European Sustainable BIO-based nanoMAterials Community

Slides of the Open Call Launch event

14/12/2022

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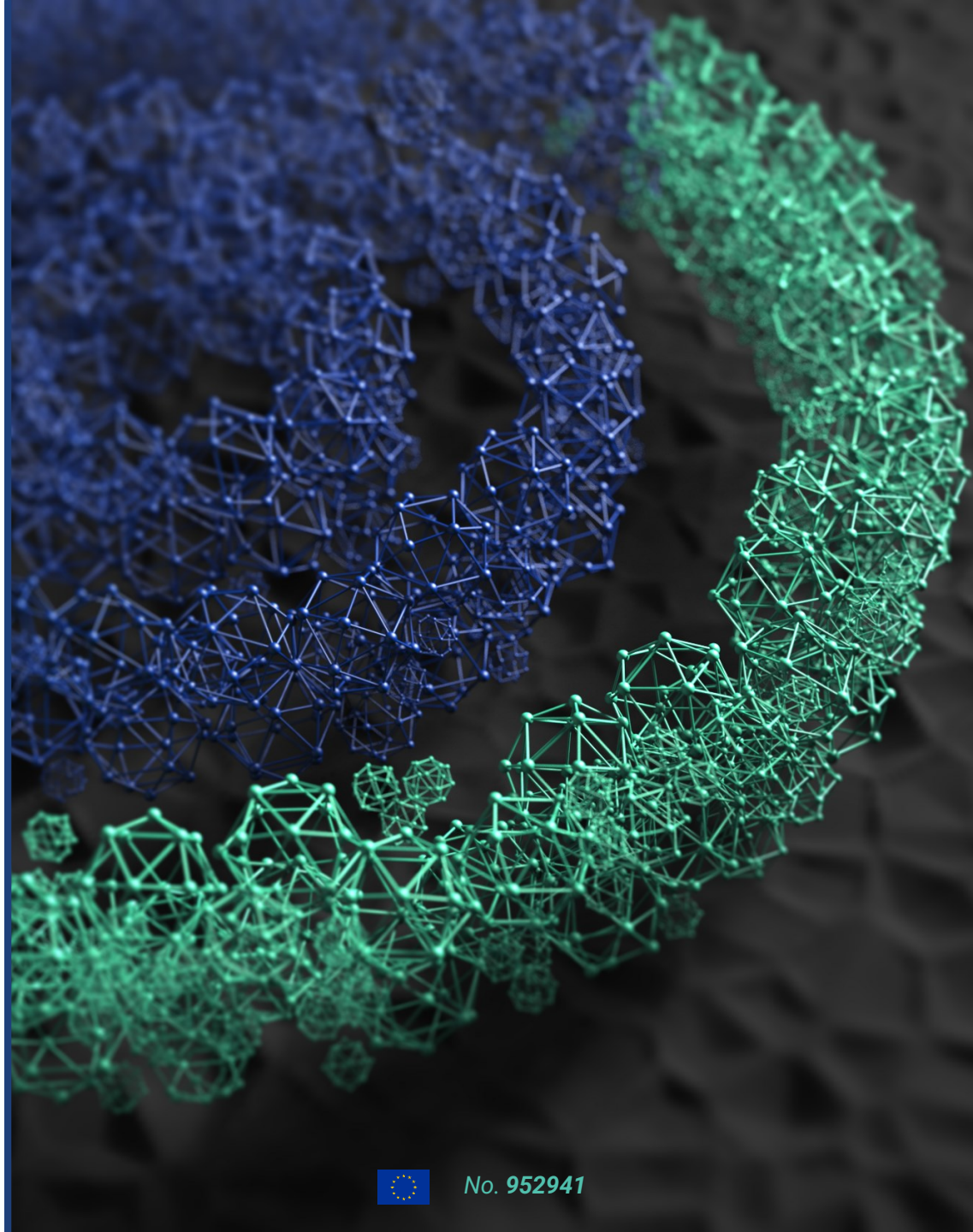


No. 952941

European Sustainable BIO-based nanoMAterials Community

Introduction to the BIOMAC Open Innovation Test Bed and Open call

Professor Dimitrios Bikiaris, Coordinator

ARISTOTLE UNIVERSITY OF THESSALONIKI

This project has received funding from the European Union's Horizon 2020 Research and Innovation Programme under Grant Agreement No. ***952941***

Agenda

10:00-10:10	Introduction to the BIOMAC Open Innovation Test Bed and Open call Prof. Dimitrios Bikiaris (AUTH)
10:10-10:30	Overview of the Pilot lines and their capabilities - Prof. Kostantinos Triantafyllidis (AUTH) and Giorgia Eranio (STAM)
10:30-10:50	Exploring the OITB transversal service hubs - Eleonora Di Maria (UNIPD)
10:50-11:10	The BIOMAC Test Cases - how to make use of the BIOMAC services - Daniel Schmidt (LIST)
11:10-11:20	How to apply to the Open call - Annika Frank (IBB)
11:20 Q&A	

