DEVELOPING ADVANCED BIO-BASED COMPOSITES

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SUSTAINABLE STRUCTURAL AND MULTIFUNCTIONAL BIOCOMPOSITES FROM HYBRID NATURAL FIBRES AND BIO-BASED POLYMERS

Vincent PLACET

Coordinator

SSUCHY FINAL EVENT PROGRAMME

CET

FEBRUARY 9

10:30 – 10:40 General introduction and overview of the SSUCHY project

Dr. Vincent PLACET, University of Franche-Comté

10:40 – 11:00 Elaboration of new bio-based polymers from undervalued wood and plant feedstock

- From biomass to building blocks: Green chemistry generation of lignin-derived tailored building blocks for polymers - Pr. Joseph SAMEC, Stockholm University
- From building blocks to bio-based thermoplastic and thermoset polymers - Pr. Christophe THOMAS, Chimie ParisTech

11:00 – 11:30 Innovative hemp value chain for composite reinforcements

- Highlights of scientific outcomes - Pr. Pierre OUAGNE, ENIT
- Industrial achievements and perspectives - Ing. Pierluigi FUSCO GIRARD, CEO Linificio e Canapificio Nazionale — Marzotto Lab

11:30 – 12:05 Bio-based composites: adding value through enhanced functionalities

- Bio-based composites used and developed within the SSUCHY project, an overview - Dr. Vincent PLACET, University of Franche-Comté
- Improving the moisture durability of flax and hemp fibre composites - Pr. Aart VAN VUURE, KU Leuven
- Nouryact, a cobalt free accelerator system for unsaturated polyester curing, suitable for non-dried plant fibres - Gea SPIJKERMAN, Teamleader Crosslinking, Thermoset and Polymer Additives, Nouryon
- Damping properties of bio-based composites - Pr. Morvan OUISSE, ENSMM

12:05 – 12:45 Demonstration of the innovation through industrial applications: experience feedbacks and last barriers to remove

Pr. Fabrizio SCARPA, ACCIS, University of Bristol

- Next Generation bio-based cabinet architecture for ultimate performance, luxury, High End Loudspeaker systems - Craig MILNES, CEO Wilson Benesch
- Sustainable Bio-based Composites for aircraft components - Rosario DE LUCA, CEO of EADCO GmbH and SCYLAX GmbH
- A biobased electric scooter body; stronger, lighter, cheaper and more sustainable - Mark LEPELAAR, Co-founder and Director — Product Engineering, NPSP BV
- Potential of continuous hemp fibers for the weight reduction and CO2 emissions neutrality of automotive semi-structural parts - Arnaud Duval, Acoustic, Innovation & CAE Director, TREVES Products, Services & Innovation

12:45 – 12:55 Environmental sustainability of biobased composites

Pr. Karel VAN ACKER, KU Leuven

12:55 – 13:00 Closure Talk

Ana RUIZ, Project Officer at CBE

Online event

Registration free but limited and mandatory

For any further information: contact@ssuchy.eu

PROJECT IDENTITY

SSUCHY - *Sustainable structural and multifunctional biocomposites from hybrid natural fibres and bio-based polymers*

BBI JU Project - Research & Innovation Action – Value Chain 1: **Lignocellulose**

Topic BBI 2016.R7. Biopolymers with advanced functionalities for high performance applications

