

ForestValue Research Programme Kick-Off Seminar  
23rd –24th of May, 2019  
National Museum of Finland in Helsinki, Finland

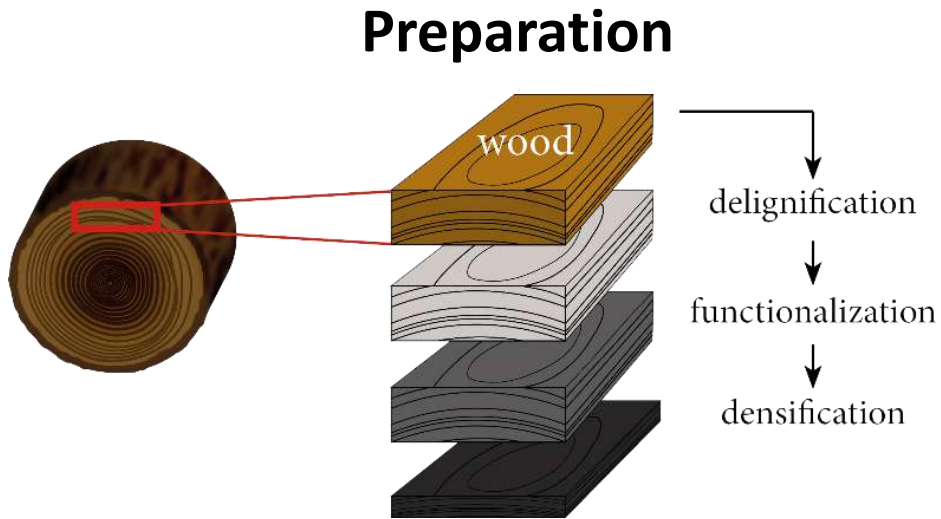
## **A Novel Material Concept for High Strength Cellulose Composites**

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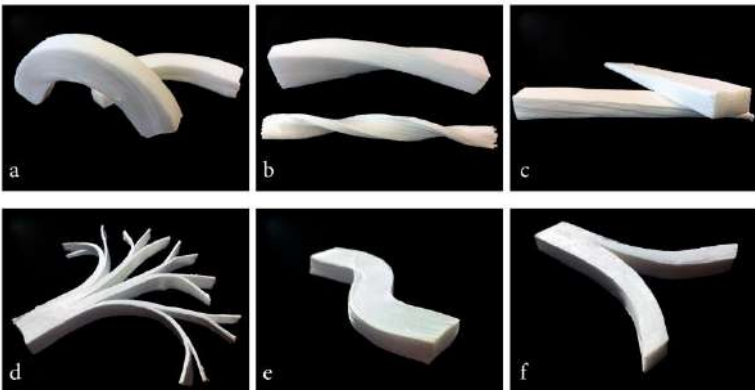


“Project Strong Composite is supported under the umbrella of ERA-NET Cofund ForestValue by Innosuisse, AKA, Business Finland, Vinnova, BMLFUW. ForestValue has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement N° 773324.”

