



LIGNOCELLULOSIC FIBRES – QUANTIFICATION OF FIBRE MORPHOLOGY AND APPLICATIONS IN THERMOFORMED PRODUCTS

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RISE PFI AS

4-6 May 2026

ENFiber Conference, Tartu, Estonia

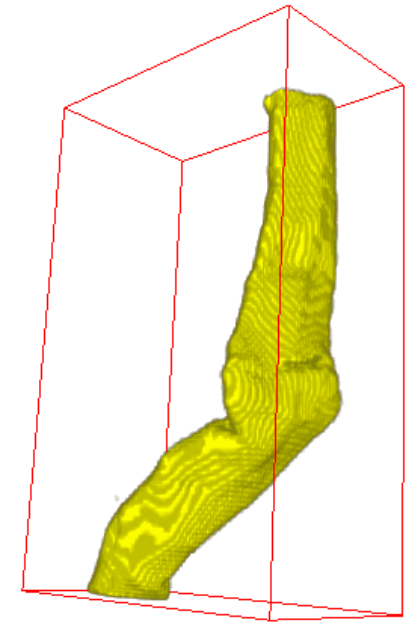
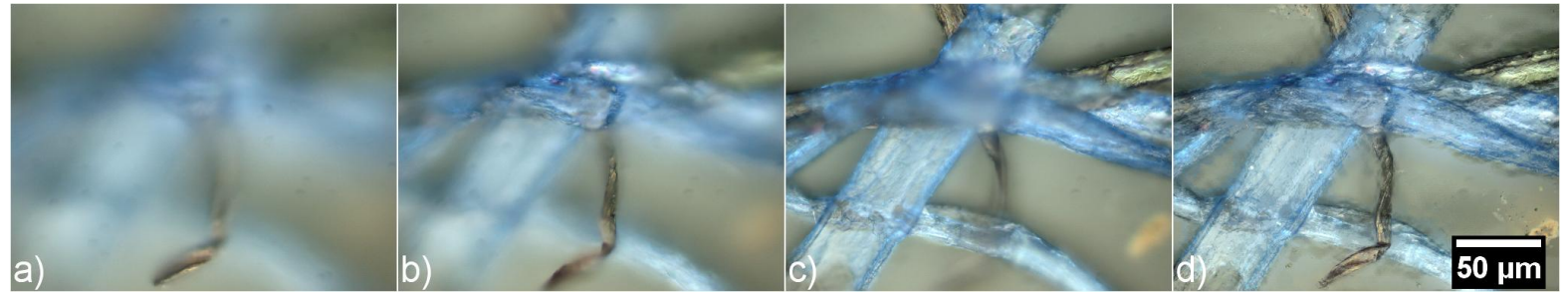
1 μm

PFI

Fibre characterisation

Fibre morphological characterisation involves e.g.:

- Optical methods
- X-ray microtomography
- Atomic force microscopy

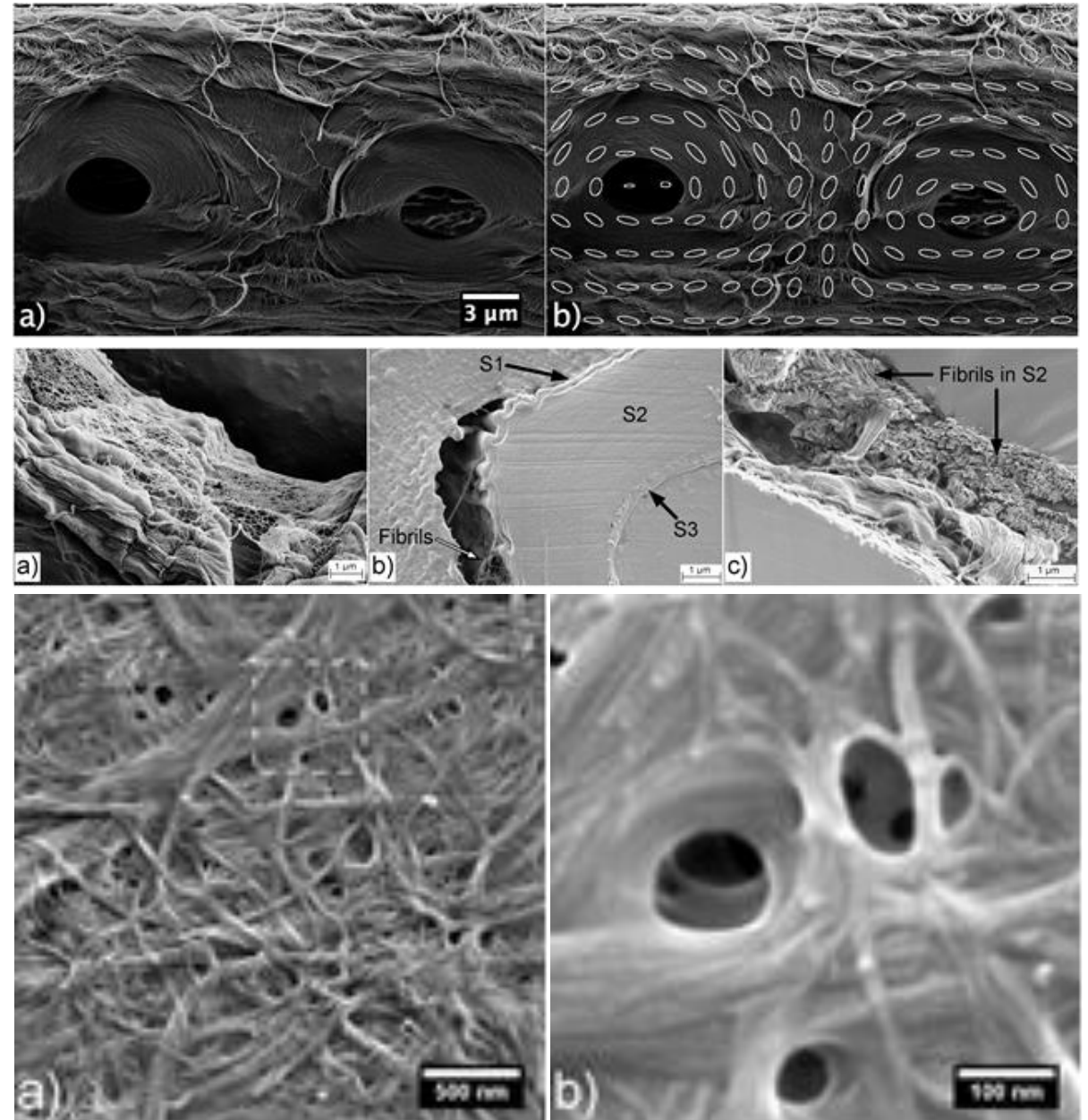


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Fibre characterisation

Fibre morphological characterisation involves e.g.:

- Optical methods
- X-ray microtomography
- Atomic force microscopy
- Scanning electron microscopy