BIOMAC

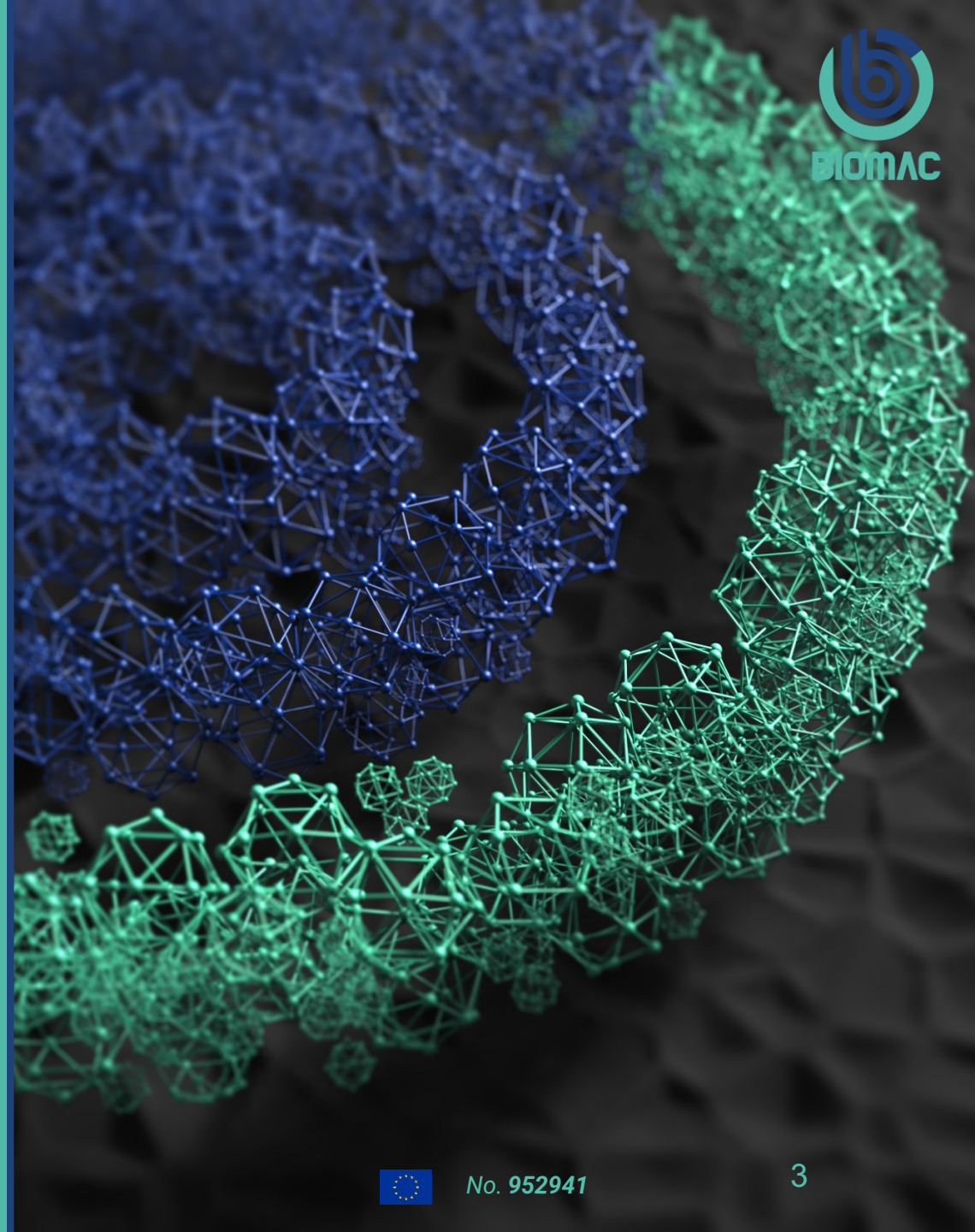
OPEN CALL

Online Presentation

14th December 2022 | 10:00 CET

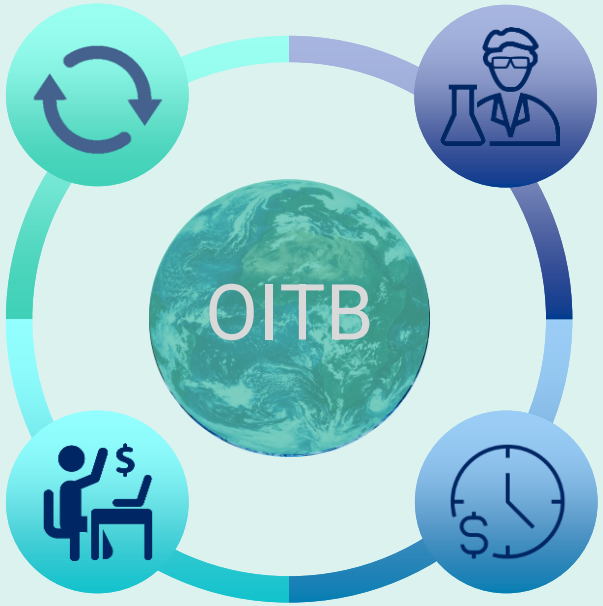
What is an OITB?

- Entity offering access to physical facilities, capabilities and services required for the development, testing and upscaling of nanotechnology and advanced materials in industrial environments.
- The **objective** of the Open Innovation Test Beds is to bring nanotechnologies and advanced materials within the reach of companies and users in order to advance **from validation in a laboratory (TRL 4) to prototypes in industrial environments (TRL 7)**.
- Aim to develop, test and upscale **nanotechnologies and advanced materials** for new innovative products and services in some specific domains.



What is so special about an OITB?

Complete, holistic services via a single contractor - the Single Entry Point (SEP)



Comprised of a multitude of expert scientists from all over Europe, offering their expertise and infrastructure at competitive prices

Integrated business and marketing services, to help with access to financing opportunities and reaching out to new markets

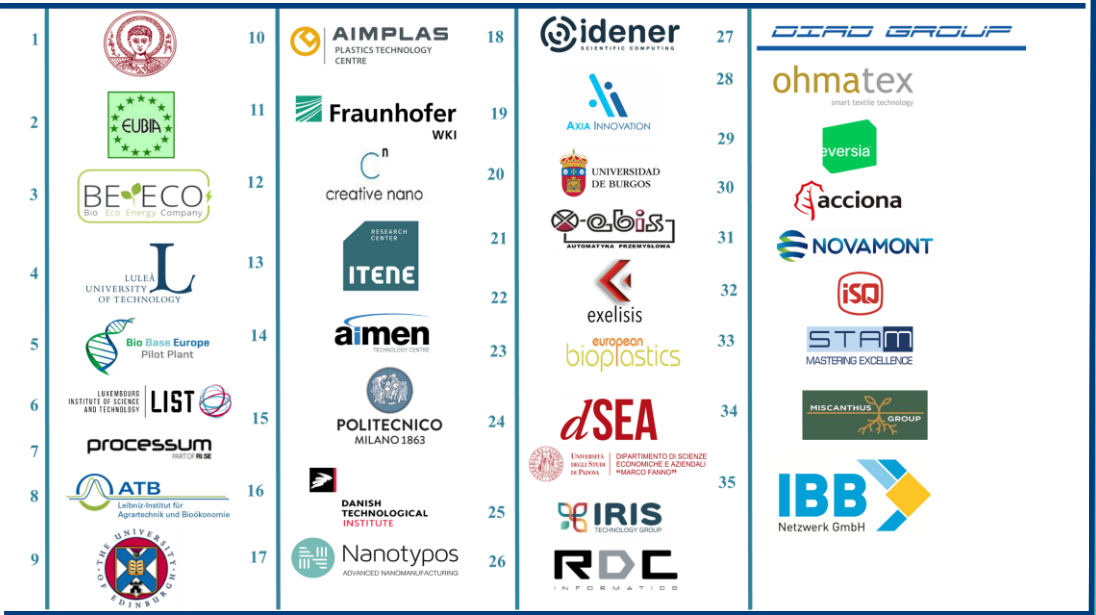
Substantially reduced time and cost to progress from an idea to a successful product.

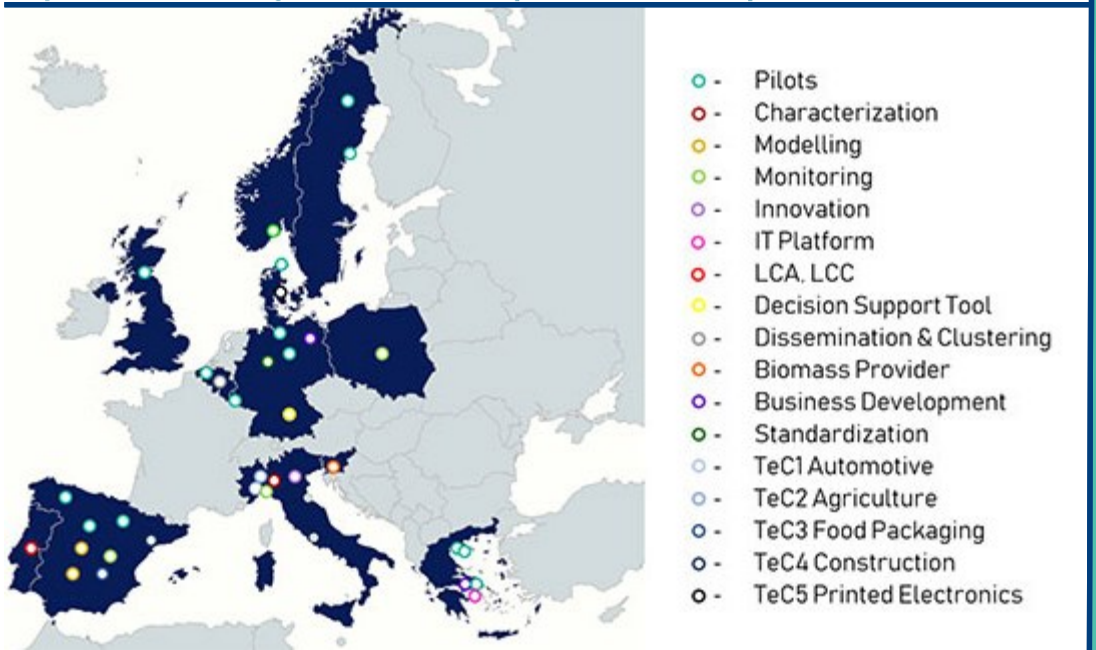
BIOMAC in a nutshell

BIOMAC is a Horizon 2020 project that will establish an **Open Innovation Test Bed (OITB)** where technologies and solutions utilising nano-enabled bio-based materials (NBMs) will be upscaled and prepared for market applications.

The overall **ambition** of BIOMAC is to boost and sustain innovation in the field of European bio-economy industries by reducing the time-to-market of novel nanotechnologies, thus reducing costs and risks.