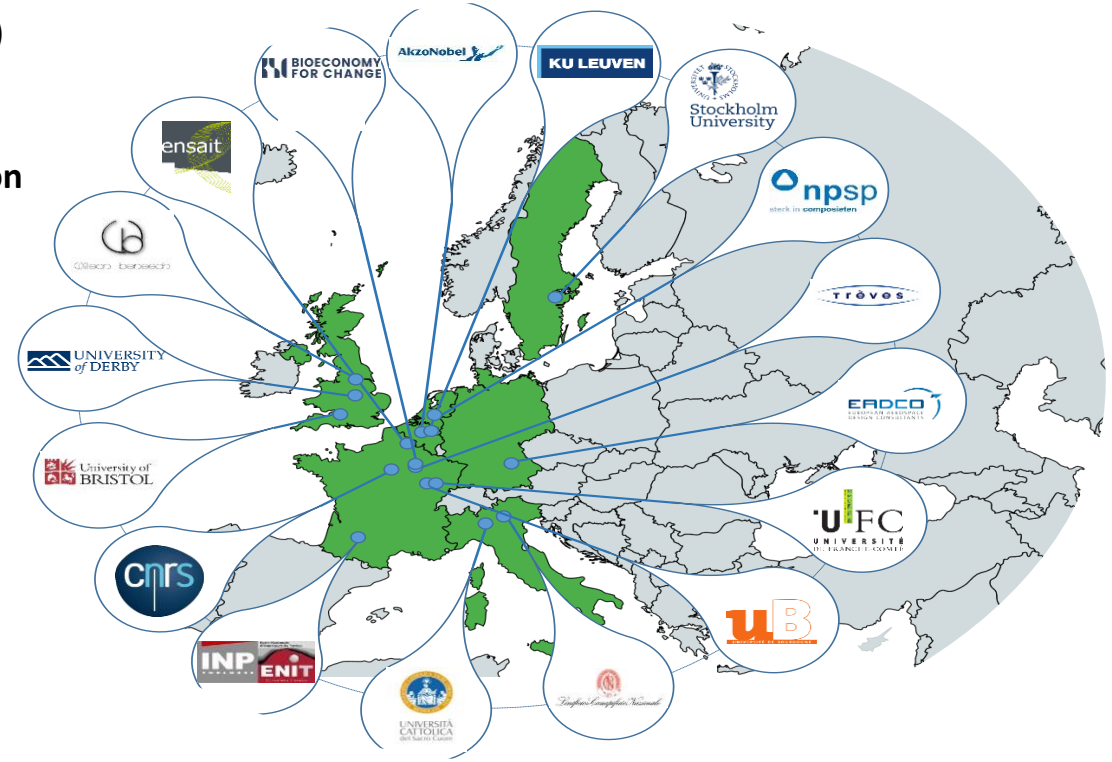
Project duration: **54 months** (September 2017 - February 2022)

Total budget: **€ 7.41 M** including **€ 4.45 M** **BBI JU contribution**

Consortium:

17 partners from 7 European countries

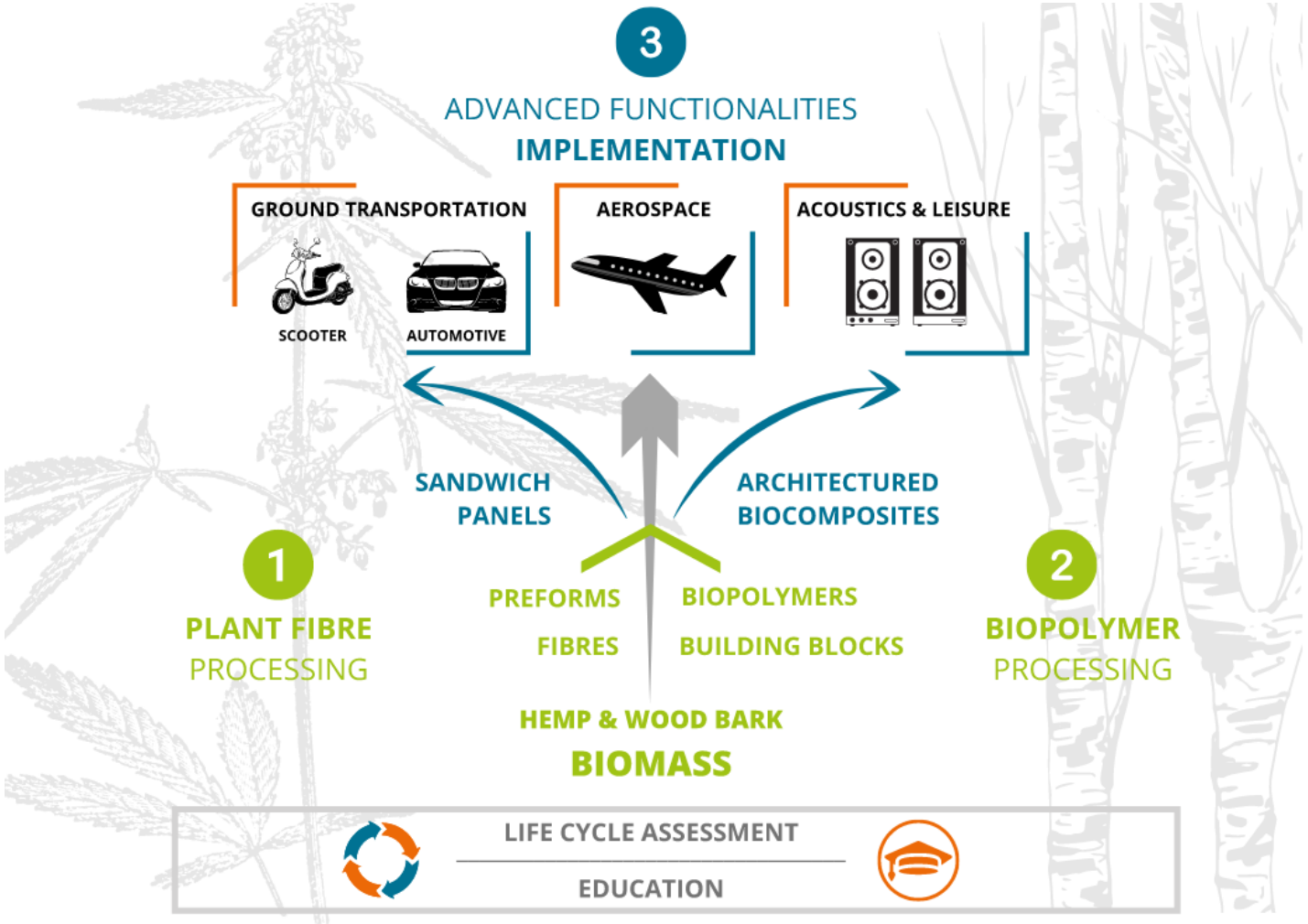
- **10** academic institutions
- **3** industries
- **3** SMEs
- **1** competitiveness cluster