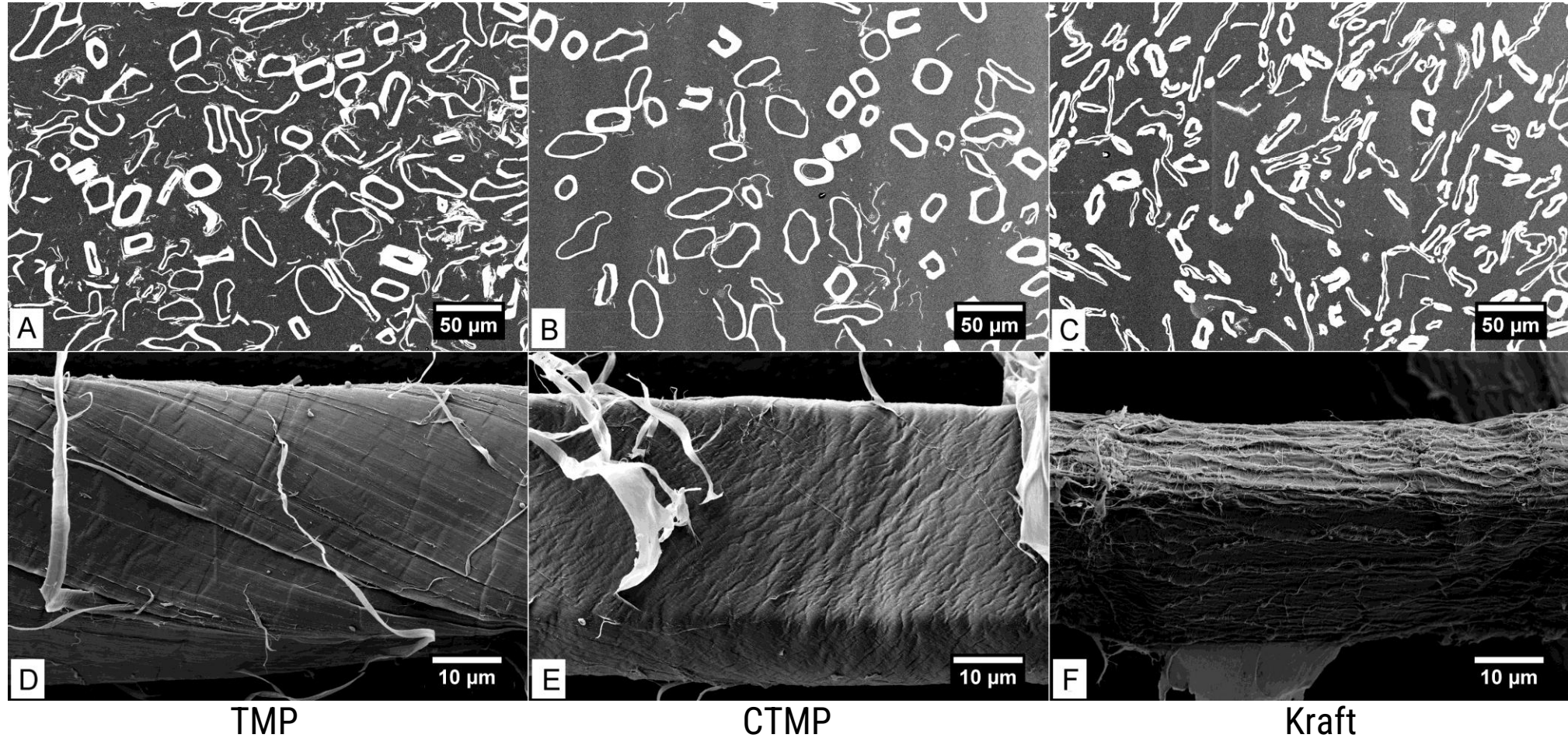


Chinga-Carrasco, G. Microscopy and computerized image analysis of wood pulp fibres multi-scale structures.

Formatex Research Center in the book **Microscopy: Science, Technology, Applications and Education** (Eds. A. Méndez-Vilas and J. Díaz), (2010), 2182.

PFI

Wood pulp fibres



Chinga-Carrasco, G. Exploring the multi-scale structure of printing paper - A review of modern technology. *J. Microscopy-Oxford* 234(3): 211-242 (2009)