BIOMAC in a nutshell



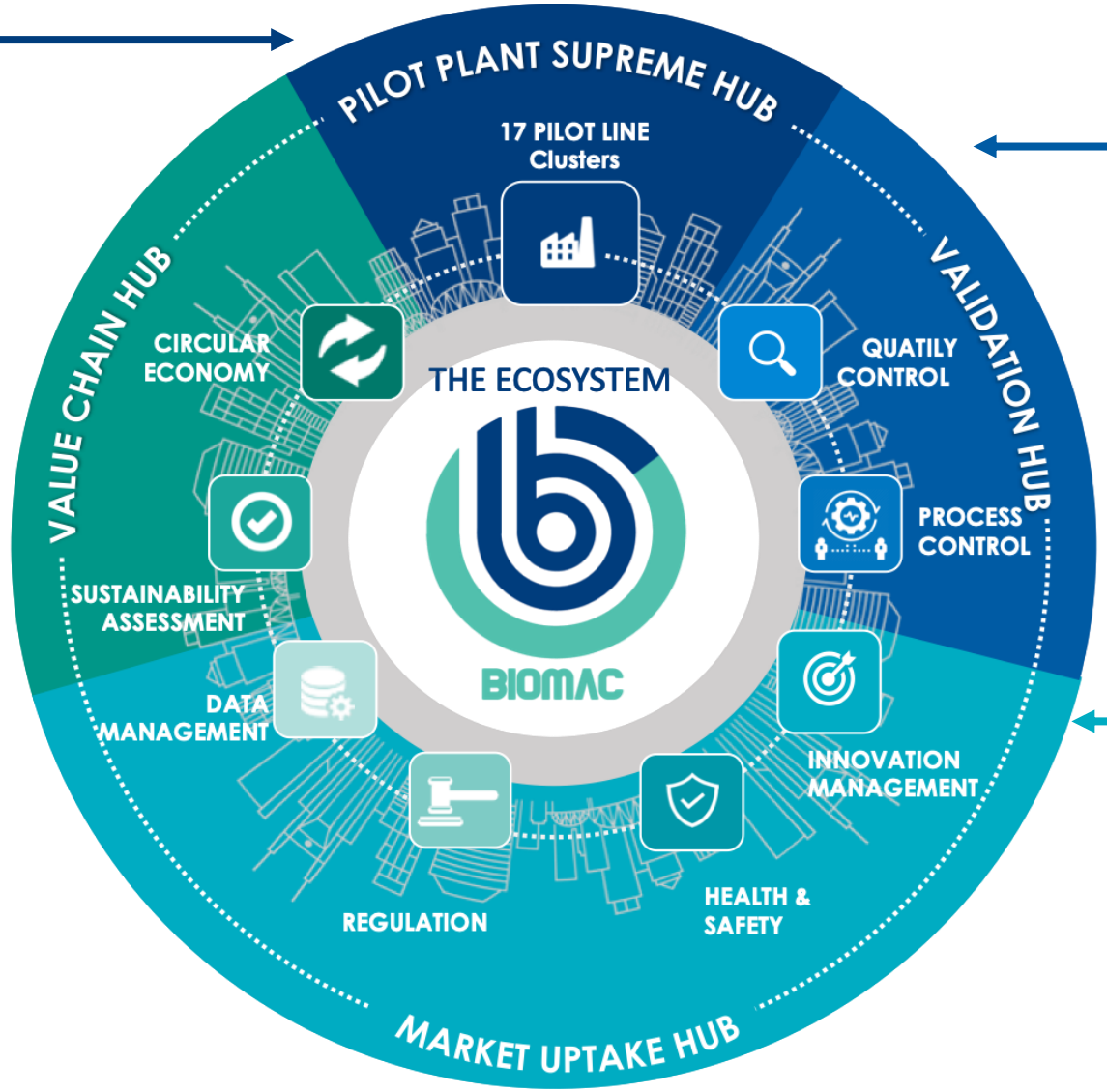


- **34 participants**. A budget close to **17 million €**.
- BIOMAC is coordinated AUTH and its management team (AUTH, STAM, UNIPD, EXELISIS, EUBIA) consists of experts in the fields of biobased polymers and additives, technology transfer projects, business management and exploitation strategies.
- The service providers of the BIOMAC Ecosystem are all highly skilled experts in the field and they are geographically distributed across Europe.
- The BIOMAC Ecosystem will provide **open access** to its facilities **(17 Pilot Lines)** and **complementary services** required for the development, testing and upscaling of materials and products in the field of nano-enabled bio-based products and materials.
- The Pilots Lines of BIOMAC cover the whole value chain, from biomass fractionation and intermediate chemicals to final Biobased Nanocomposites.

Structure of the BIOMAC OITB: 4 Hubs

a) *Biomass Fractionation and Nanocomposite Production Cluster*
b) *Intermediate Materials and Nanocomposite Production Cluster*
c) *Final Products Production and Formulation Hub*

a) *Sustainability assessment*
b) *Supply management*
c) *Circular economy*

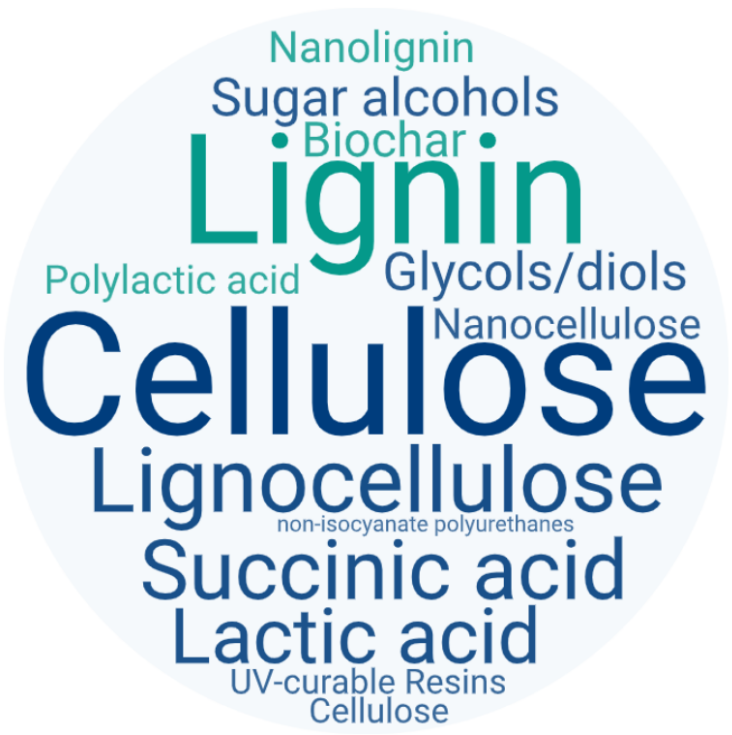


a) *Quality control, characterization*
b) *Standardization*
c) *Process validation: modelling*

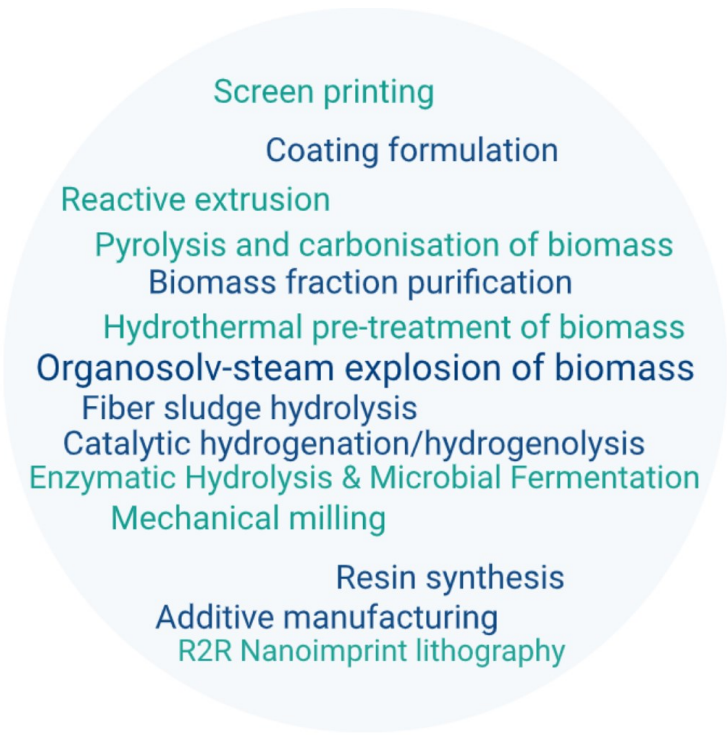
a) *Innovation management*
b) *Health and safety*
c) *Regulation*
d) *Data management*

Services

Materials



Technologies



The Open Call

- BIOMAC will offer its services **free of charge** to 5 parties (SMEs or other stakeholders), which will be chosen via the Open Call, aiming to upgrade existing or develop new concepts within the lignocellulosic value chains of nanomaterials and polymers, starting from Technical Readiness Level (TRL) 4-5.
- Proposals for test cases can be submitted **online** using the application form available on the BIOMAC Open Call platform.
- The chosen proposals will have **full access to the open innovation environment of BIOMAC**, which will advance their technology readiness level and bring them one step closer to the market.

