



Thesis offer

Lignin functionalization through assisted biocatalysis for the development of innovative bio-based materials

Keywords: Lignin, mechanochemistry, biocatalyst, biorefinery, non-conventional media, bio-based materials.

Summary: This project aims to valorize lignin, one of the main components of lignocellulosic biomass, by imparting new functionalities through a hybrid approach combining mechanochemistry and biocatalysis. The objective is to functionalize this biopolymer in order to improve its solubility, thermoplasticity, and affinity with hydrophobic matrices, thereby facilitating its incorporation into bio-based materials. The project relies on an in-depth investigation of the structural, morphological, chemical, and thermal properties of lignins, both non-modified and functionalized, to elucidate the mechanisms and efficiency of enzymatic modification, with or without bio-extrusion assistance. In a second stage, the modified lignin will be incorporated into polymer matrices to evaluate the technical performance and industrial potential of the resulting materials. By combining sustainability with methodological innovation, this project proposes a concrete pathway for the development of bio-based materials derived from lignin, exhibiting potential antibacterial and antioxidant properties.

Workplace: UMR CNRS 5518-Laboratoire de Génie des Procédés pour la Bioraffinerie, les Matériaux Biosourcés et l'Impression Fonctionnelle (LGP2). Address: 461 Rue de la Papeterie, domaine universitaire -CS 10065, 38402 Saint Martin d'Hères Cedex-France.

Student profile: A Master's degree (M2) or an Engineering diploma in biochemistry, chemistry, physical chemistry, biotechnology, biorefinery, bioprocess engineering, or materials science is required. The candidate must have a strong background in plant biomass chemistry, enzymology, biocatalysis, and chromatographic and spectroscopic analytical techniques. A strong interest in interdisciplinary research is essential. The candidate should demonstrate teamwork skills, rigor in experimental work, as well as a high degree of autonomy and initiative. Additionally, strong scientific writing skills and fluency in English are required.

Duration and position start date: 36 months, beginning on October, 2026.

To apply: All applications must be submitted via ADUM. Candidates will participate in a selection process of the I-MEP2 Doctoral School, for which the application file and the candidate's level of excellence are very important. Applications submitted outside of ADUM will not be considered.

Here is the link to apply for the topics within this competition (**before May 5, 2026**):

<https://adum.fr/as/ed/proposition.pl?site=edimep2>

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