

# Sherpack Final Workshop



**What's next? The future of paper-based flexible packaging**

David Guérin | CTP



# What's Next ? The future of paperbased flexible packaging

David Guérin

Grenoble, October 7<sup>th</sup>, 2020



Horizon 2020  
European Union Funding  
for Research & Innovation



# Presentation outline

- Flexible packaging market, drivers and challenges
- Sherpack achievements – What's next?
  - MFC wet lamination
  - Biobased emulsion
  - Grid printing
- Conclusions

# Flexible packaging European market



- is growing
  - CAGR of 5% by 2022 (Technavio - March 2018)
  - CAGR of 4% 2019-2025 (Business wire - May 2020)
  - CAGR of 4.29% (revenue) and 3.29%(Vol) 2019-2027 (Inkwood – 2019?)
- Drivers
  - Longer shelf life and changing lifestyle of people
    - Millennials, E-commerce
  - New innovative products
    - Lighter products, Flexible over rigid
- Restraints
  - Concerns about the environment and recycling

#### Sources:

- <https://www.mordorintelligence.com/industry-reports/europe-flexible-packaging-market-industry>
- <https://www.globenewswire.com/news-release/2020/05/23/2037896/0/en/The-Europe-flexible-packaging-market-size-is-expected-to-grow-at-a-CAGR-of-over-4-during-the-period-2019-2025>

# The future of flexible packaging



- ID card of tomorrow's material
  - High barrier & High strength
    - Shelf life, but overdesign has to be avoided
    - Whatever the temperature/humidity
  - Comply with existing converting/conditioning machine
    - Some modifications are however possible
  - Low cost
  - Recyclable, recycled, high recycling rate

# Paper based flexible packaging materials

- Main challenges
  - Barrier performances
    - Oxygen, Water vapour barrier
  - Strength to weight
  - Runability on conditionning lines
  - Stretchability
  - Transparency
  - Heat sealing
    - Seal strength
  - Cost



Roadmap for  
paperbased packaging materials



Development of cellulosic materials  
for packaging markets

Better  
barrier

+ Light  
+ Strength

3D  
Shapes

Safe and food contact compliant

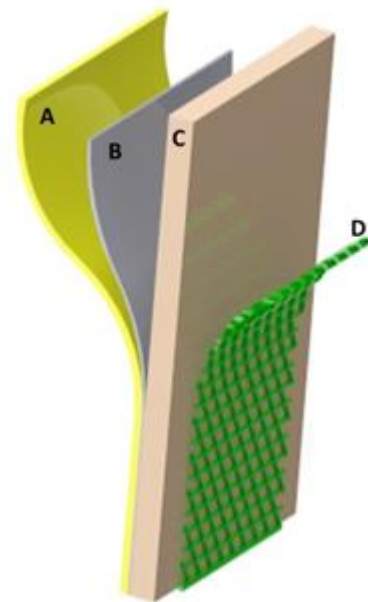
Recyclability – Biodegradability  
Low Environmental Impact



# Sherpack's materials and technologies



- Adequate solutions to market expectations
  - MFC wet lamination
    - All-cellulose recyclable/biodegradable
  - Biobased emulsion
    - Biobased, heat sealing, water vapour barrier
  - Grid printing
    - Lighter and stiffer materials
- What's next?



# MFC wet lamination - What's next?

- Today, the technology is at TRL 5
  - In depth analysis of the process
    - Filtration, replication, drying
  - Continue product development
    - Curl management & post-treatment
      - for water/water vapour barrier
      - Glueing, heat sealing
  - Get a better positioning of product performances vs market needs
  - Then develop the process at higher TRL