The Open Call

The 5 selected TeCs will be implemented from September 2023 until December 2024 (maximum duration 14 months).

The estimated budget available for the TeCs is ~ 1.5 M €.

Apply on biomac-oitb.eu

19th December 2022
OPEN CALL STARTING DATE

The Open Call

Interested party

Concept

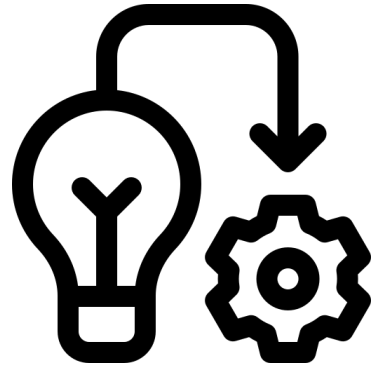
- TRL entry 4-5
- Advanced materials and/or nanomaterials
- Relevance to BIOMAC capabilities

Proposal

Selection of 5 proposals

- Excellence, implementation, impact.
- Max. 1 TeC per country

BIOMAC



Development

BIOMAC

THANK YOU!

https://www.biomac-oitb.eu/en/static/open-call

www.biomac-oitb.eu

biomac@chem.auth.gr

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European Sustainable BIO-based nanoMAterials Community

BIOMAC

Overview of the Pilot lines and their capabilities

Prof. Konstantinos Triantafyllidis (AUTH)
Giorgia Eranio (STAM)

ARISTOTLE UNIVERSITY OF THESSALONIKI

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Structure of the BIOMAC OITB: 4 Hubs

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b) *Supply management*

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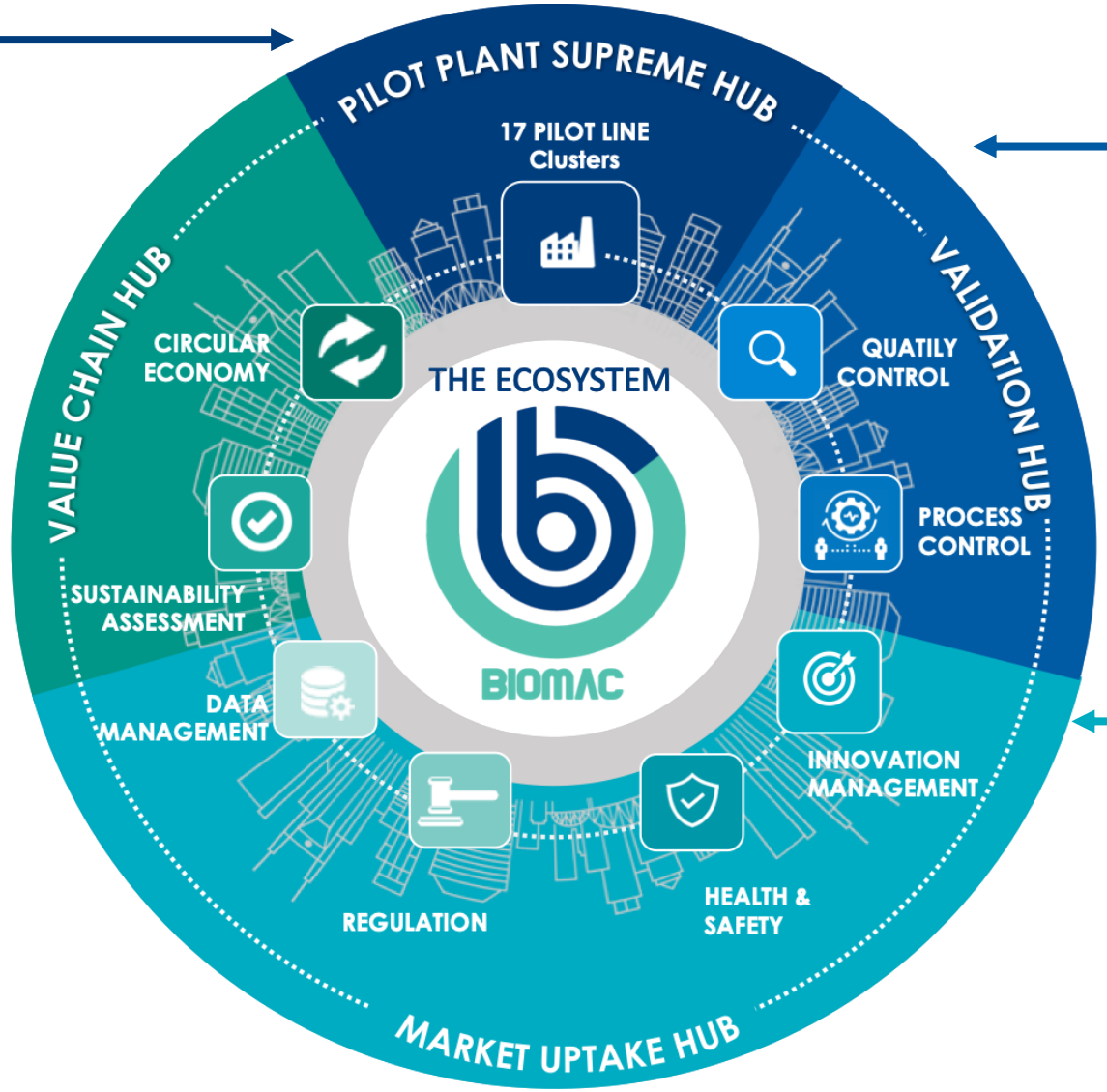


a) *Quality control, characterization*

b) *Standardization*

c) *Process validation: modelling*

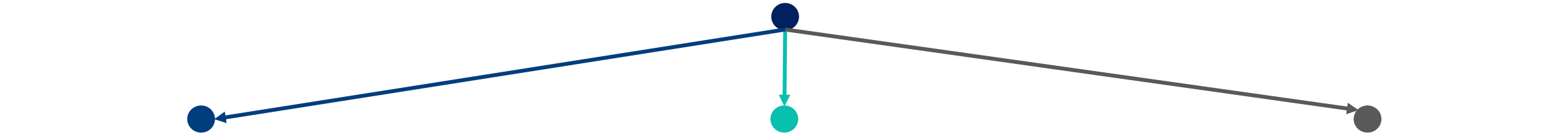
a) *Innovation management*

b) *Health and safety*

c) *Regulation*

d) *Data management*

Pilot Line Supreme Hub



Biomass Fractionation & Pre-treatment Cluster (BFPC)

LTU	BBEPP
PL1	PL5

Intermediate Materials & Nanocomposite Cluster (IMNC)

RISE	AUTH
PL2	PL3
CNANO	BBEPP
PL4	PL6
ATB	UEDIN
PL7	PL8
LIST	ITENE
PL10	PL13

Final Products & Formulation Cluster (FPFC)

LIST	AIMPLAS
PL9	PL11
FHWKI	ITENE
PL12	PL14
AIMEN	DTI
PL15	PL16
NNT	
PL17	

PL1 - Luleå Tekniska Universitet (LTU)

Objective: Continuous operation organosolv fractionation of biomass

Cluster: Biomass Fractionation and Pre-treatment

Feed: Lignocellulosic biomass (e.g. sawdust, straws, etc)

Process: Organosolv pre-treatment/fractionation

Products: Cellulose rich fibers and a liquid fraction containing hemicellulose and lignin (lignin can be separated after solvent recovery)

Related test cases: TeC1, TeC3, TeC5

PL5 - Bio Base Europe Pilot Plant (BBEPP) -

Objective: Hydrothermal pre-treatment of biomass

Cluster: Biomass Fractionation & Pre-treatment Cluster (BFPC)

Feed: Lignocellulosic biomass (e.g. straws, miscanthus, sawdust, etc.)

