

Cellulose Valley

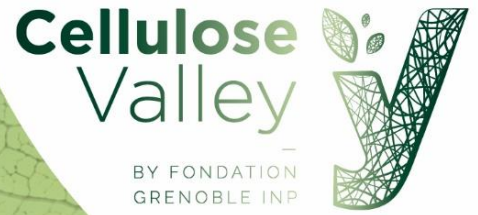
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POSTERS POC 2022

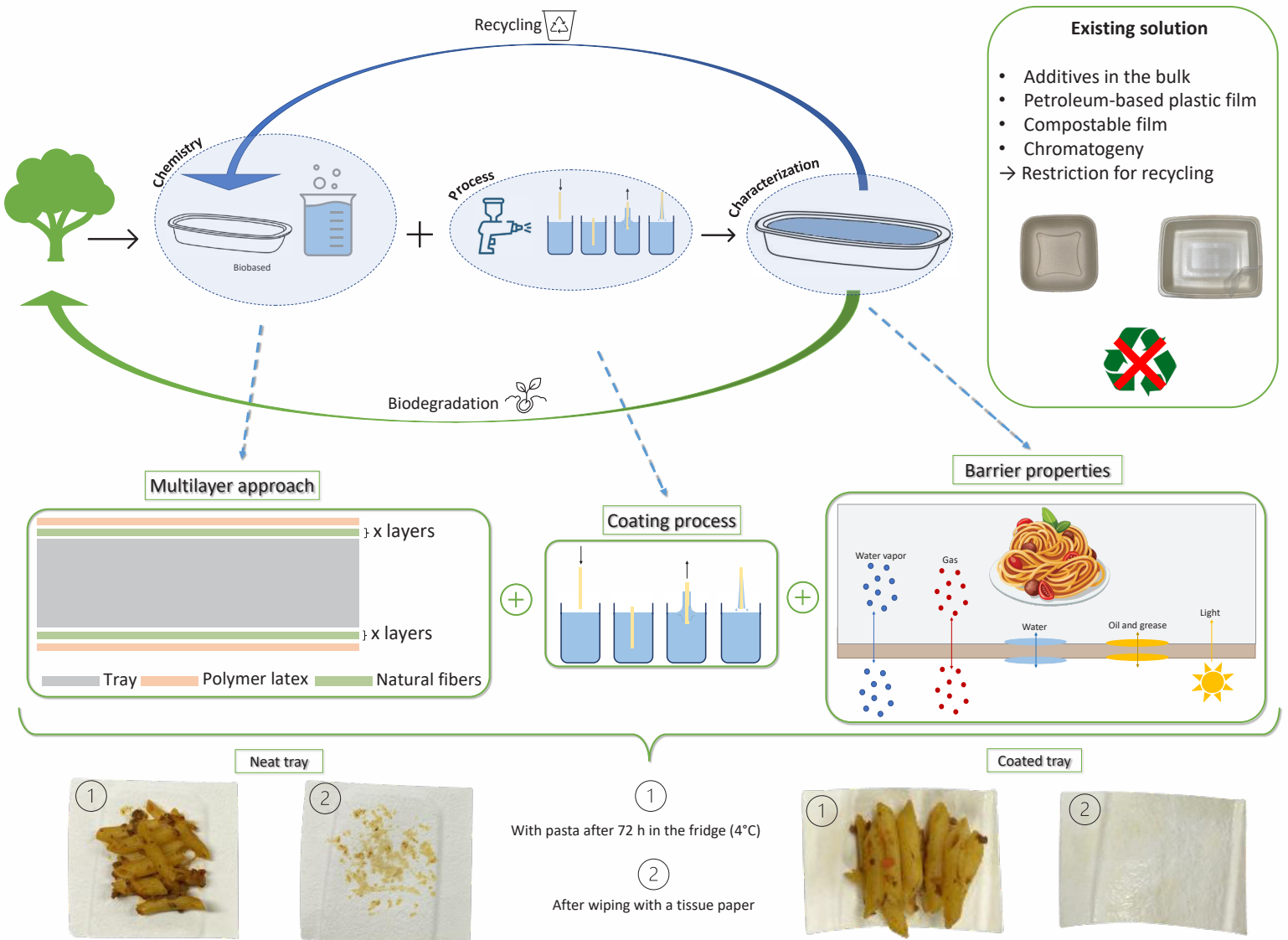
New process to bring barrier to molded cellulose tray