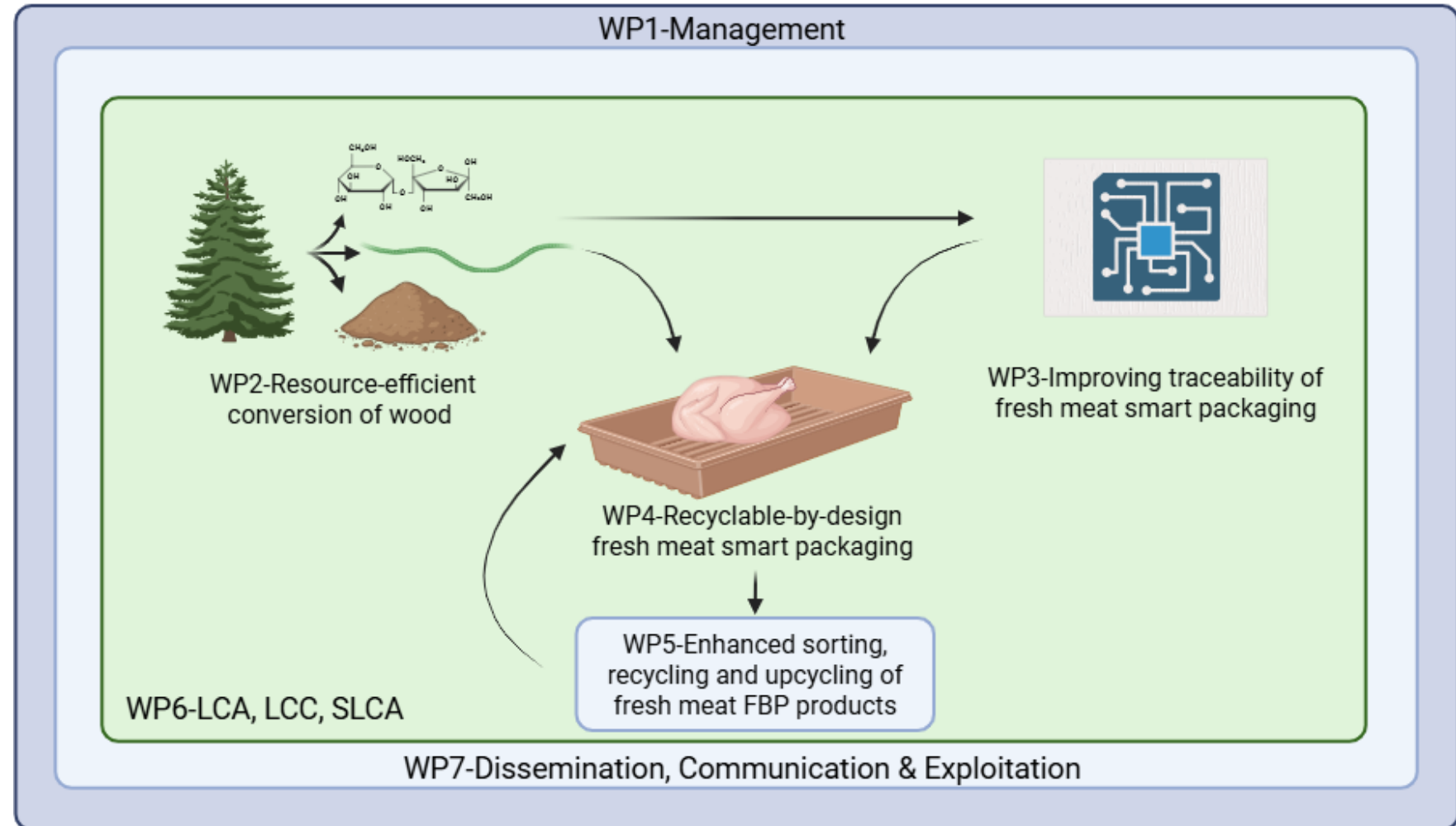
European project: Call ID:
HORIZON-JU-CBE-2022
Topic: HORIZON-JU-CBE-R-03
Type: Research & Innovation
action