This project has received funding from the Bio-Based Industries Joint Undertaking (JU) under the European Union's Horizon 2020 research and innovation program under grant agreement No 744349.

PROJECT OBJECTIVE

FROM LIGNOCELLULOSIC FEEDSTOCKS (HEMP AND WOOD) TO BIO-BASED COMPOSITES WITH ADVANCED FUNCTIONALITIES FOR TRANSPORTATION AND HIGH VALUE MARKET NICHES



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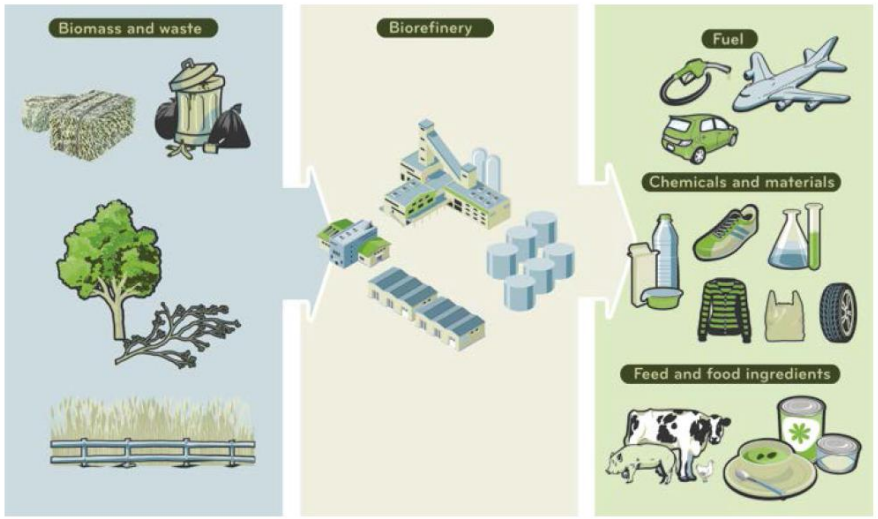
VALUE CHAINS

Bio-based Industries Consortium

Bio-based industrial value chains

The concept



Converting Europe's untapped biomass and wastes into greener everyday products

SSUCHY value chain

Converting undervalued hemp and wood feedstocks into greener engineering products

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HEMP VALUE CHAIN

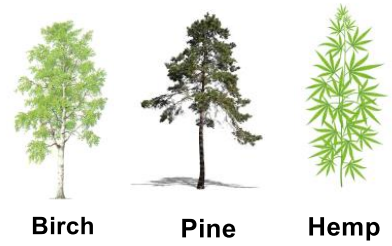
Hemp, a good candidate to expand purpose-grown biomass

Main assets are:

- a **sustainable high yielding crop**, very adaptable, **growing worldwide**, well adapted to most European conditions,
- a **multipurpose crop** (seed/oil, shives, metabolites and fibres),
- a **rapidly growing plant** (substantial consumer of CO2, 1.4 kg of CO2 per kg).
- a **vigorous growth**, shading capacity and disease resistance, that allow a growth **without the use of herbicide, pesticide or fungicide**. Suitable for organic agriculture.
- a **low energy cost for its production** (low fertilizer inputs, limited interventions and manpower requirements for farming).