Process: Weak acid and hydrothermal pre-treatment or alkaline pretreatment

Products: Cellulose, lignin or hemicellulose rich fractions, also monomer sugars after enzymatic hydrolysis

Related test cases: TeC2, TeC3, TeC4

PL6 - Bio Base Europe Pilot Plant (BBEPP)

Objective: Purification (Recovery and Separation) of liquid fractions

Cluster: Intermediate Materials & Nanocomposite Cluster (IMNC)

Feed: Monomer sugar streams (glucose, xylose,...), sugar alcohols/glycols (sorbitol, EG, PG, etc.)

Equipment: Filtration equipment (MF, UF, NF, reverse osmosis), ion exchange, Solvent extraction, Crystallization to obtain monomeric fractions,...

Products: Pure compounds for hydrogenations, fermentation or polymerization (benchmark to the performance of mixed streams)

Related test cases: TeC1, TeC2

PL7 - Leibniz Institute for Agricultural Engineering and Bioeconomy (ATB)

Objective: Enzymatic hydrolysis & microbial fermentation for succinic and lactic acid

Cluster: Intermediate Materials and Nanocomposites Cluster (IMNC)

Feed: Pre-treated biomass

Process: Upstream, enzymatic hydrolysis, fermentation, purification (downstream)

Products: Lactic acid (LA) and succinic acid (SA)

Related test cases: TeC1, TeC 2, TeC 3

PL3 - Aristotle University of Thessaloniki (AUTH)

Objective: Hydrogenation of sugars (glucose, fructose) and succinic acid towards sugar alcohols/polyols, glycols, diols

Cluster: Intermediate Materials and Nanocomposites Cluster (IMNC)

Feed: Pure glucose, xylose, succinic acid – Biomass pretreatment and hydrolysate streams

Process: High pressure, batch, semi-batch, continuous hydrogenation/hydrogenolysis with tailored supported metal catalysts

Products: Sorbitol, smaller diols and glycols (glycerol, EG, 1,2-PDO) with sugars feeds; α,ω-diols (e.g. 1,4-BDO) with biomass derived di-acids as feed

Related test cases: TeC1, TeC2, TeC5

PL2 - RISE Processum (RISE)

Objective: Production of bacterial nanocellulose

Cluster: Intermediate Materials and Nanocomposites Cluster (IMNC)

Feed: Fibre sludge (side stream from pulp and paper industry)

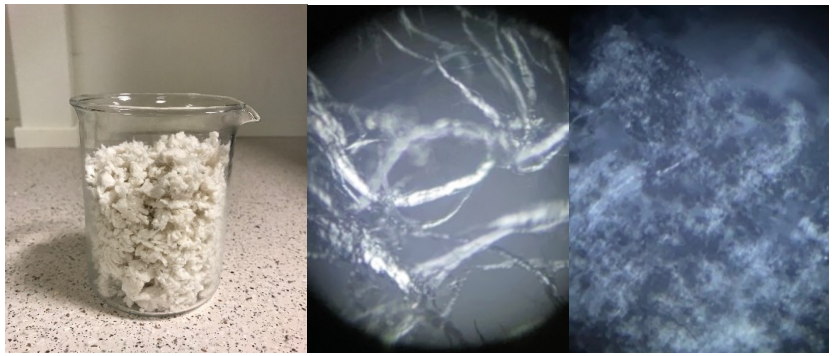
Process: Enzymatic hydrolysis and fermentation

Products: Bacterial nanocellulose

Related test cases: TeC3, TeC5







PL10 - Luxembourg Institute of Science and Technology (LIST)

Objective: Mechanical milling and Production of different grades of nanofibrillated cellulose NFCs

Cluster: Intermediate Materials & Nanocomposite Cluster (IMNC)

Feed: All cellulosic materials

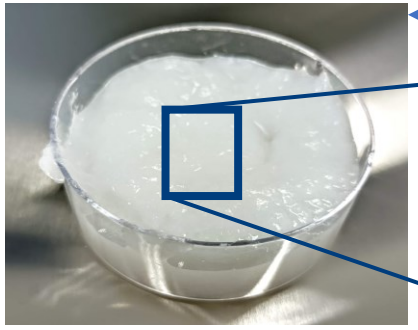
Process: Mechanical milling of water-based suspension

Products: Nanofibrillated cellulose with a narrow particle size distribution (100-300 nm)

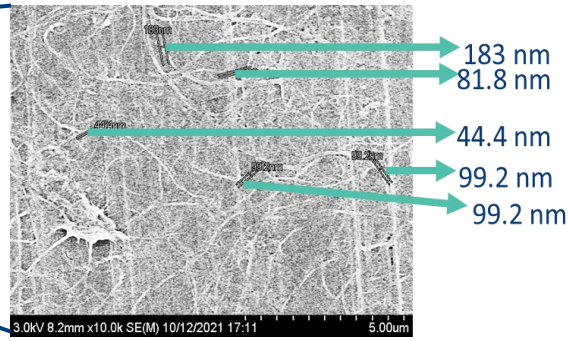
Related test cases: TeC1, TeC4

Micro-fibrillated cellulose

Pulp



Nanofibrillated cellulose



PL13 - ITENE

Objective: Production and modification of nanomaterials (nanocelluloses and nanocrystals) from lignocellulosic biomass

Cluster: Intermediate Materials and Nanocomposites Cluster (IMNC)

Feed: Cellulose-rich fractions from PL1 and PL5

Process: Continuous mechanical disintegration to produce nanocellulose and acid hydrolysis to obtain cellulose nanocrystals

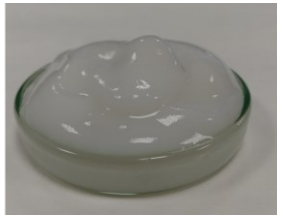
Products: Different qualities of modified nanocelluloses and cellulose nanocrystals

Related test cases: TeC2, TeC3, TeC5

Upgraded grinder for continuous disintegration

Cellulose pulp

Continuous disintegration



Mechanical

Acid reactor for acid

Cellulose nanocrystals

PL4 - Creative nano (Cnano)

- **Objective: US-assisted PL reactor for the production of lignin NPs**
- **Cluster:** Intermediate Material and Nanocomposite Cluster
- **Feed:** Lignin
- **Process:** Physical treatment of lignin using ultrasounds avoiding the need for hazardous chemicals pre- or post-treatment to produce lignin NPs water-based dispersion
- **Products:** Lignin NPs dispersion. Freeze drying of dispersion to acquire lignin NPs in dry powder form
- **Related test cases:** TeC2, TeC3

PL8 – University of Edinburgh (Uedin)

Objective: Pyrolysis and biochar production

Cluster: Intermediate Materials and Nanocomposites Cluster (IMNC)

Feed: Lignin, biomass, organic residues

Process: Pyrolysis process at temperatures up to 800°C

Products: Biochar, activated/modified biochar, can be used for a range of applications in areas such as agriculture, construction, textiles, sensors, materials and environmental management, pyrolysis liquids

Related test cases: TeC2, TeC4, TeC5

PL9 - Luxembourg Institute of Science and Technology (LIST)

Objective: Continuous Reactive Extrusion of Non-isocyanate polyurethane (NIPU)

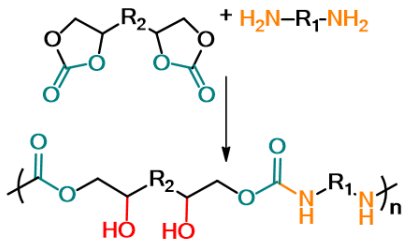
Cluster: Final Products & Formulation Cluster (FPFC)

Feed: All monomers and macro-monomers used for the typical synthesis of NIPU; nanocellulose, nanolignin, biochar

