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Ph.D. thesis (2025-2028)
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Design of an innovative wood-based biocomposite and development of its processing by 3D LDM printing and thermopressing

Elaboration d'un biocomposite innovant à base de bois et développement de sa mise en forme par procédés d'impression 3D et thermopressage

MatBio FunPrint

Context

Biomass processing industries

Industrial lignins

The global lignin market~**over €3 billion**

90% of extracted lignin use as a **biofuel**

So what might be other **alternative application areas** for industrial lignin?

1) Developing fully bio-based resins as a competitive and sustainable alternative to conventional petroleum-based adhesives.

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Objectives

There are different approaches alternative to current petroleum-based materials, creating different application areas for utilization of industrial lignins.

➡ To create **fully bio-based resins** which will be **formulated with phenolic groups** obtained from **depolymerized lignin** and **a bio-based alternative to formaldehyde**

Thermoplastic copolymers

Thermoset liquid resins

Applications:

Methods

Materials: PFA, lignin, cellulose nanoparticle ➡ Preparing composite materials

Processing

3D printing (Liquid deposition modelling)

Spary Coating or Casting

Analysis & Characterization

Chemical properties:

FT-IR, NMR, DSC

Physical properties

Viscometer (viscoelastic property), UTM and 3-point bending test machine (mechanical properties)

Morphological property

SEM, VLM, X-ray tomography