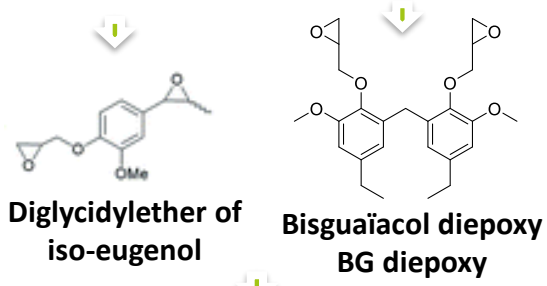
Take advantage of availability, technical and environmental-friendly characteristics and moderate cost of hemp fibres to market a high performance plant fibre reinforcement for composite application with competitive price

WOOD BUILDING BLOCKS VALUE CHAIN



Wood, woody materials by-products (saw dust, bark, shives…)

Generation of tailored lignin derived building blocks from lignocellulosic feedstock by catalytic fractionation



Transformation by chemical processes of bio-based building blocks into functional polymerizable synthons suitable for biocomposite applications

BIOBASED EPOXY THERMOSETS

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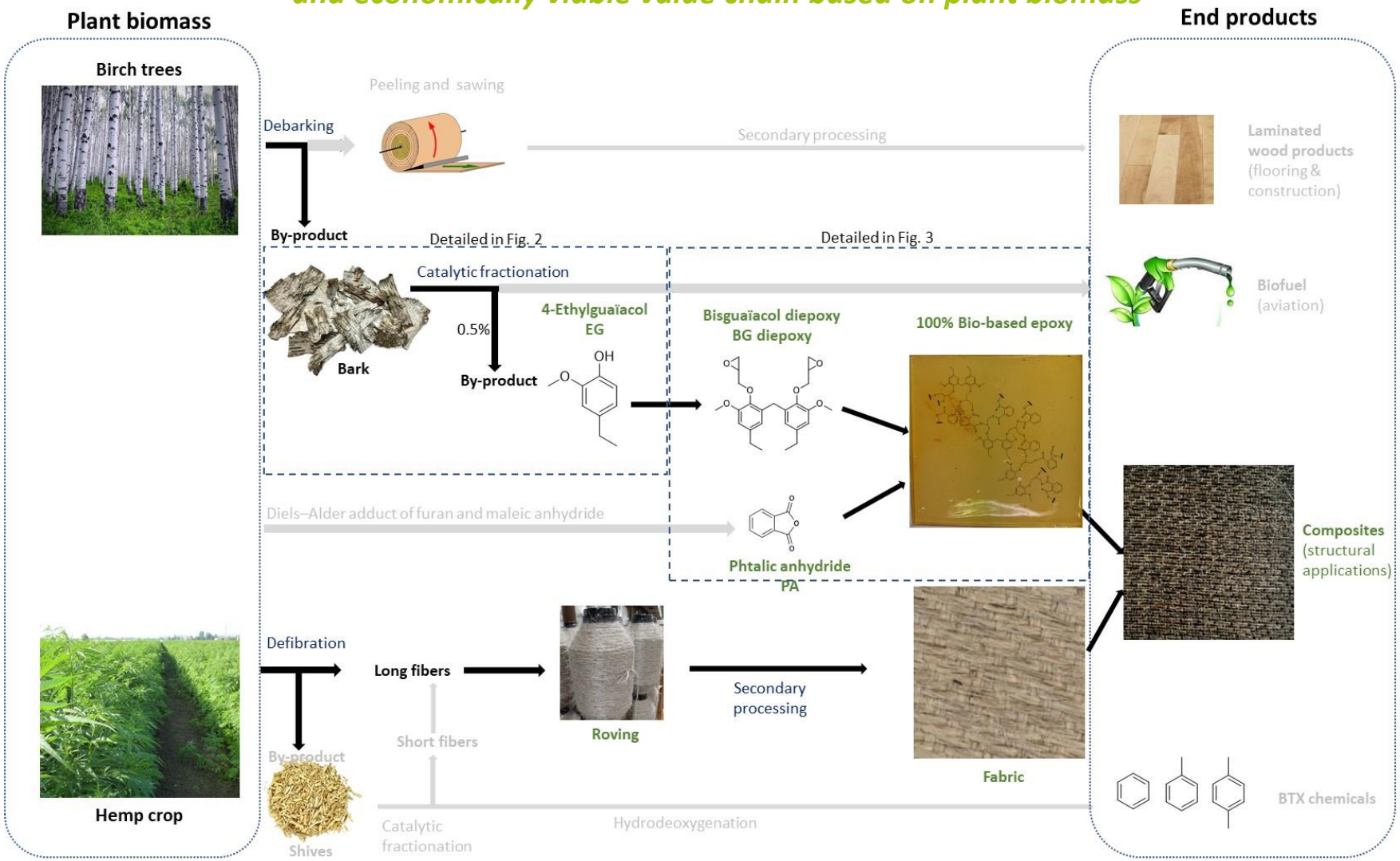
VALUE CHAINS - INTERCONNECTIONS

