



PhD position in Organic Chemistry & Polymeric Materials

Synthesis of lactic acid-based additives and chemical modification of agricultural by-products for flooring applications

URD Industrial Agro-Biotechnologies (URD ABI) – AgroParisTech

CEBB – 3, rue des Rouges Terres 51110 Pomacle - <https://urd-abi-agroparistech.com/Home/>

Research unit & expertise: The Industrial Agro-Biotechnologies Research and Development Unit (URD ABI) from AgroParisTech is located in the European Center of Biotechnology & Bioeconomy (CEBB) close to the biorefinery of Pomacle-Bazancourt (near Reims, France). URD ABI specializes in the valorization of agro-resources and biorefinery byproducts, focusing on white biotechnologies, green chemistry, polymer chemistry, and process engineering. Their research spans multi-disciplinary projects aimed at developing new industrial processes, including the transformation of agricultural byproducts into high-value chemicals, polymers, materials, fine chemicals, and cosmetics. One area of focus involves the development of additives to enhance the thermo-mechanical properties of polylactic acid-based materials for several applications (e.g., textile, biomedical).

Project description: The project “NeoForbio”, in collaboration with Forbo and ITheMM (URCA), aims to increase the use of renewable materials in order to reduce the ecological footprint and improve the sustainability of flooring products. One part of the project is dedicated to the development of “PVC-free” formulations using polylactic acid (PLA) materials with innovative additives to introduce functionalities (e.g., crease resistance, self-cleaning properties). Another part focuses on the valorization of natural compounds or agricultural by-products for PVC-based formulations.

Objectives & research plan: The first objective will be to synthesize amphiphilic lactic acid-based additives to provide functional properties to PLA-based materials. Two main strategies will be considered: i) functionalizing lactic acid-based monomers, and ii) preparing and functionalizing telechelic α,ω -PLA. The recruited PhD student will design and synthesize these new additives. Then, he/she will collaborate with project partners to formulate PLA-based materials and perform thermo-mechanical property testing. The second objective will involve chemical modifications of agricultural by-products or natural resources to improve their chemical compatibility with PLA and PVC. The formulation of PLA and PVC materials incorporating these prepared products will then be undertaken in collaboration with partners. Upscaling from gram to kilogram scale will also be considered.

The recruited PhD student will also conduct thermal, mechanical, chemical, and/or structural characterizations of the synthesized additives and formulated materials. He/she will also be expected to present results to the project's scientific committee and at (inter)national conferences, as well as to write reports and publications.

Candidate profile: The candidate should have a master degree in organic/synthetic chemistry and strong knowledge of polymeric materials. An experience in using extruder and/or hot-melt processes is highly appreciated.

The position is required for a period of 36 months starting January-March 2026.

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