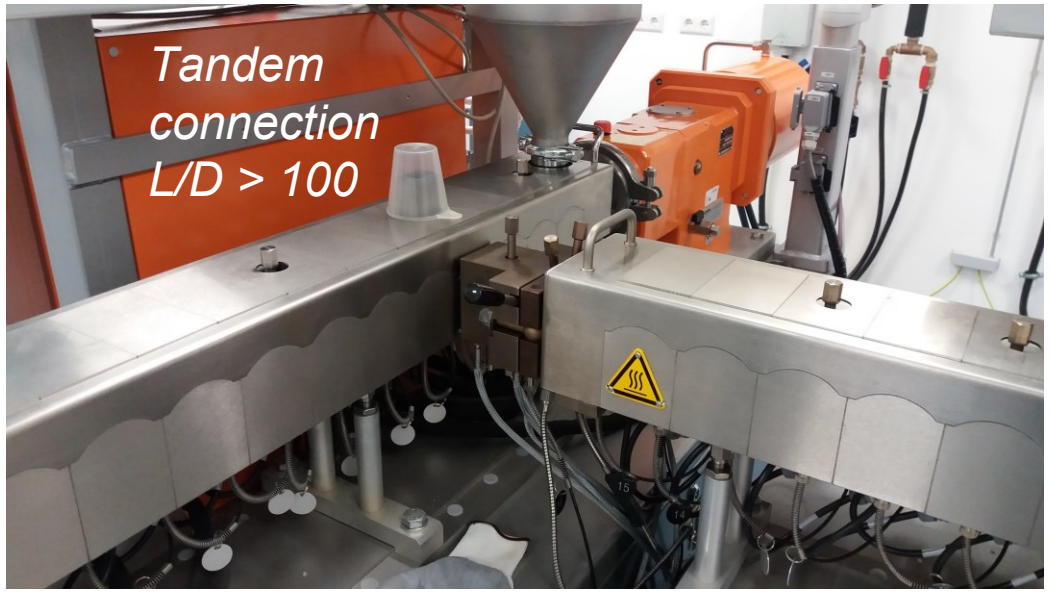
Process: Reactive extrusion with online monitoring by near-infrared (NIR)

Products: Granules of pure thermoplastics

Related test cases: TeC4, TeC5

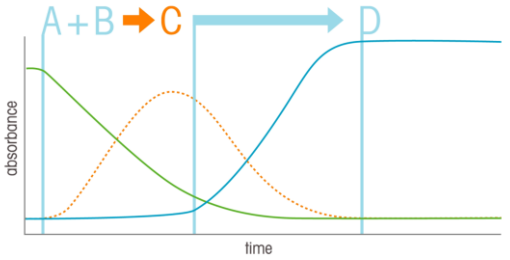


An example of NIPU



Reactive 18 mm twin-screw extrusion.
Tandem set-up for longer residence times

NIR probe
λ : 300 - 2400 nm



Online NIR characterization

PL11 - AIMPLAS

Objective: Reactive extrusion (REX) of PLA, copolymers & nanocomposites

Cluster: Final Products & Formulation Cluster (FPFC).

Feed: Lactic acid (LA), lactide, bacterial nanocellulose (BCN), nanofibrillated cellulose (NFC), nanolignin (NL), biochar.

Process: Reactive extrusion with inline monitoring by NIR, “in-situ polymerisation”, compounding.

Products: Granules of PLA and PLA copolymer & nanocomposites.

Related test cases: TeC2, TeC3.

PL12 - Fraunhofer WKI (FH-WKI)

Objective: Synthesis binder resins for coatings and 3D-printing material

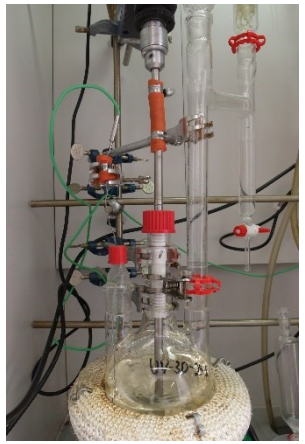
Cluster: Final Products & Formulation Cluster (FPFC)

Feed: Monomers (Diols, Diacids)

Process: Polycondensation, Polyaddition

Products: Polyester resins, Polyurethane-Dispersion, UV-curing resin

Related test cases: TeC1, TeC 5



PL14 - ITENE

Objective: Formulation of biobased coatings, using the biomaterials developed in other pilot plants

Cluster: Final Products Production & Formulation Cluster (FPFC)

Feed: Nanocellulose from PL13 and other nanomaterial from other PLs

Process: Different dispersion, mixing and agitation processes at different scales for coating formulation

Products: Production of barrier coatings for applications in food packaging and protection for electronic printing.

Related test cases: TeC3, TeC5

General view PL14

Example of barrier coating formulation (TeC3)

Example of barrier coating application (TeC5)

PL15 - AIMEN

Objective: Additive Manufacturing - 3D printing technologies for bio-based polymers and nanomaterials reinforced composites

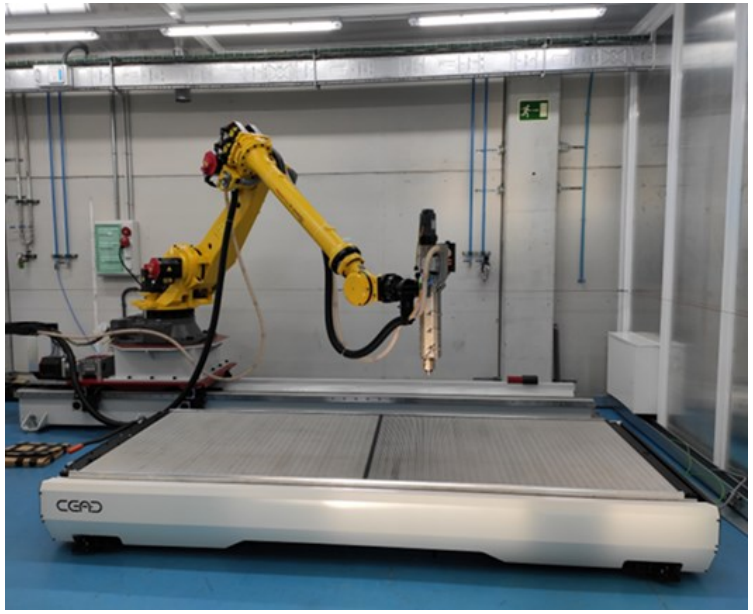
Cluster: Final Product Production and & Formulation Cluster

Feed: All nanomaterials and bio-based polymers produced in BIOMAC: Polylactic acid, thermoplastic polyurethanes, polyesters, PU/UV-curable Resins, nanocellulose, nanofibrillated cellulose, nanolignin, bacterial nanocellulose, biochar

Process: Large Format Additive Manufacturing (fused filament and pellets fabrication) and Photopolymerization

Products: Polymers and nano-reinforced polymers pellets and filaments and 3D printing manufactured products

Related test cases: TeC1, TeC4



PL16 - Danish Technological Institute (DTI)

Objective: Development & production of flexible, printed electronics using bio-based materials, including eTextiles

Cluster: Final Products Production & Formulation Cluster (FPFC)

Process: formulation testing, industry scale screen printer and heat press equipment

Products: Printable materials and electronic components embedded onto textiles

Related test cases: TeC 5

PL17 – Nanotypos (NNT)

Objective: Production of large area micro/nano structured surfaces - R2R Nanopatterning and thermoforming

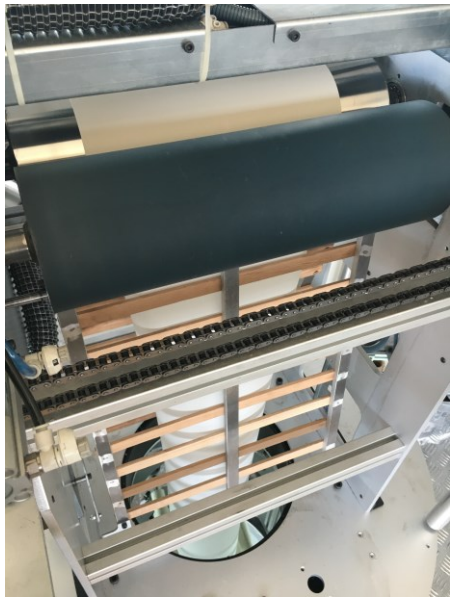
Cluster: Final Products Production & Formulation Cluster (FPFC)