Emma COLOMBARI - Master 2 internship
 Université Grenoble Alpes, UFR Chimie & Biologie, Master 2 PTA



Abstract - Demonstrator

Nowadays, 40% of the worldwide plastic production is used for packaging. For this reason, the Single Use Plastic European directive ban some consumable objects in plastic, such as trays. New companies produce molded cellulose trays which may be an interesting alternative to some plastic ones. The objective is to develop **cellulosic tray for collective catering with high barrier properties that can be recycled**.



Conclusions and perspectives

- Resistance to water and oil after test in real condition
- Good barrier to oil and water
- Low air permeability

- Recycling test following Aticelca norm
- Food contact test and thermal stability
- Investigate bio-based coatings

- Abrasion test
- Sealability
- Scale up the process

References

Pulp Material with a Cellulose-Base Laminate Layer, and Method for Manufacturing Such Food Packaging Unit", 2021
 Ezel Bildik, A.; A. Hubbe, M.; Gürboy, K. B. Alkyl Ketene Dimer (AKD) Sizing of Paper under Simplified Treatment Conditions. *TJ* 2016, 15 (8)
 Timshina, A.; et al. "The Last Straw: Characterization of per- and Polyfluoroalkyl Substances in Commercially-Available Plant-Based Drinking Straws". *Chemosphere*, 2021
 Kuiper, H. J.; Timmerman, J. H. "Biodegradable and Compostable Food Packaging Unit from a Moulded

New transparent packaging & eco design of closure system

Marion DELANNOY

Univ. Bretagne Sud, Lorient, Master 1 ECPC



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Context



Existant solutions



New closure system



LDPE (Low Density Polyethylene)



New fully recyclable polyethylene (PE)



Reduce the impact of packaging on the planet



By innovations and alternative packaging materials

Objectives



- Replace plastic packaging of grated cheese by cellulose
- Re design the bag closure



Multilayer material for grated cheese

Requirements

Recyclability



Transparency

Water Vapour, Oil and Water Barrier



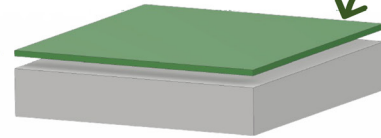
Multilayer approach

To provide the necessary barriers to packaging :

- 1 Layer Biopolymer Latex
- Supercalendered paper

Speciality paper

Biopolymer latex

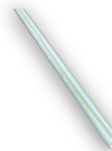


Easy to open/close again

Hermetic closure



Cardboard hooks



Cardboard slide



Conclusions and perspectives

- The Latex layer provides barrier to oil and water
- Good transparency
- Good sealability of latex
- Innovatives solutions of bag closure
- Promising results for LCA
- Recycling test following Aticelca norm
- Mechanical tests to be performed
- Improve water vapor barrier
- Quantify the successive number of openings/closings

New 3D cellulosic packaging

Annabelle JULIEN¹

¹School of Wood Science and Timber Engineering - ENSTIB - University of Lorraine, Épinal

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Context

Cushioning cosmetic packagings are necessary for transport to prevent breakage

	Plastic	Polyurethane foam	Cardboard	Molded cellulose	Myco composite	Cork	
Recyclability	~	~	♻️	♻️	❌	❌	→ The only biobased and recyclable solution
Special issues	CO ₂	CO ₂	abrasive	📄	⌚	⌚	<ul style="list-style-type: none"> ♻️ Cardboard Abrasive ♻️ Molded cellulose Production rate