Development of structural bio-based composites from a sustainable and economically viable value chain based on plant biomass



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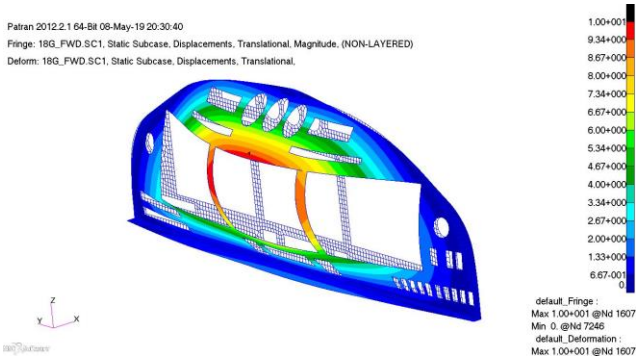
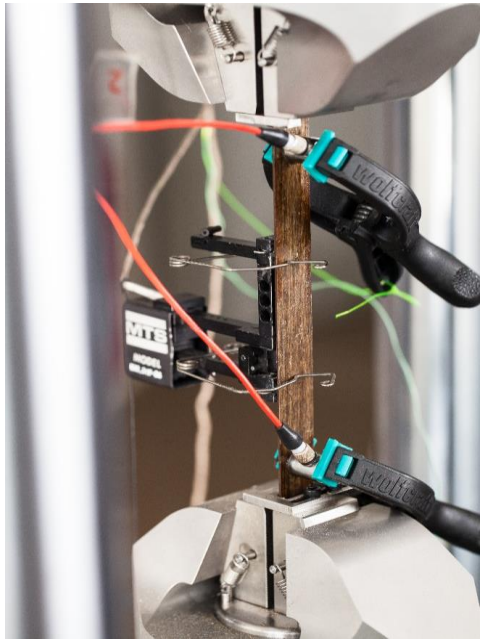
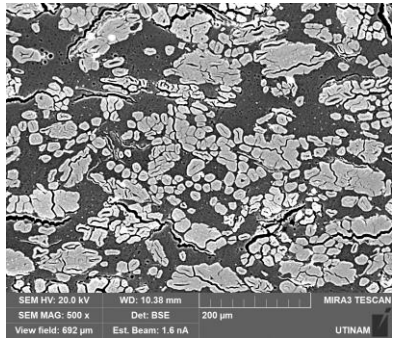
BIO-BASED COMPOSITES

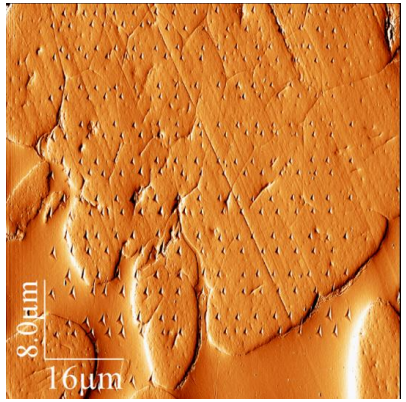
DEVELOPMENT OF COMPOSITES WITH ADVANCED FUNCTIONALITIES – MULTI-SCALE TESTING & MODELING

- **High strength to weight ratio**
- **Durability enhancement**
- **Vibration damping**
- **Fire retardancy**









