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Ph.D. thesis (2021-2024)
LGP2 (J. Bras; N. Belgacem)

New cellulose engineering for high barrier specialty papers and 3D cellulosic materials

Développement d'une nouvelle matière cellulosiques pour des papiers spéciaux et des objets 3D à hautes propriétés barrières

MatBio

Context

Single use plastics problematics

- EU restrictions' severity increases
  2040 : Final prohibition in France
- Petroleum resource decreases
- Social green initiatives flourishment

Cellulose as a great alternative

- Most abundant bio-polymer
- Attractive mechanical featuring
- Prone for chemical modifications

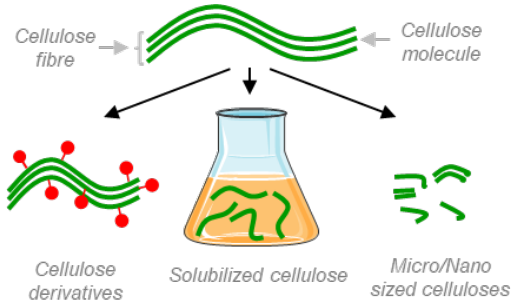
Cellulose Valley chair

- Ambition to find practical solutions for efficient bio-based packaging.
- Combination of research, education and industrial contributions.

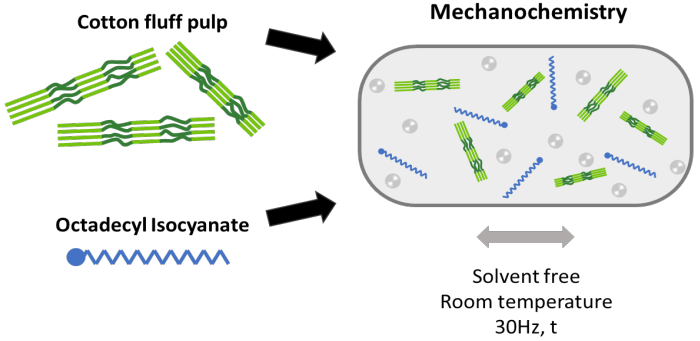
Funded by: Fondation Grenoble INP, LGP2, AHLSTROM, DS Smith, ALPHA FORM BY GUILLIN, Aptar, CHANEL, DECATHLON, Marie, CITEO

Methods

Cellulose-sourced materials



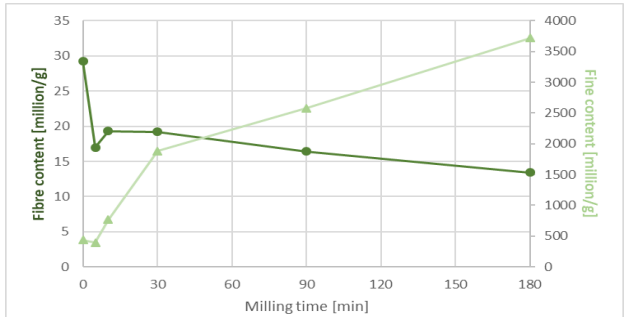
Innovative chemical modification



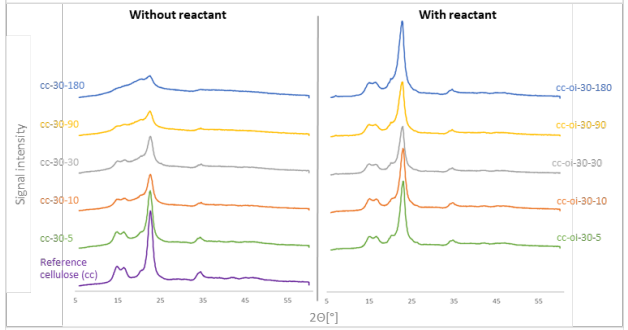
Morphology and chemistry characterization

- MorFi and granulometry
- Microscopes (optical, SEM)
- XRD, NMR
- FTIR
- Elemental analysis
- XPS, NMR
- Contact angle

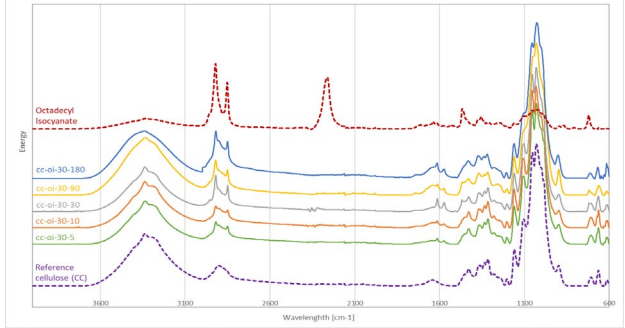
Results



Fragmentation



Amorphization



Chemical modification