The law « Anti-Gaspillage pour une Economie Circulaire » (AGEC) 

→ Need to stop producing single use plastic

Considered solutions

Cellulose foam with additives

→ Lighter than molded cellulose

Modified wood

→ The use of wood instead of pulp avoids the pulping and refining steps



Conclusions

- ✓ **3D shapes** can be obtained from biosourced material
- ✓ Samples are really **soft** and **light**

Perspectives

- ✓ Assess the **mechanical properties** of both solutions
- ✓ Determine the **recyclability rate**
- ✓ Improve the **process**

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

Julia PESCHEUX-SERGIENKO

PhD work: 11/2021 – 11/2024

Univ. Grenoble Alpes, CNRS, Grenoble INP, LGP2, F-38000 Grenoble France

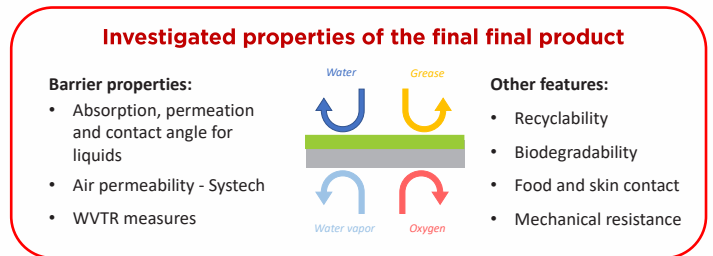
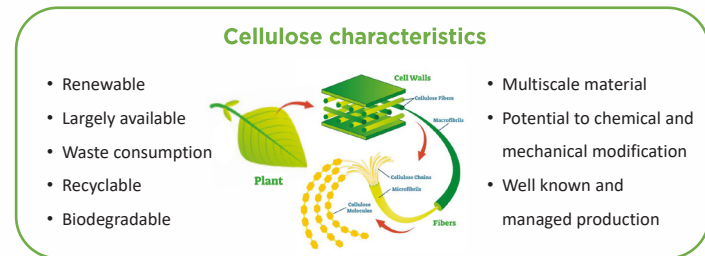
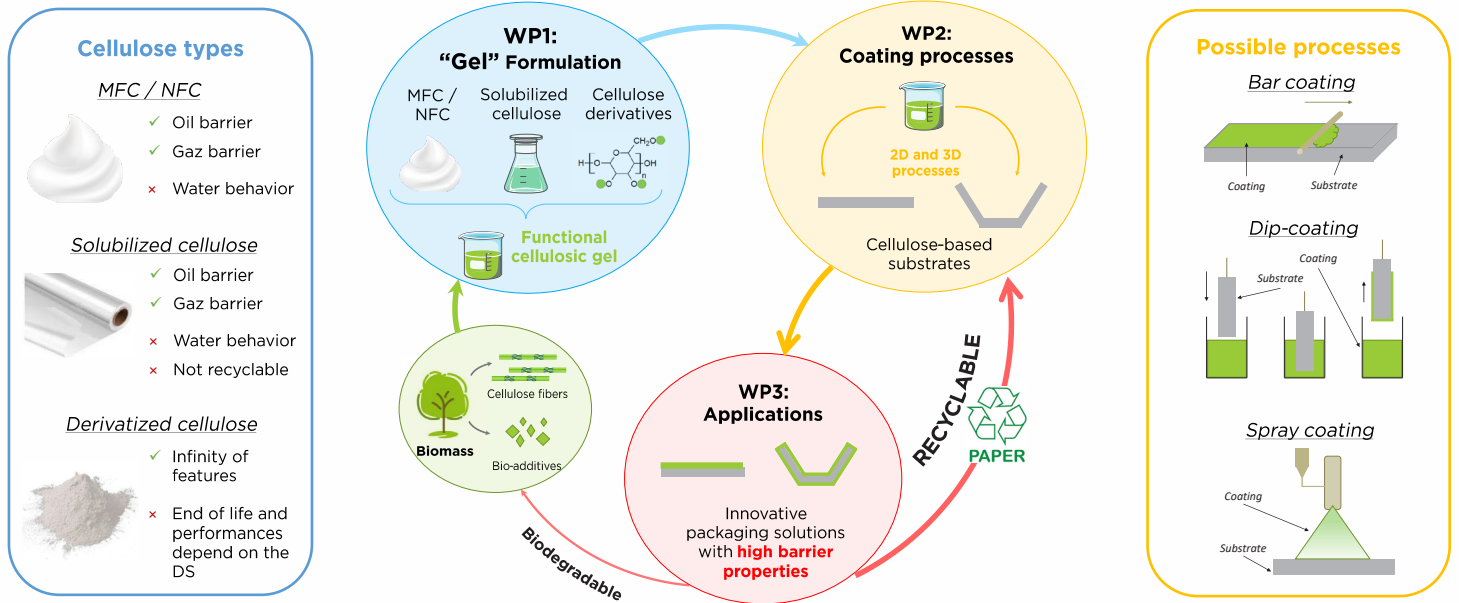