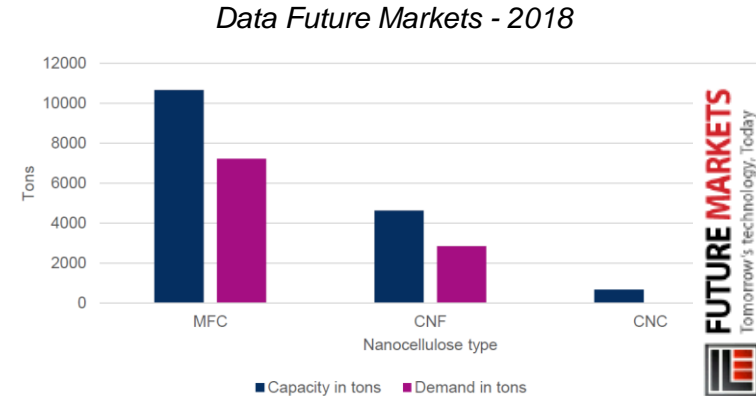




# MFC wet lamination - What's next?

## – Production of Micro and Nanofibrillated Celluloses

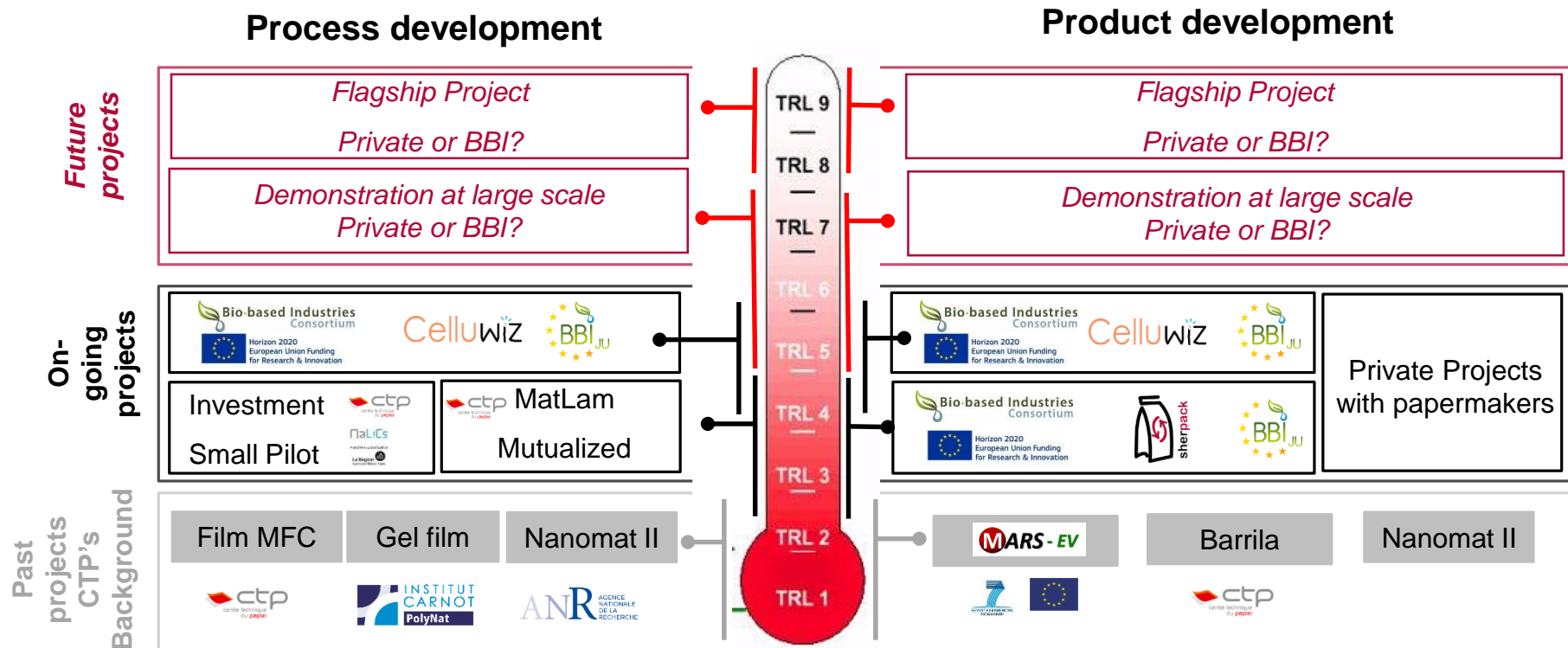
- 10kT of MFC
  - Means 52 kT of packaging acc. to PoC1
- EU wrapping paper production
  - 790kT
- EU Grease resistant paper production
  - 325kT
- EU Sacks and bags paper production
  - 957kT