Number of partners: 13

- **TECNALIA** - Coordinator
- **RISE PFI** - Coordinator WP4

Project period: 2023-2027

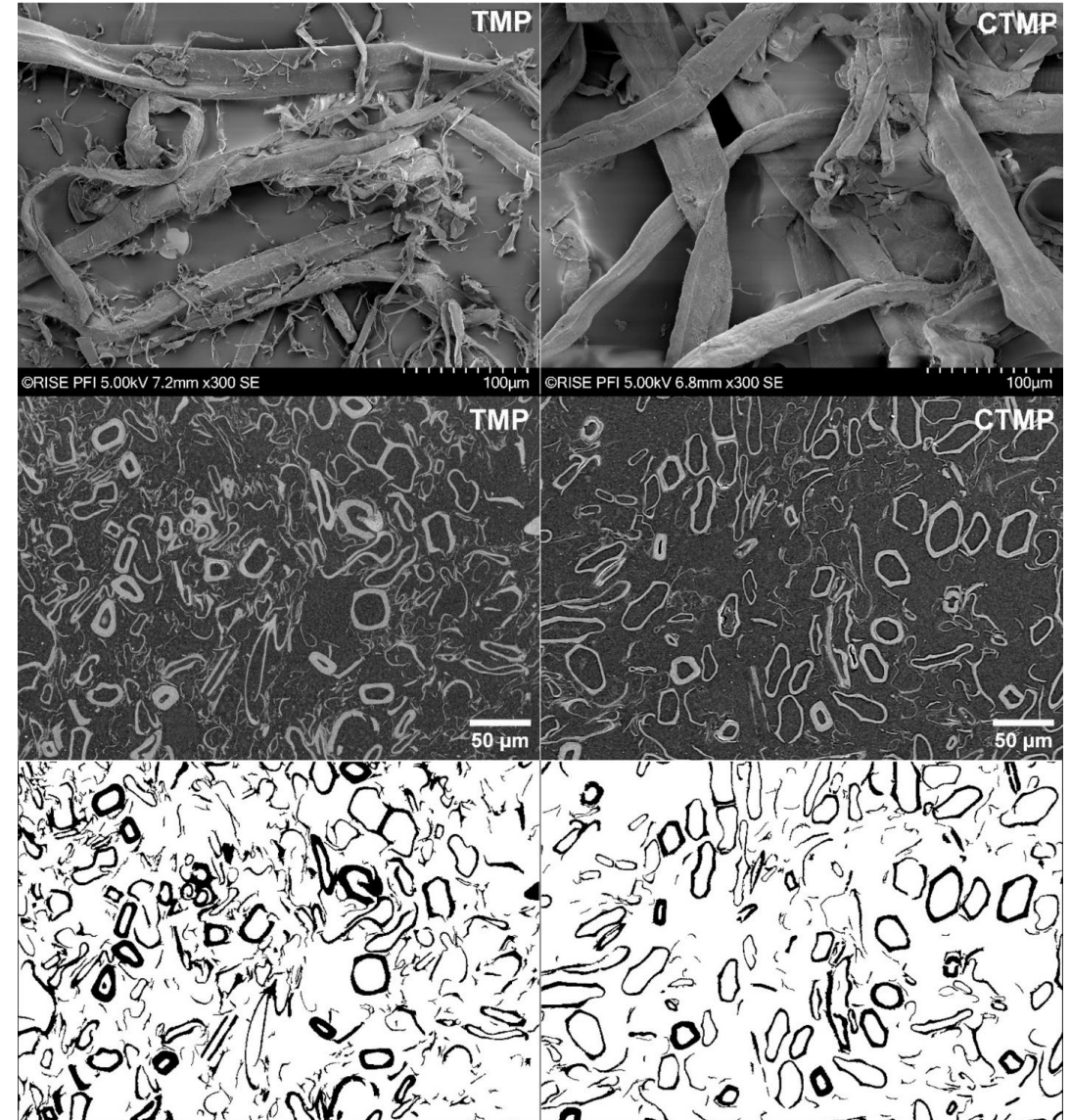
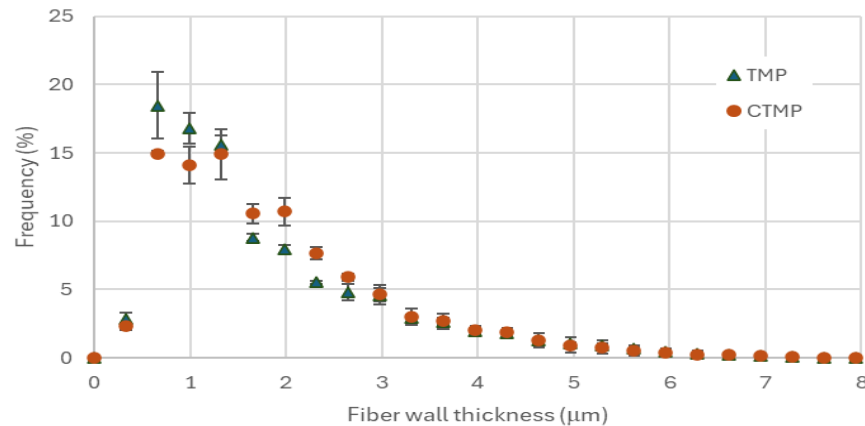
Total budget: ~5 MEur