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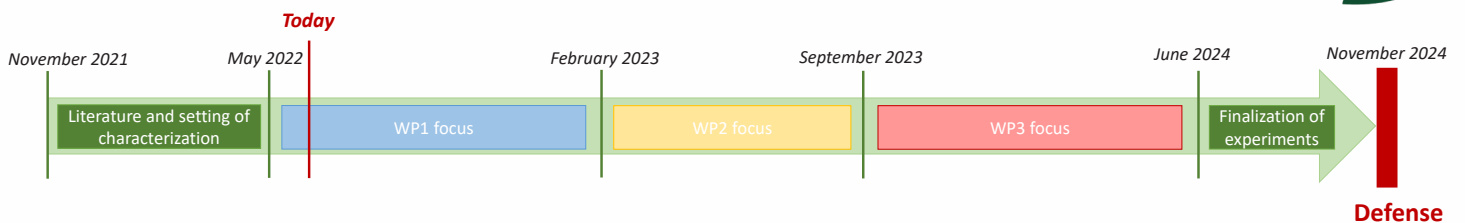
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Project organisation



Planning



LGP2, 461 rue de la papeterie, CS10065, 38402 Saint-Martin-d'Hères
<https://lgp2.grenoble-inp.fr/>

Julia.Pescheux-Sergienko@grenoble-inp.fr



Julien.Bras@grenoble-inp.fr

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Cellulose derivative multilayer paper for barrier properties

René ROMERO

Grenoble-INP Pagora, Master 2 Biorefinery and Biomaterials, Grenoble France



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1

VALORIZATION OF CELLULOSE DERIVATIVES

Identify potential cellulose derivatives for food packaging.

Study

Barrier properties

Availability

Processability



Coating with cellulose derivatives

3

PACKAGING APPLICATION

Targeted properties :


High oil and water resistance

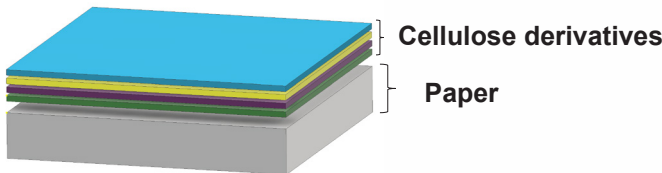
Heat sealability

Folding resistance

Low oxygen permeability

Food contact

Recyclability 



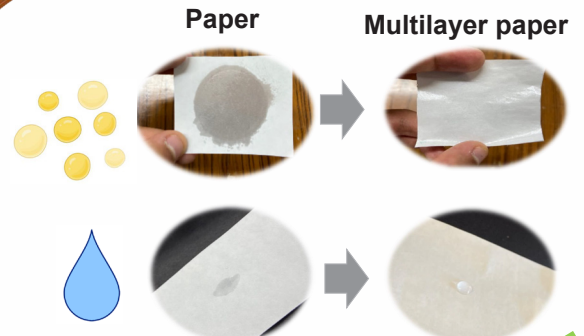
2

DEVELOPPEMENT OF A NEW MULTILAYER PAPER

- Upgrade the barrier properties of cellulosic paper by coating with cellulose derivatives.
- Employment of a process scalable to the industry.



