

Barrier properties on 3D cellulose objects via dip-coating

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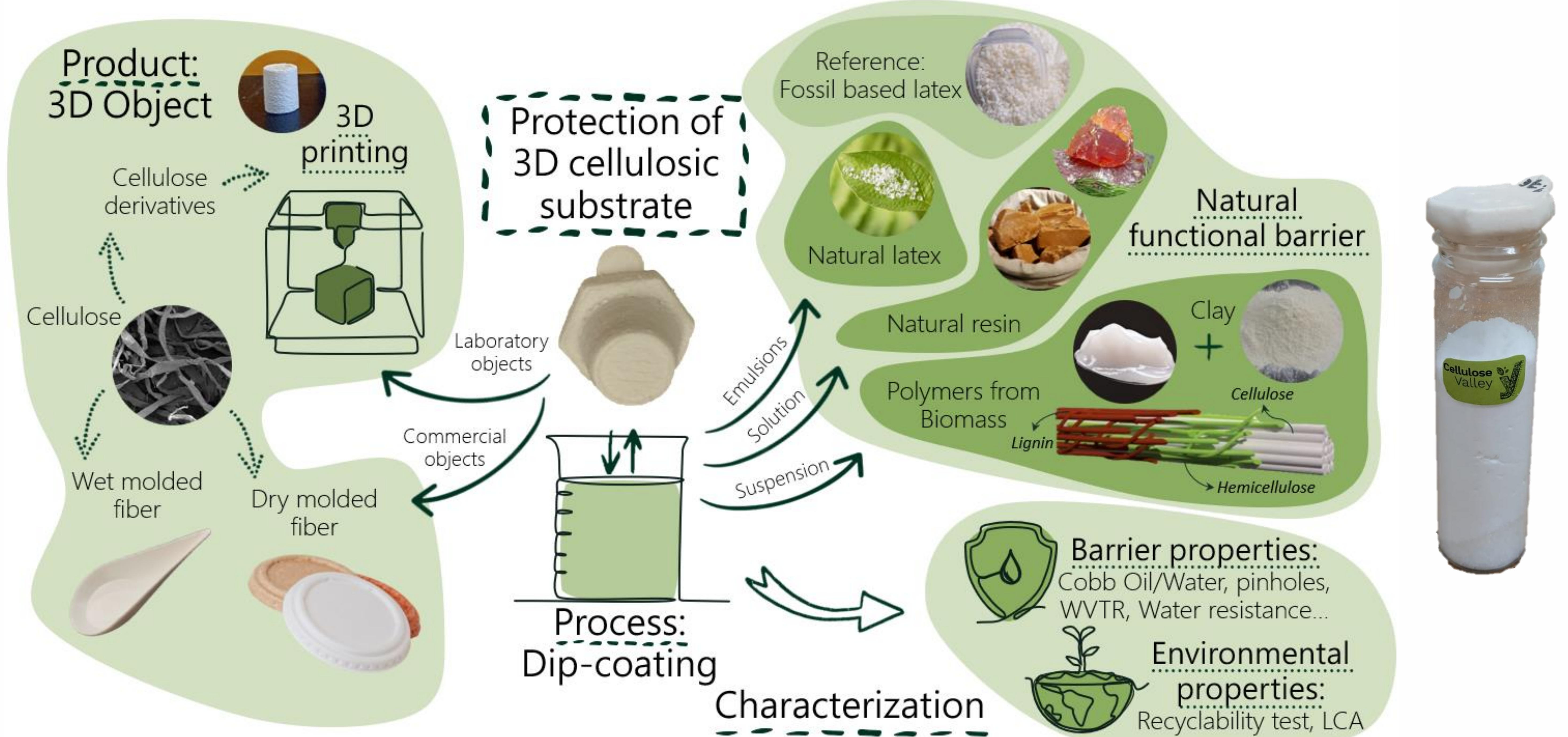
Cellulose Valley

