniques. Experience or marked interest in the fields of photochemistry/photophysics, analytical chemistry, material sciences and/or optics would be advantageous.

Foreseen dates approximately (3 months max – May to July): May 2nd to July 26th

Internship proposal (description and expected training outcomes / half page min, 1 page max) :

The objective of this research project is to prepare and study the photochemical properties of new photocaged organocatalysts – designed to be active in ring-opening polymerizations (ROP) of biosourced cyclic esters and carbonates – and to apply them to light-controlled covalent on-surface polymerization (from glass, cellulose, etc.), thereby leading to cost-effective and environment friendly polyesters/carbonates-based functional materials with finely tuned topography. In this project, we propose to couple quantitative phase imaging, local optical triggering and mass spectrometry to finely analyze the reaction in situ and operando, consequently being able to control the spatial distribution and chemical properties of the resulting layer. One of the expected outputs will be to access new materials, that would constitute green alternatives to petroleum-based surface-grafted polymers, likely to exhibit antibacterial properties.

This project gathers two researchers from PPSM laboratory merging complementary expertise in organic synthesis (Nicolas Bogliotti) and material chemistry/optics (Vitor Brasiliense) towards the development of novel functional surfaces derived from sustainable resources for applications in the biomedical field. It will benefit from the interaction with external collaborators specialized in analytical techniques derived from mass spectrometry (Vincent Guerineau, ICSN, Université Paris-Saclay) and in the design and characterization of antibacterial surfaces (Davy-Louis Versace, ICMPE, Thiais).

This interface project based on organic synthesis will constitute a unique opportunity for the recruited intern to develop skills in a variety of fields such as photophysics, molecular modelling, analytical chemistry, materials science and optics.

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Appropriate training on these topics will be provided to the intern depending on its background, interest and progress of the project.

Signature of the supervisors

Nicolas Bogliotti

Vitor Brasiliense

Signature of the laboratory director