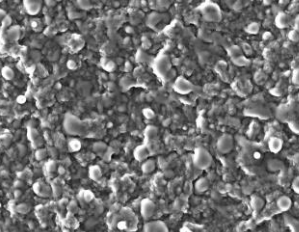
THE GLOBAL MARKET FOR NANOCELLULOSE  
TO 2030: Cellulose nanofibers(CNF), Cellulose  
nanocrystals (CNC) and Bacterial cellulose particles  
(BC)

- Development of the MFC wet lamination technology is linked to the development of MFC production capacity

# Strategy for the development of the wet lamination technology



- 
- 200 nm
- Mag. = 10.01 k x 041 x 1.00 kv  
 Signal = 282  
 Date = 11 Jul 1997
- Width = 7.510 mm  
 Ht = 87.2 mm  
 40.00 mm x 3.250 mm
- IMM  
 Digital Imaging



SEM image showing the surface morphology of the 100% PCL film. The surface appears granular with many small, rounded features. Technical details: SED 15.0 kV, WD 8.9 mm, Sd 4.0 mm, Magnification x500, Scale bar 50 μm.

11

# Impact of policies and regulations

- Impact of policies and regulations
  - SUPP – Single Use Plastic Products
    - EU Directive 2019/904 – June 12<sup>th</sup>, 2019
    - Guidance not disseminated yet



*Extracts from al. 11*

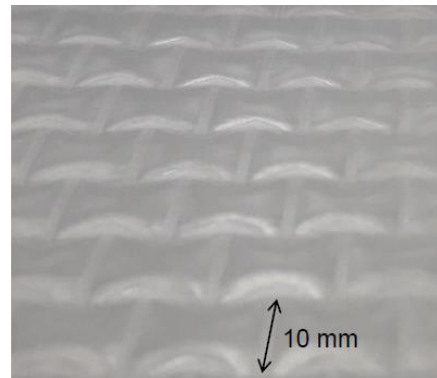
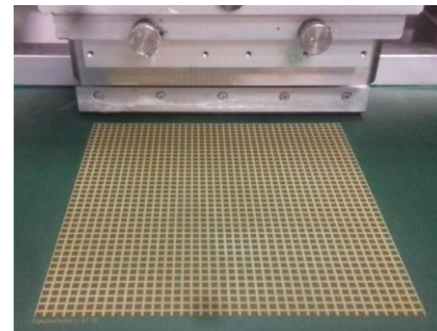
Single-use plastic products can be manufactured from a wide range of plastics. Plastics are usually defined as **polymeric materials** to which additives may have been added.....

....The adapted definition of plastics **should therefore cover polymer-based rubber items and bio-based and biodegradable plastics regardless of whether they are derived from biomass or are intended to biodegrade over time.**

As far as it is understood now, **papers coated with bioplastics are concerned** regardless their recyclability/biodegradability