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DEMONSTRATORS

- High performance green **loudspeaker** system

- Bio-based monocoque structure for **electric scooter**

- Bio-based panel for **electric aircraft interior**

- Bio-based floor and trim panel structures for **automotive applications**

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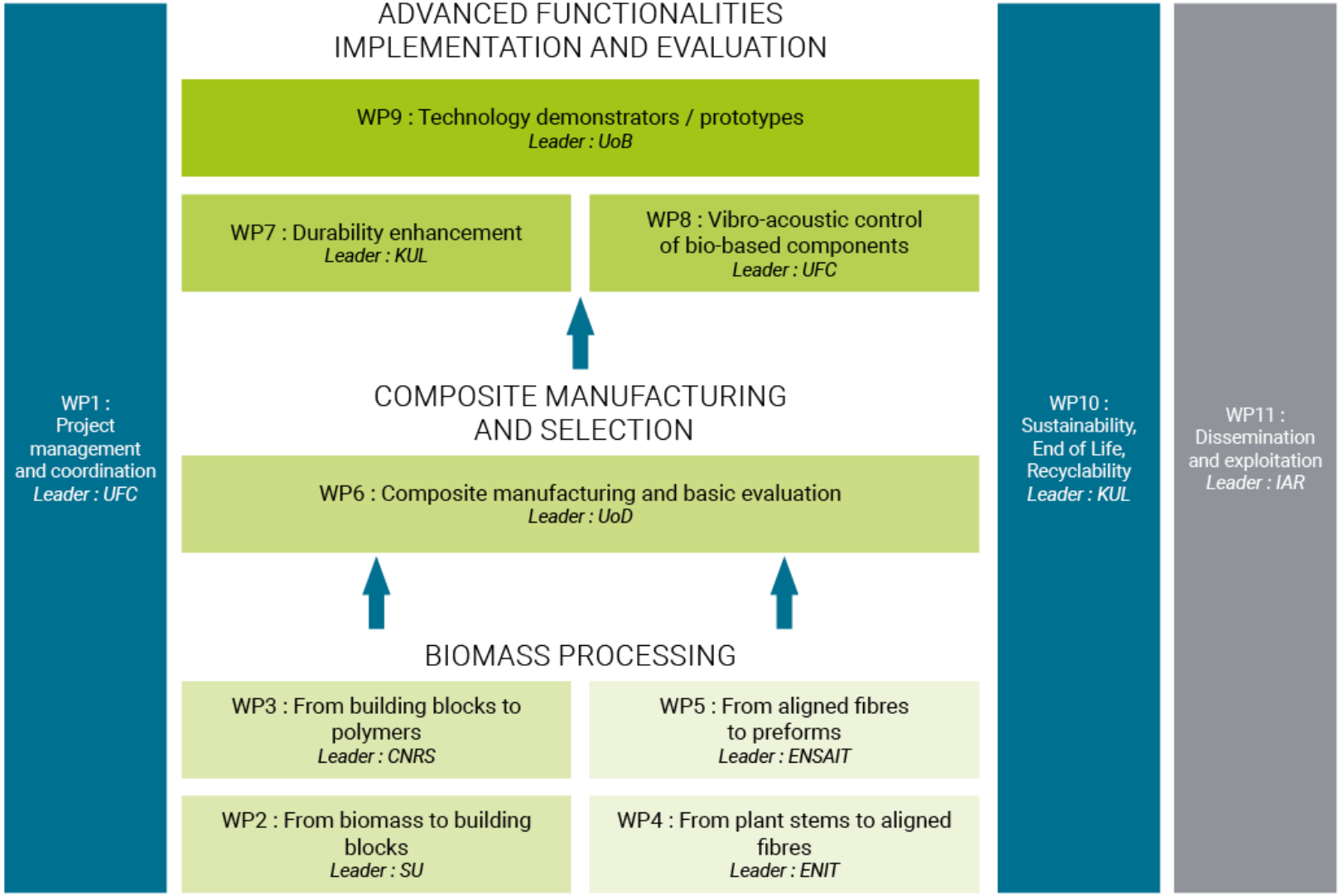
PROJECT STRUCTURE



EDUCATION

Graduation of 6 PhD students + ***10 Post-doc researchers, 25 master students and internships***

- **Anne-Clémence CORBIN**
  Woven hemp fabrics (ENSAIT)

- **Marie Grégoire**
  Hemp fibre extraction (ENIT)

- **Benjamin Sala**
  Creep behavior of bio-based sandwich composites (UFC)

