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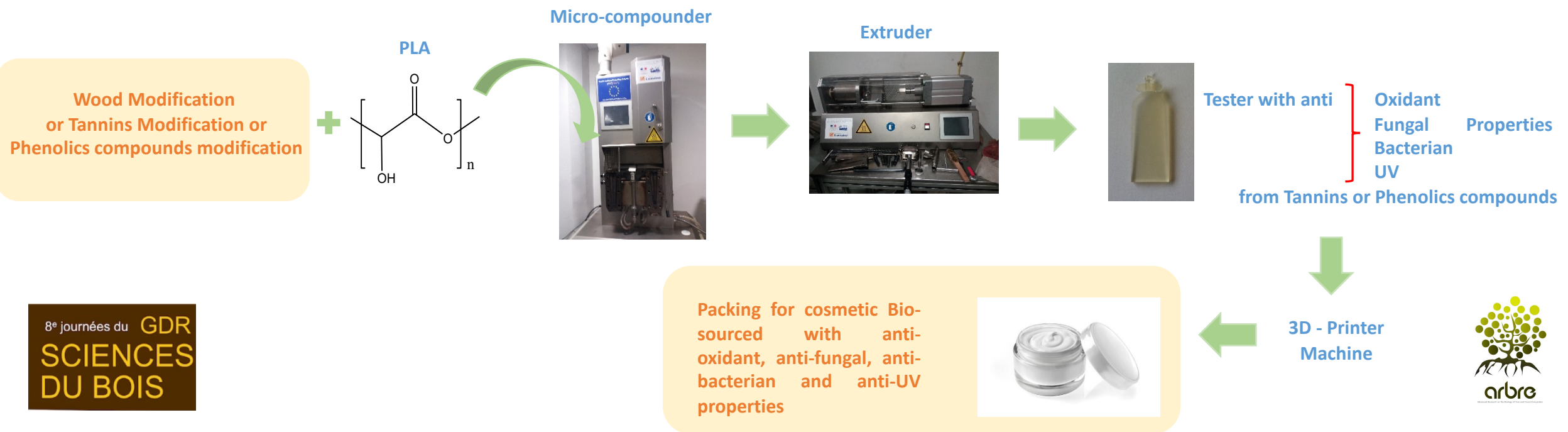
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## Introduction

- In recent years increased the interest in the use of renewable raw materials due to the decrease of easily accessible fossil resources.
- Growing interest of industries and consumers to use molecules of natural origin to replace synthesis products of petrochemical origin.
- Forestry Biomass appear as a good alternative to replace products of petroleum origin for its wide availability and natural origin and to decrease the number of ingredients in formulations and the obtention of a green product.

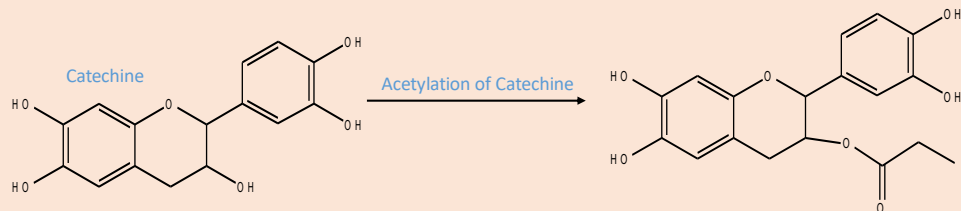
## Objectives:

- Nowadays, the cosmetic industry has a higher demand of active products in their formulations or in their packages.
- In this context, the objective of this project is the conception of a bio-sourced pack, synthesized by thermoplastic filaments of chemically modifies wood based or by-products of the industry of first transformation of wood like tannins or phenolics extracts to obtain a 3D printed pack with antioxidants and/or antifungals and /or antibacterial and/or anti-UV properties.

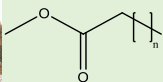
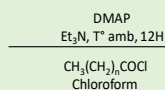


## Phenolic compounds Modification

### Catechine Modification

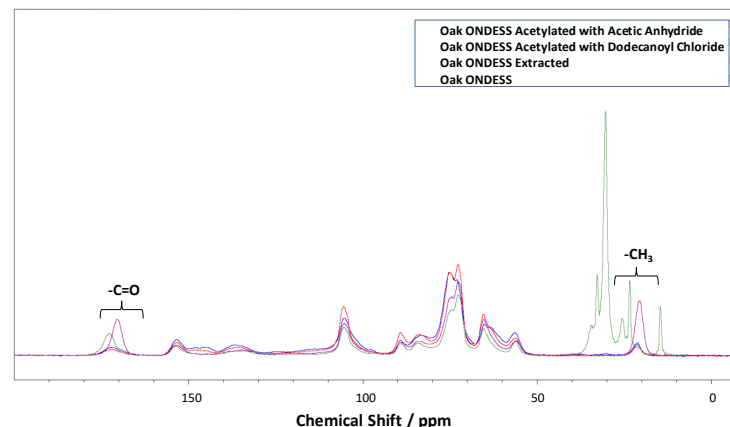


### Tannins Modification



## Characterization of Unmodified and Modified wood

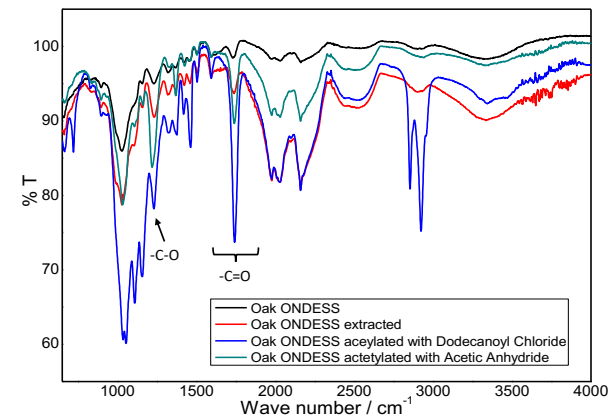
### <sup>13</sup>C Solid NMR



Left: the signal ~ 22 ppm correspond to a -CH<sub>3</sub> carbon of acetyl group, and ~ 176 ppm correspond to a carbon of carbonyl of acetylated wood -C=O.

Right: the stretching band at ~ 1740 cm<sup>-1</sup> correspond to a -C=O and ~ 1210 cm<sup>-1</sup> at -C-O of acetylated wood

### IR-TF



## Conclusions

In this way, it is possible to obtain a packaging made from bio-sourced materials, allowing:

- By one hand, condition the cosmetic formulations in a 100% bio-sourced packaging and with a rendering highlighting the product.
- On the other hand to simplify the cosmetic formulations by reducing the number of preservatives, antioxidants, type of ingredients that are conventionally present to protect the formulation, and this, thanks to the properties of use provided by the container.
- In addition, it provides important added value to forest biomass through the valorization of by-products of the wood industry.

## Perspectives

We plan to extend the process to the incorporation of modified wood extractants with grafts to improve the compatibility with PLA but also to bring additional properties to the final material.

## Acknowledgements:

LERMAB benefits from state aid managed by the National Research Agency under the Investissements d'avenir program with the reference number ANR-11-LABX-0002-01 (Excellence Laboratory TREE). The authors thank the EMPP cluster of the University of Lorraine for funding this project.

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