Wood pulp fibres

➤ FiberTester and SEM analyses

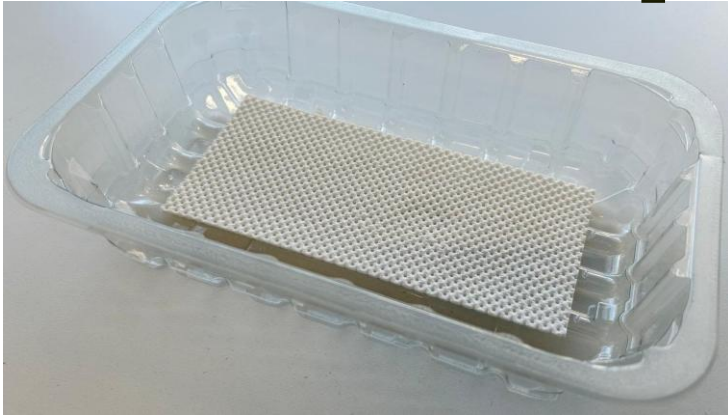
Pulp code	Mean length (mm)	Mean width (μm)	Mean fibril area (%)
TMP	1.38 ± 0.03	33.13 ± 0.21	10.43 ± 0.38
CTMP	1.50 ± 0.02	35.77 ± 0.12	4.17 ± 0.15



Chinga-Carrasco, G. (2026). 3D printing to optimize the dry forming of thermomechanical pulp and chemi-thermomechanical pulp trays for food packaging. **Sustainable Materials and Technologies** 48, e01928

Trays for fresh meat packaging

Replacement of plastic
trays



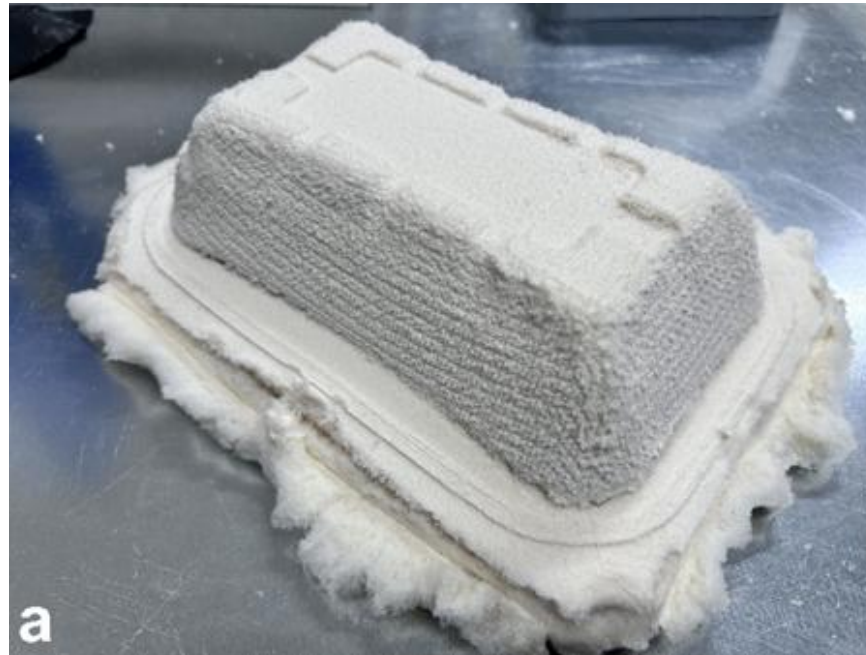
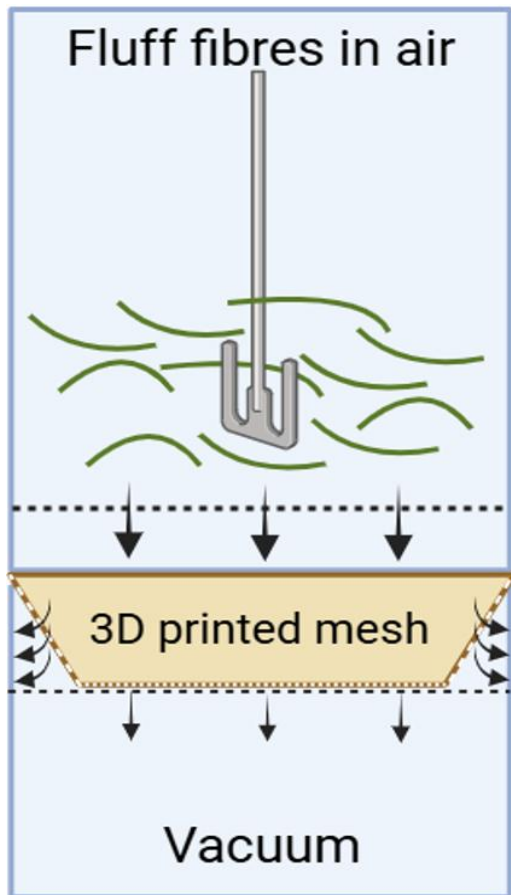
Wood fibre trays