Feed: Bio-polymers produced in BIOMAC (exp. PLA)

Process: Blow film extrusion combined with roll to toll nanoimprint lithography and thermoforming

Products: Micro/nano structured polymer films/sheets with antibacterial properties

Related test cases: TeC4



Optimization Plan of the pilot lines

Increase production capacity per hour and production parameters
PL1, PL3, PL4, PL 5, PL11, PL12, PL13, PL15

Increase sample dimensions
PL4, PL14, PL17

Semi- continuous to continuous operation mode
PL1, PL2, PL13

Improve environmental performance
PL8

Optimization of production parameters
PL3, PL6, PL7, PL9, PL10, PL16

Increase feedstock flexibility and materials to be processed
PL3, PL8, PL15

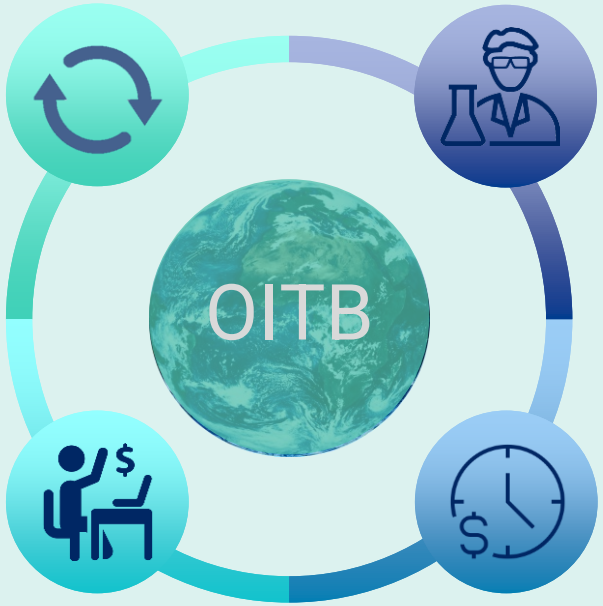
Optimization Plan of the pilot lines

PL1 LTU

Semi-continuous set-up is upgraded to a fully continuous organosolv system by adding a continuous biomass feeder with a capacity of size with a capacity of up to 0.7 liters of biomass per minute.

PL3 AUTH

The new configuration offers the flexibility to simultaneously operate the two main processes/steps, hydrogenation or hydrogenolysis.
The flexibility to simultaneously process different feeds, i.e. either sugars or acids or polyols, is achieved



PL2 RISE

Previous hydrolysis reactor (50L) has been upgraded to ~600L reactor.
Strain development to decrease by-product formation is carried out.
Continuous mode operation is achieved.

PL4 CNANO

Upscale of US reactor at a power of 1500W and frequency 20 kHz. The PL can be operated with two different configurations, batch, and flow processing 4 L/min, increasing production and sample dimensions

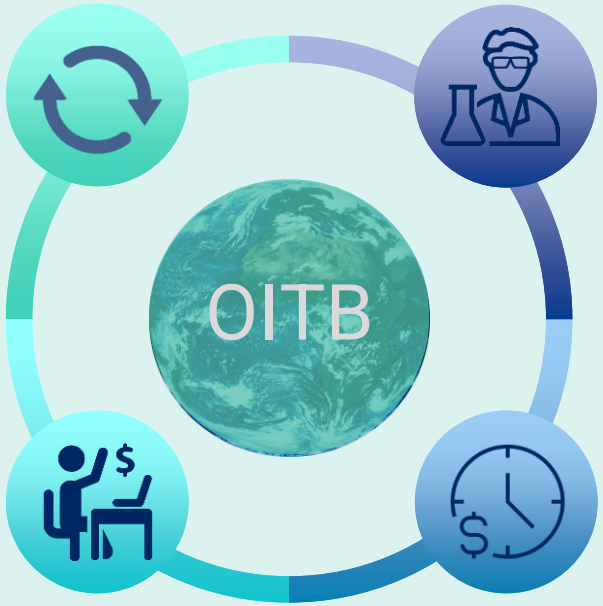
Optimization Plan of the pilot lines

PL5 BBEPPP

Implementation of grinding and milling steps before pre-treatment to improve biomass fractionation capabilities.

PL7 ATB

SA Production & LA Production: Process optimized for standard ingredients as control fort he whole system;
Hydrolysis optimization: specific enzyme, concentration, solid loading, pH, T.



PL6 BBEPPP

Tools for simulations and mathematical optimization are applied for the optimization of the processes to ensure the purity and recovery of the biomass fractions and materials optimization.

PL8 UEdin

Improved combustion performance
Online monitoring of gaseous emissions to the environment and Tuneable emissions management system.

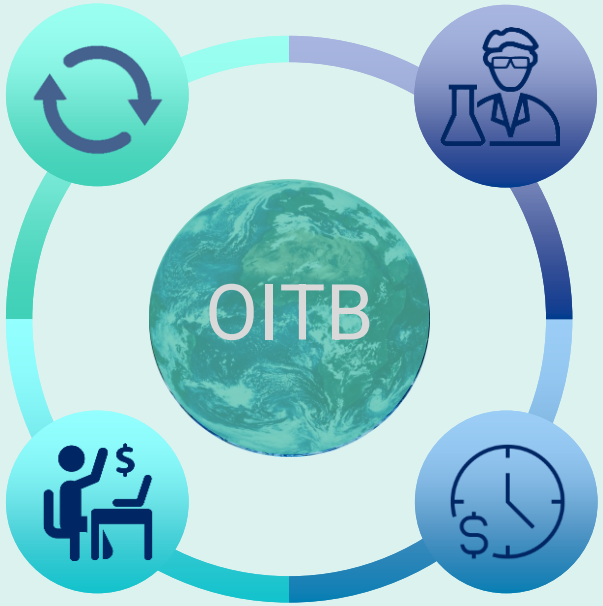
Optimization Plan of the pilot lines

PL9 LIST

On-line monitoring via Near InfraRed sensor installed on the REx extruders to achieve the Optimization of NIPU formation.

PL11 AIMPLAS

Increase the production capacity from 250g to 10kg of processed lactic acid to yield 2-3kg of purified L-lactide for REx, through the NIR inline reaction monitoring.



PL10 LIST

Mechanical milling of NFC, through the set-up and operation of mechanical mill, resulting in optimized production cycle and product.

PL12 FH-WKI

Installation of 30l reactor, allowing to increase the polymerisation capacity from just under 4 kg to 25 kg for a single reaction.

Optimization Plan of the pilot lines

PL13 ITE

Production NFC by continuous mechanical disintegration. An automatic feeding system for continuous production has been designed and installed and an increased production achieved, 2 Kg/day (dry MFC or NFC).

PL15 AIMEN

Monitoring systems are being applied to ensure the quality of large-size printed parts (FFF, SPP&MPP). A thermal camera is being tested to monitor the thermal distribution over the manufactured parts.

PL14 ITE

Batch size has been increased to 20 litres by the acquisition of a new dispersing system to produce nano coatings with BNC.

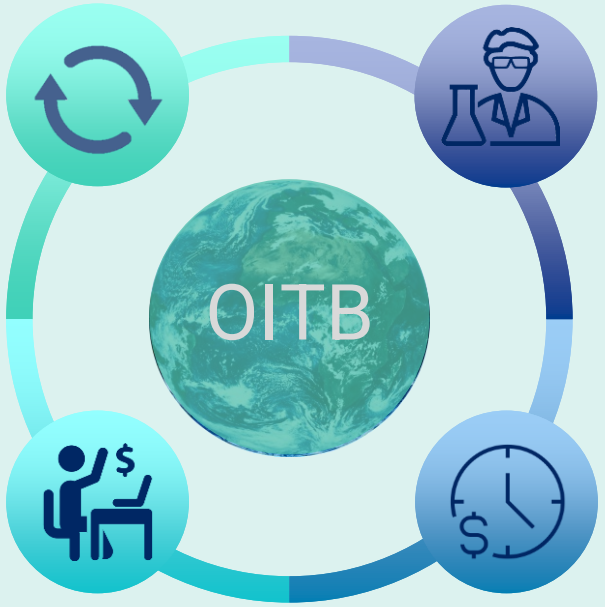
PL16 DTI

Automatic, faster, controlled, wash-tested production of printed wearable electronics.

