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Ph.D. thesis (2023-2026)
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Lignocellulosic biorefinery: Development of a new pulping process to produce high-quality fibers from underexploited resources

Bioraffinerie lignocellulosique : Développement d'un nouveau procédé de mise en pâte pour la production de fibres de haute qualité à partir de ressources sous-exploitées

Context

Underexploited biomass:

Huge quantities are available

- Wastes of industrial biomass
- Underexploited sources: hemp, nettle and poplar residues available in local areas

The Kraft process is a strongly alkaline process

Large plants with limited flexibility

- Soft alkaline pulping processes are in the trend
- Total Chlorine Free (TCF) bleaching sequence is a must
- Smaller cooking units for smaller biomass quantities

MicroFibrillated Celluloses (MFC) are in current development for their good properties

- Reinforcement in composites
- Packaging applications for barrier properties
- Textile utilization

Funded by:



Objectives

Selection & analysis of biomass

- Chemical composition
- Prepare biomass for cooking

Development of an alternative, mildly alkaline pulping process

- Find a way to delignify the biomass with a limited quantity of chemicals
- Compare this pulping process with the Kraft process
- Understanding the impregnation phenomena

Fibers and pulp modification & analysis

- TCF bleaching sequences
- Refining steps
- Pulp, paper & fibers properties

MFC production

- MFC production capabilities
- Analysis of their properties
- Impact on fiber morphology
- Controlling energy consumption during production



Wood tree



Wood chips



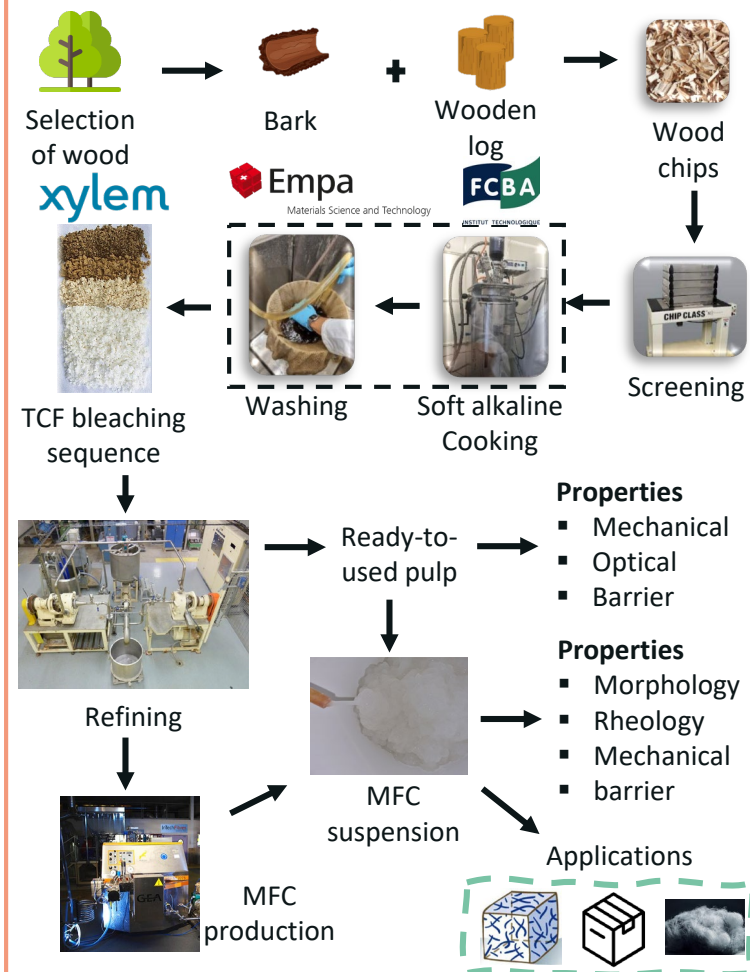
Cooked pulp



MFC suspension

Methods

Process – at lab and/or pilot scale



Properties

- Mechanical
- Optical
- Barrier

Properties

- Morphology
- Rheology
- Mechanical
- barrier

Applications