- **Maria Morissa Lu**
  Durability of bio-based composites (KUL)

- **Gilles Koolen**
  Durability of bio-based composites (KUL)

- **Taiqu Liu**
  Damping of bio-based composites (UFC)

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COMMUNITY/NETWOK

- **Creation of succsessful and sustainable collaborations between partners (academics, industry and SMEs) and with external stakeholders**

- **Participation at the emergence and development of the bio-based composite community in Europe**

✓ 1ST EDITION OF THE EUROPEAN SUMMER SCHOOL ON BIO-BASED COMPOSITES – ESBBC

https://events.femto-st.fr/ESBBC/
esbbc@femto-st.fr

Dates: 6, 7, 8 of July 2021

Online, virtually hosted by the FEMTO-ST Institute, Bourgogne Franche-Comté

Under the auspices of 4 EU projects

NETFIB, SUCHY, FibreNet, FLOWER (Flax composites, LOW weight, End of life and Recycling)

150 attendees (Young researchers, Post-doc, PhD and MSc students) from **27 countries**

Best presentation awards

Social networks

A community of **423** followers

A community of **358** followers

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DISSEMINATION

32 Articles in scientific journals **1** Patent

A wide scientific and multi-disciplinary area covered by the SSUCHY activities

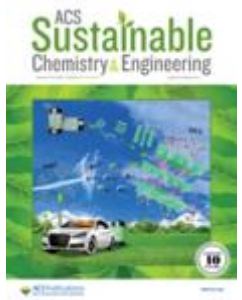
- ✓ Biomass fractionation
- ✓ Bio-based polymers synthesis
- ✓ Hemp processing
- ✓ Fibres and textile
- ✓ Bio-based composite and structures
- ✓ Durability
- ✓ Damping

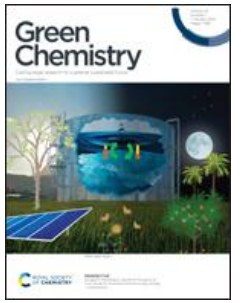
Scientific collaborations

Most of the articles are co-authored by several SSUCHY partners

High reputation of journals

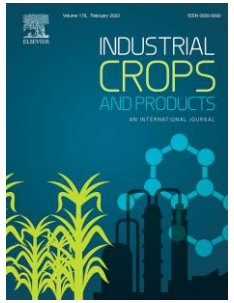
A focus on hemp

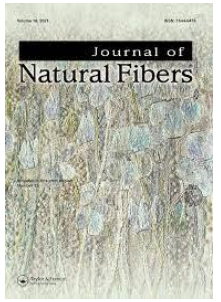




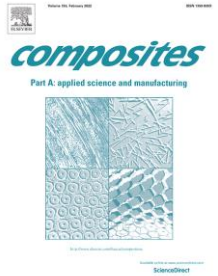
nature chemistry

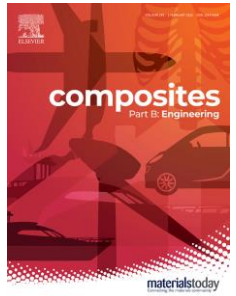
Angewandte
International Edition Chemie

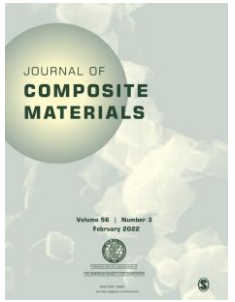




polymers







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DISSEMINATION

46 Communications in conferences

SSUCHY sessions at the 4th and 5th editions of ICNF 2021 (International Conference on Natural Fibers)

Communication tools to enable a wider audience

- ✓ **Press releases (5) and press articles (25)**
- ✓ **SSUCHY website**
- ✓ **Book of final results with a lexical document**
- ✓ **Video**

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IMPACT

- ✓ **New hemp reinforcements** for **composite applications**.
- ✓ **New bio-based composite structures** and **products** and demonstration of their **advanced functionalities at demonstrator level**.
- ✓ **Sustainable management** and **efficient use of natural ressources** such as **hemp and wood** and their **by-products**.
- ✓ **Decrease CO_2 emission** by substituting petroleum-based materials by **low-weight bio-based composites and products**.
- ✓ **Increase the sustainability and the competitiveness of the European bio-based composite sector** through the development of **innovative materials and process technologies.**

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Horizon 2020
European Union Funding
for Research & Innovation

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