Chinga-Carrasco, G. (2026). 3D printing to optimize the dry forming of thermomechanical pulp and chemi-thermomechanical pulp trays for food packaging.
Sustainable Materials and Technologies 48, e01928

Trays for fresh meat packaging

Pre-formed

Hot-pressed-40 MPa and 200 °C



TMP provides better mechanical properties than CTMP in dry-formed trays

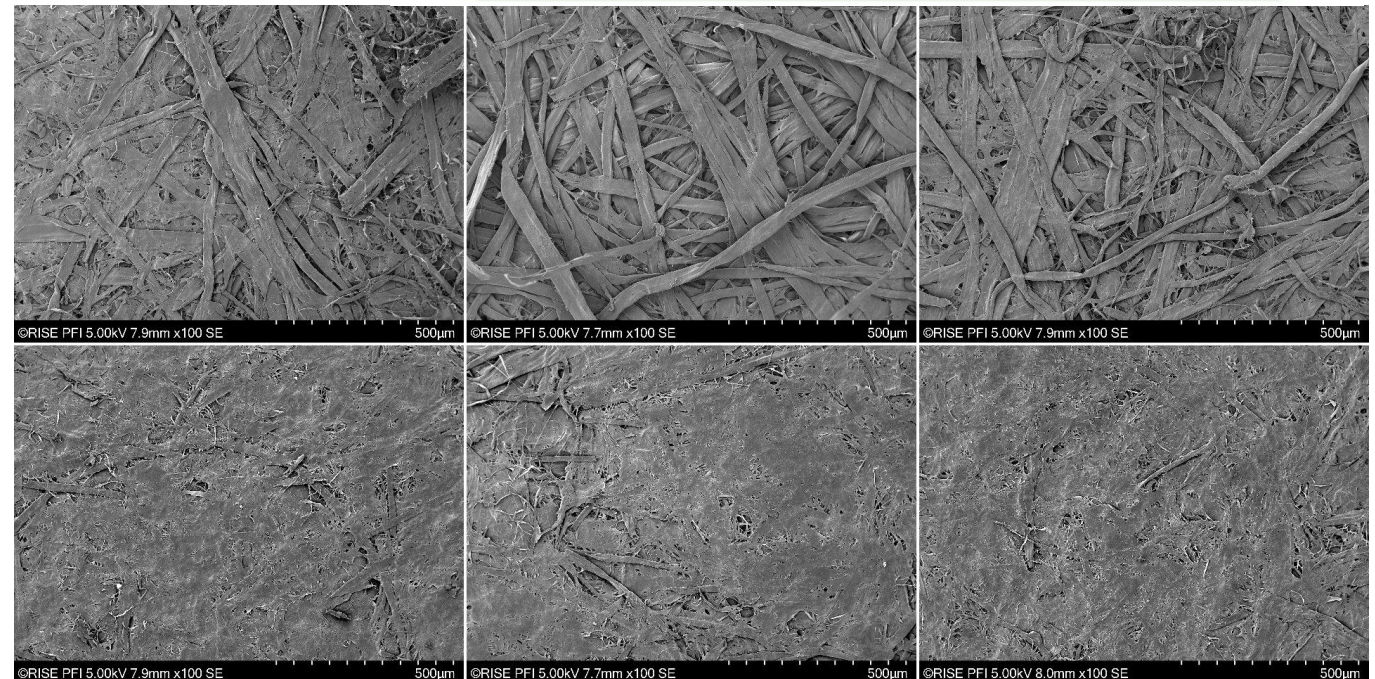
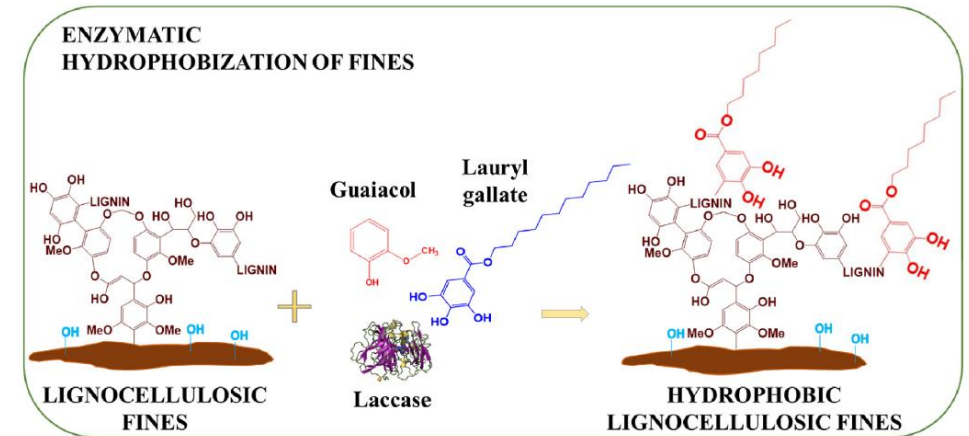
Trays for fresh meat packaging