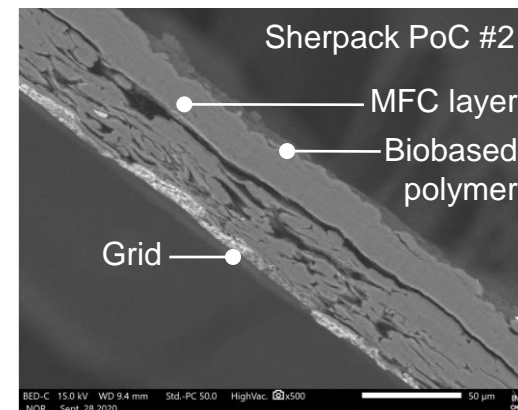
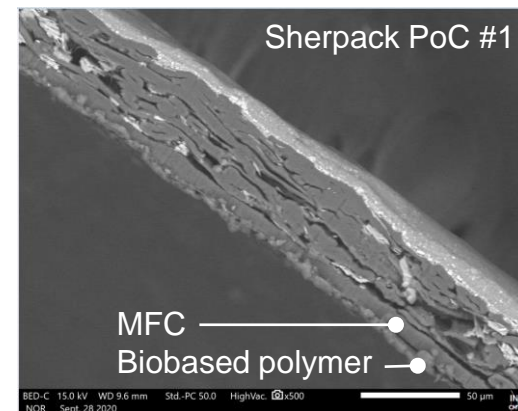
# Grid Printing – What's Next

- Today, the technology is at TRL 3-4
  - Validate the concept at larger scale
    - Suitability with the pouch production process?
  - Better understanding of the phenomena
- Opportunity
  - Other functions than stiffness?
  - Other applications than flexible packaging?
- Development under discussion



# Grid Printing – Opportunity

Material	Density g/cm <sup>3</sup>
Sherpack PoC #2	0,82
BOPP	0,90
LDPE	0,917 to 0,93
HDPE	0,95
Sherpack PoC #1	1,04
Nylon	1,1 to 1,16
EVOH	1,14 to 1,22
MFC film	1,0 to 1,30
PVOH	1,19 to 1,31
PLA	1,25 to 1,36
PET	1,37 to 1,39
NFC/CNC film	1,25 to 1,48











## Conclusions



# Paper based flexible packaging materials



- Main challenges and Sherpack's Achievements
  - Barrier performances
    - Oxygen  , Water vapour barrier 
  - Strength to weight  
  - Runability on conditioning lines
  - Stretchability
  - Transparency
  - Heat sealing 
    - Seal strength
  - Cost



# Conclusions



- Developments in Sherpack
  - High potential
  - To task with the needed improvements for paper based flexible packaging
  - Matching market expectations and policies
- How to move forward?

# Selected requirements for a packaging material



- Barrier to **water, grease, oxygen, water vapour**, carbon dioxide, nitrogen, ethylen, aroma, **contaminants**, light, acid resistance, alkali resistance
- Weight/sqm, strength, wet strength, dry strength, strain at break, impact resistance, tear resistance, burst resistance, stretchability, formability, noise, heat resistance, ageing resistance, static electricity, smell and taste free, right friction coefficient, flatness, dimensionnal stability
- Cutting, dusting, folding, creasing, elastic spring back, folding memory, heat sealable, glueable, surface energy, corona/plasma activation
- Gloss, transparent, translucent, smooth, rough, printable (Offset, rotogravure, flexo, ink jet, laser...), adhesive label, adhesive tape, anti-finger printing
- **Recyclable**, recycled, **yield of recycling process, quality of recycled material**, deinkable, **biodegradable** (in compost medium, home compost, marine), **environmental impact, food contact, safety**, compliance with regulations (nano)

# Conclusions

- Still some Product development/performance check
- Technologies at TRL 5
  - Next steps – upscaling
  - Thanks to the project the risky phase is behind us
  - Partners are waiting for next steps BBI Calls and Private supports to go ahead
- Sherpack partners are open to any opportunity to continue the developments



off the mark by Mark Parisi  
www.offthemark.com



Tribute to Chris Breen†



**Thank you for your attention**  
**Any question?**



Horizon 2020  
European Union Funding  
for Research & Innovation





**Thank you for attending  
this Sherpack webinar!**

**And thank you to the organising team  
and all the speakers**



Horizon 2020  
European Union Funding  
for Research & Innovation