Design of a packaging demonstrator





New Multilayer Transparent Cellulosic Materials

Marie SÉGUR¹

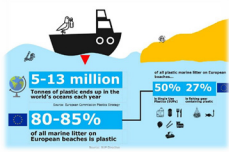
¹Grenoble INP - Pagora Graduate School of Engineering in Paper, Print Media and Biomaterials / 38402 Saint-Martin-d'Hères Cedex, France

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Context



Plastics -40% of the materials used in the packaging industry

European Directive (2019) targets SUP

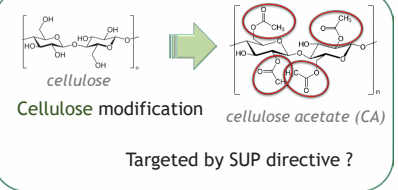
→ AGEC law - to remove SUP packaging by 2040



- 4-year project •
- 7 industrial partners •

Developing new cellulosic materials for innovative packaging solutions to propose SUP alternatives

- 3 PhD students •
- 5 Master students/year •

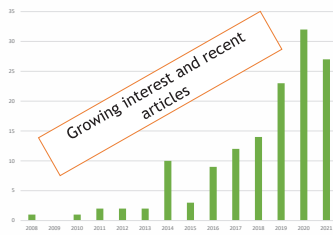


OBJECTIVE
Translucent alternatives to CA windows



A promising and innovative project

➢ It aims to find solutions to current issues : finding alternatives to cellulose acetate windows in food packaging

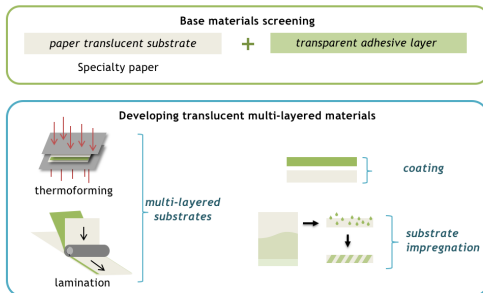


Growing interest and recent articles

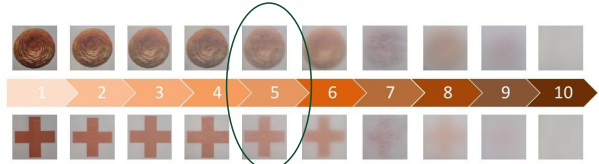


[2] VTT, June 2022

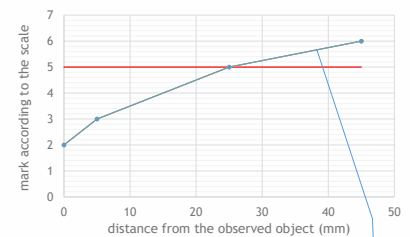
➢ Project Organization



➢ Results



Transparency scale : acceptable limit at 5



Mean curve of all coated papers : test passed until 25mm from observed object

Coated specialty paper could replace CA windows

Conclusions

- CA alternatives found
- Promising LCA assessment
- Compatibility with projected use

➢ References

- [1] Un sac entièrement en papier avec fenêtre chez CEE Schisler Packaging. Pack & Label Around.
[2] Transparent cellulose film to replace plastics | VTT. (n.d.).

Perspectives

- Industrialization of process
- Lamination of other films
- Recyclability tests

➢ Acknowledgements

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