



**Chloé PARISI**

Ph.D. thesis (2023-2026)  
LGP2 (J.BRAS)  
SIMAP (E.BLANQUET)  
CILKOA (F.MERCIER)

**ALD optimization into cellulosic substrate**  
Optimisation du traitement ALD (Atomic Layer Deposition) sur support cellulosique barrière et recyclable dans le domaine de l'emballage

**Context**

**New legislation on plastic packaging**

*Reduce Reuse Recycle*

■ **44%** of the global plastics for packaging

And only **10%** recycled in 2021...

- Single Use Plastics Directive (2019)
- Packaging and Packaging Waste Regulation (2018)



**Green alternative**

**Cellulosic materials**

*Most abundant biopolymer on earth*  
*Recyclable, Biodegradable & Renewable*



x But *Permeable, Low barrier & Hydrophilic*

**CILKOA**

*Created in June 2022 in Grenoble*

*Develop an innovative hydrophobic barrier treatment for cellulose substrates with few nanometers of ceramic*



Funded by:



In collaboration with



**Objectives**

**High barrier & mechanical properties**

*The requirements for a good packaging*



**3 applications**

*Flexible (High-performance & Green)*

*Water barrier molded cellulose*

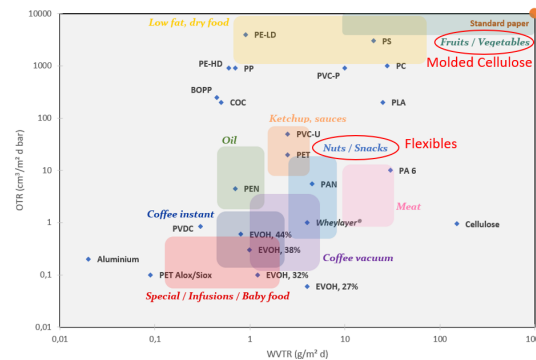
*Foam*

*Depending on the application:*

→ *Water, Water Vapor, Oxygen & Grease Barriers*

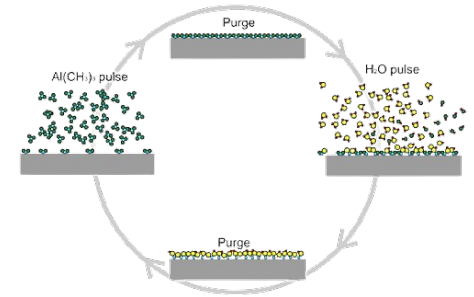
→ *Hydrophobic*

→ *Good wet and dry mechanical and thermal properties*

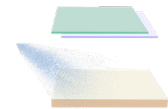


**Methods**

**Atomic Layer Deposition**



**Protection strategy & New technologies**



**Ecoconception**

Recyclability

Durability

Life Cycle Assessment