## The material concept

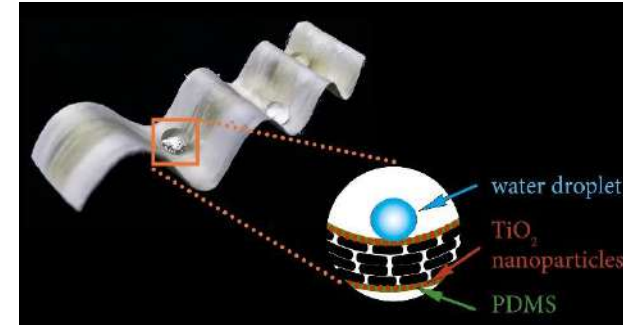


## Shaping



Frey et al. 2018 ACS Applied Mater & Interfaces

## Functionalization



Frey et al. 2019  
Advanced Science



## Mechanical Performance

### Without resin matrix:

- elastic modulus:  $\sim 35$  GPa
- tensile strength:  $\sim 270$  MPa

### With epoxy matrix:

- elastic modulus: up to 70 GPa
- tensile strength: up to 600 MPa <sup>2</sup>

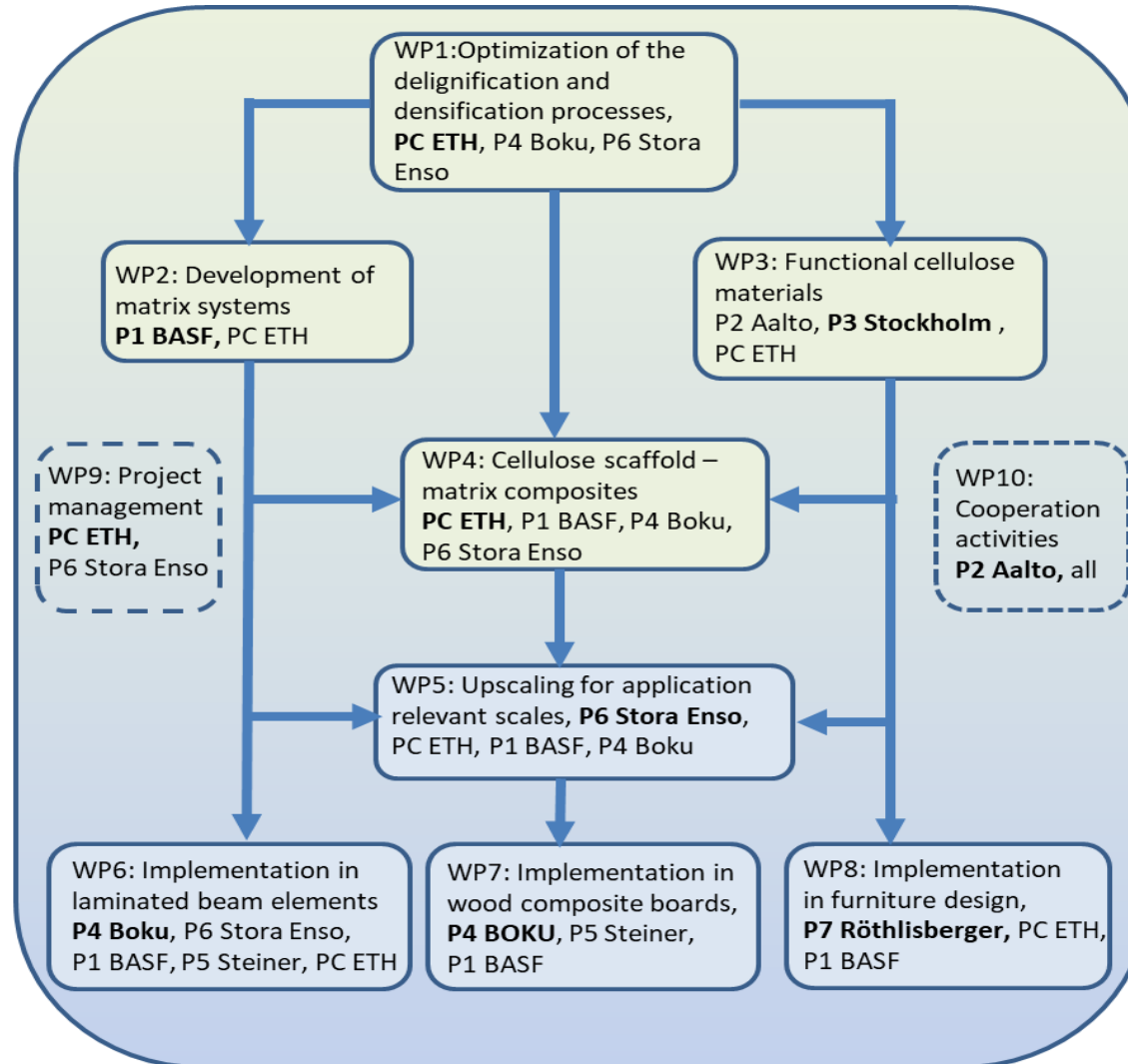
## **Scientific objectives**

- Achieve targeted material densities and mechanical performances
- Use “green chemistry” for functionalization to achieve additional performance features
- Design adjustable resin matrices for advanced composite properties
- Develop composites with high strength, high stiffness, and toughness
- A suitable and efficient process of veneer stacking to reach larger sample dimensions

## Technological objectives

- Upscale to industrial processes for prototype geometries for different fields of application (e.g. automotive, furniture)
- Use extracted wood components as the resin matrix or in other bio-based materials
- Produce prototypes that fulfil performance requirements for industrial implementation
- Implement densified cellulose scaffolds in OSB-like panel prototypes

## Work packages



## Thanks for your attention

**ETH**

Eidgenössische Technische Hochschule Zürich  
Ecole polytechnique fédérale de Zurich  
Politecnico federale di Zurigo

**BASF**

We create chemistry



**IB STEINER**



**Aalto University**  
School of Chemical  
Engineering



**Stockholm  
University**



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