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Ph.D. thesis (2024-2027)
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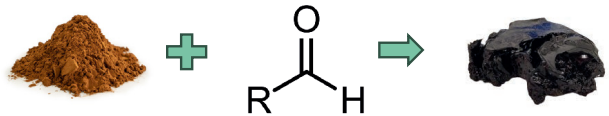
Set-up of an innovative wood-based biocomposite for processing by 3D LDM printing and wood panel adhesion

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

FunPrint

Context / Objectives

Substitution for formaldehyde resin



Lignin
=> Phenol substitute (petrol based)

Bio-based aldehyde
=> Formaldehyde substitute (SVHC)

Formulated resin
100% bio-based and non toxic

- Around 500 kT of phenol formaldehyde is produced per year for **wood panel adhesion**.
- **Bio-based** and **non toxic** substituents for phenol and formaldehyde are needed.

Lignin as a phenol substitute

- Abundant, cheap and bio-based chemical with phenolic structure.
- Potential to enhance performances of adhesive (UV resistance, thermal stability…)

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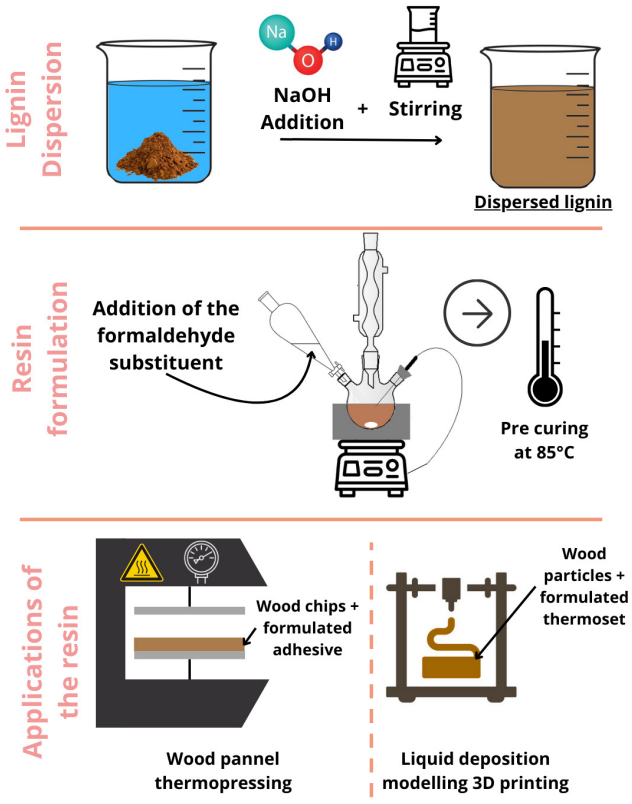
Methods

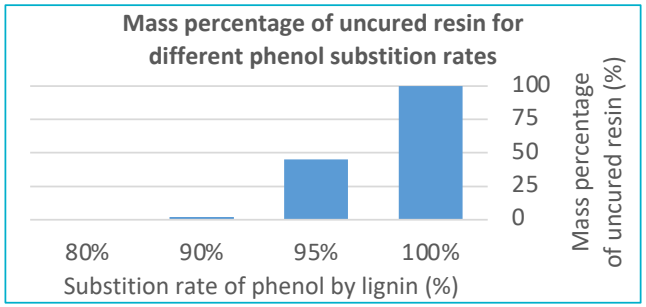


Results

Process optimization

- Dry matter content 20% ↗ to 40 % with the choice of lignin.
- Substitution of phenol by lignin 70% ↗ to 90 % with thermochemical modification of lignin before formulation.
- New chemicals identified to replace formaldehyde.

Limitations after 1 year



- Phenol substitution by lignin above 90% is a challenge.
- Bio-based phenolic coreactants are investigated.