BY FONDATION GRENOBLE INP

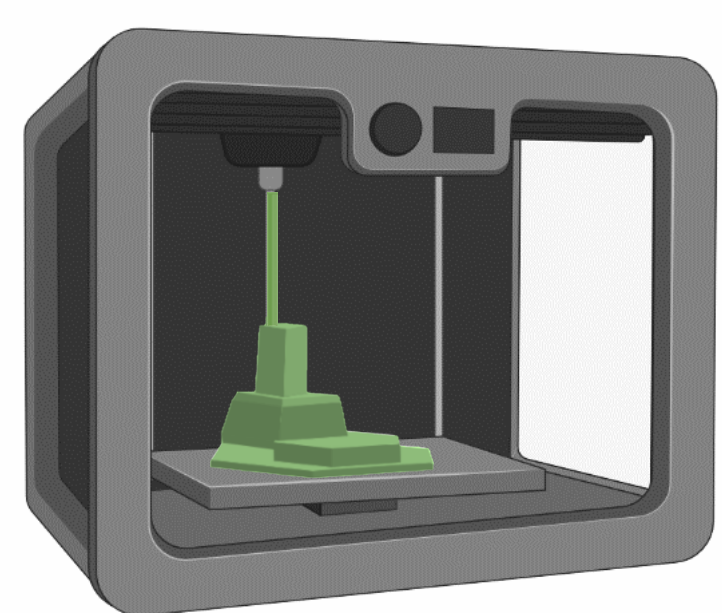


Context

New laws are being voted by the European union and the French government to promote reduction of single-use plastic production and consumption. 3D plastic objects such as bottle caps or disposable cutlery are rarely recycled and commonly found in nature. New sources are being studied to provide bio-based, recyclable and biodegradable 3D objects among which bottle caps. The main challenge of this project is to provide grease, water and gas **barrier properties to cellulose 3D objects via dip-coating**.



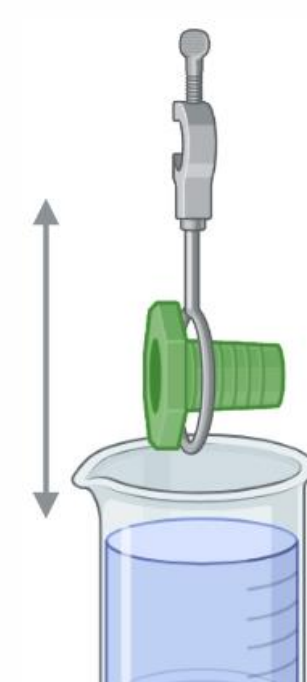
Material & method



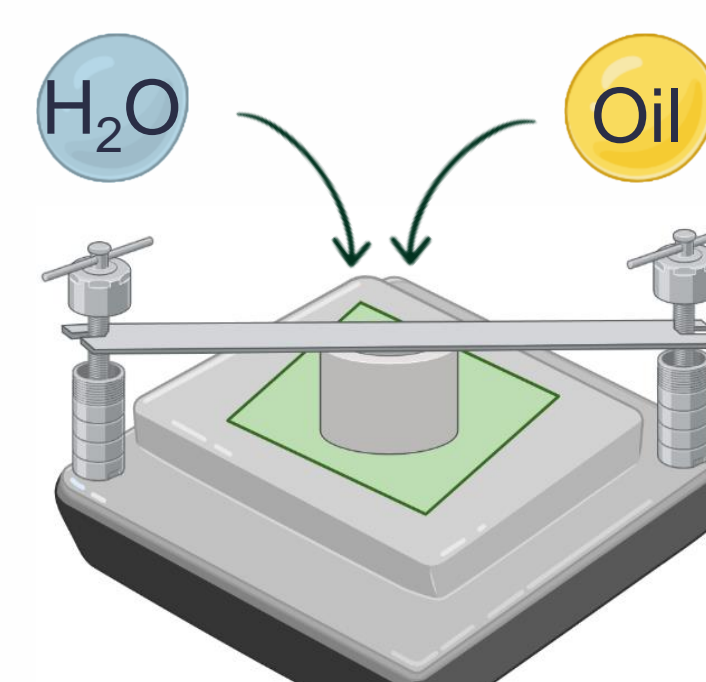
3D printing



Surface characterization



Dip-coating



Cobb

23°C 50% RH



Water vapor transmission rate

Conclusion and perspectives

Best result: Natural Latex



- Good oil and water vapor barrier properties
- Medium water barrier properties

- Low water resistance
- Viscous coating → accumulation in complex shapes
- Not recyclable (issue with the substrate)

Next:

- More tests with natural resin
- Analysis on coating viscosity
- Optical analysis of complex shapes
- Recycling test with different substrates



Scalable cellulose-based 3D object