➤ Engineering trays

- **Core:** TMP fibres
- **Surface:** Fibres modified with lauryl gallate

➤ Wet- and Dry-forming

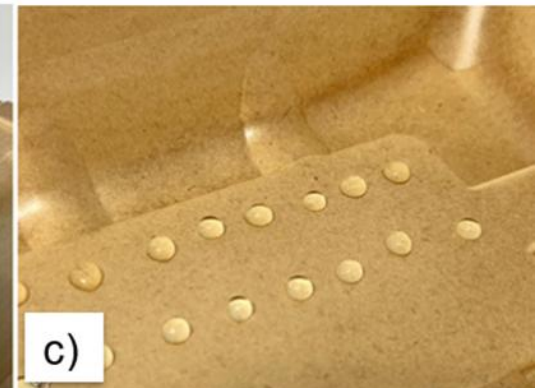
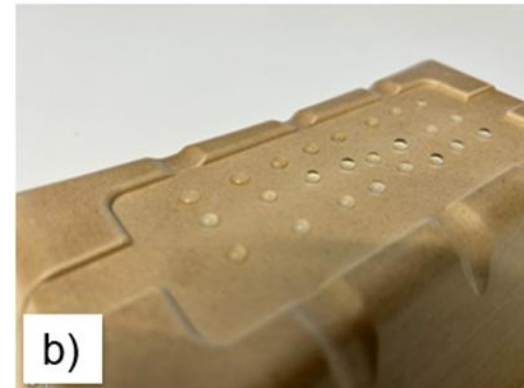
➤ Thermo-pressing



Chinga-Carrasco, G., Garcia-Garrido, J., Tejado-Etayo, A., Martinez-Filgueira, D. (2026). Thermo-pressed specimens coated with lignin-containing thermo-mechanical pulp fines and modified enzymatically to increase hydrophobicity. **Cleaner Engineering and Technology** 31, 101172,

Trays for fresh meat packaging

- Surface-modified to introduce water-resistance



The future is green and blue!

Thank you!

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**Circular
Bio-based
Europe**
Joint Undertaking



Forskningsrådet