Optimization Plan of the pilot lines

PL17 NNT

Upgrade to accommodate 300mm wide web PLA films while inspection tools for quality control are encompassed.
R2R micro-nano structured foils are converted to sheets with the desired sizes/formats and processed to a post thermoforming step.



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Exploring the OITB transversal service hubs

Prof. Eleonora Di Maria

800 1222·2022 ANNI
Università degli Studi di Padova
dSEA

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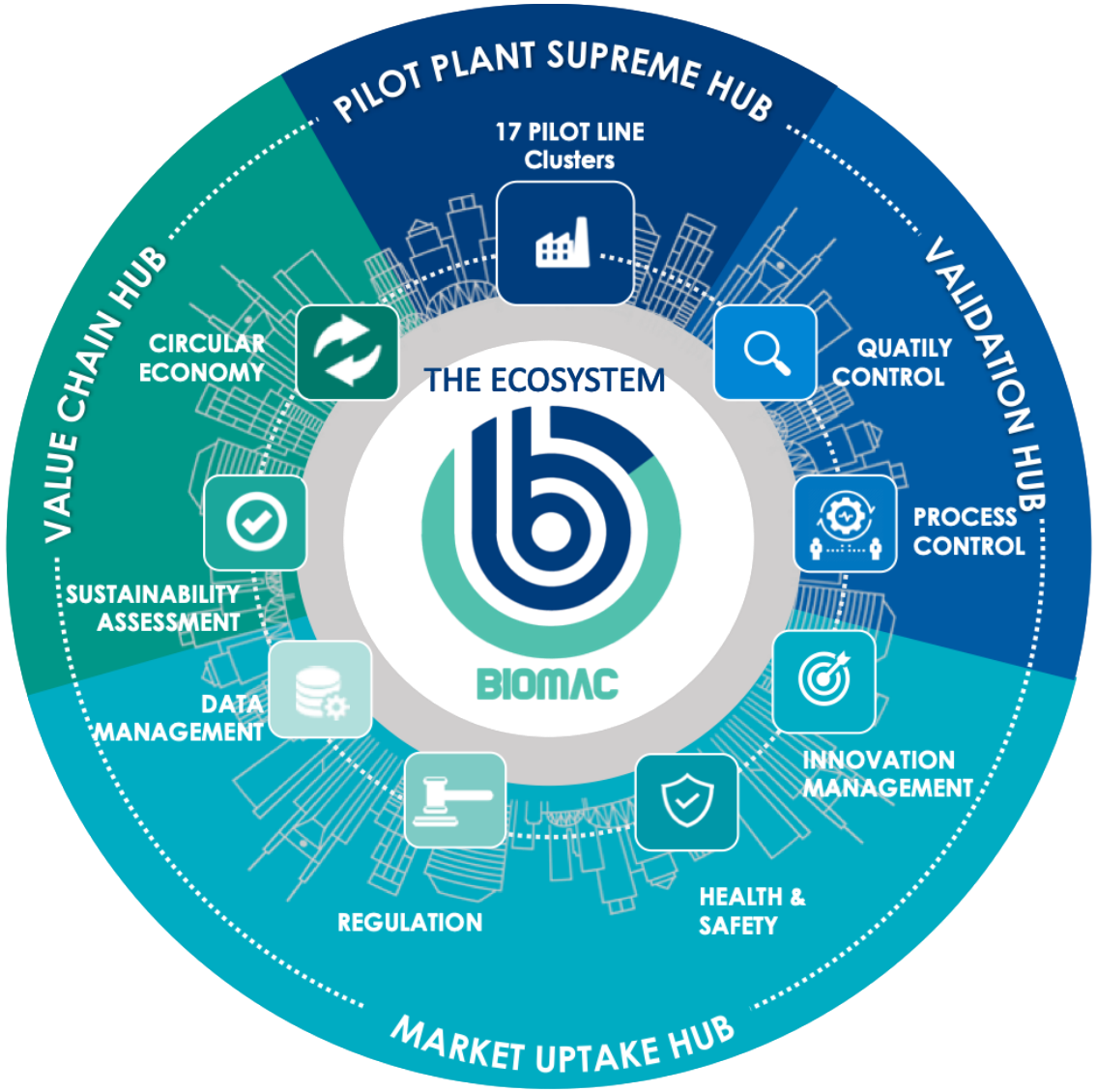
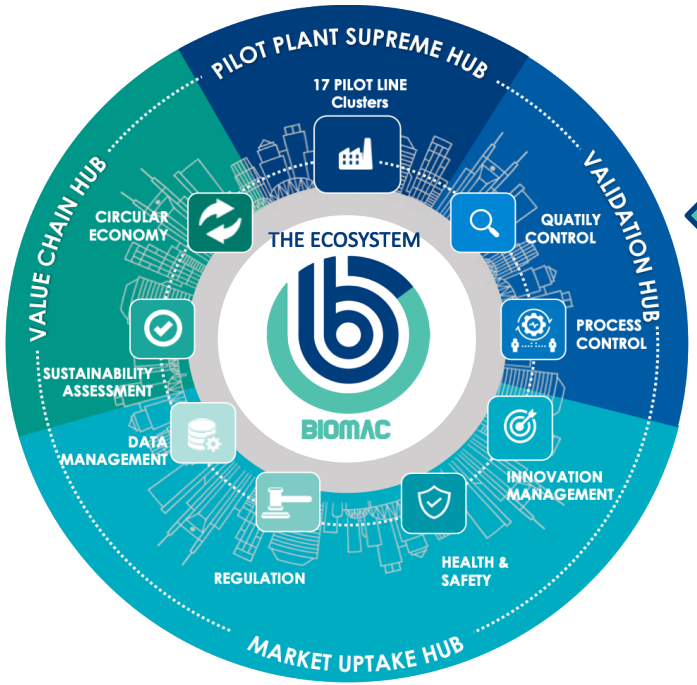
BIOMAC Transversal Services – Overview



Validation Hub



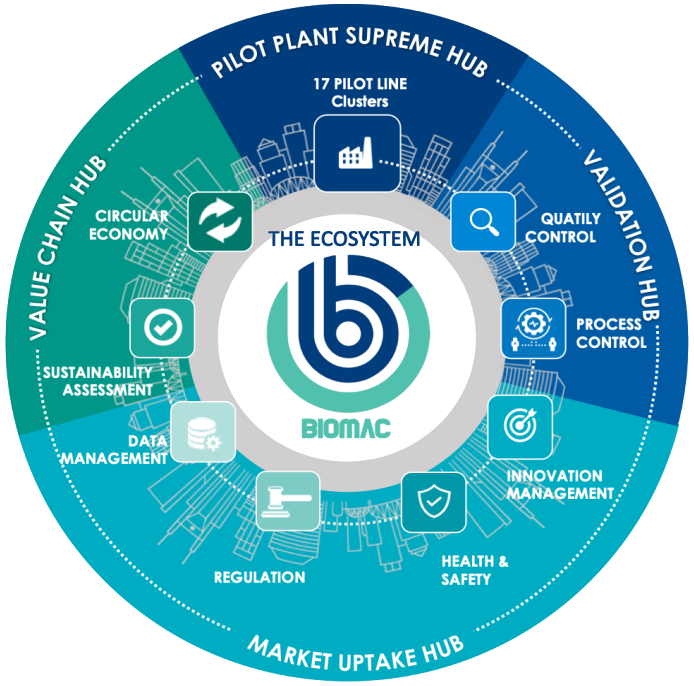
AIM: examining the feedstock, the technologies and the products from a chemical, environmental, and economical perspective

1. ***Quality Control & Characterization***: responsible for characterization of materials and products through suitable characterization techniques in order to ensure the achievement of the desired properties.
2. ***Standardization***: Understanding, monitoring and contributing to the activities of relevant standardization levels
3. ***Process Validation – Modelling***: development of sensor-based setups that monitor and evaluate the state of the system and development of mathematical models of the system to provide a feasible prediction of process performance in a range of conditions

Value Chain Hub

AIM: providing services around the environmental monitoring, resource efficiency, logistics and cost analysis

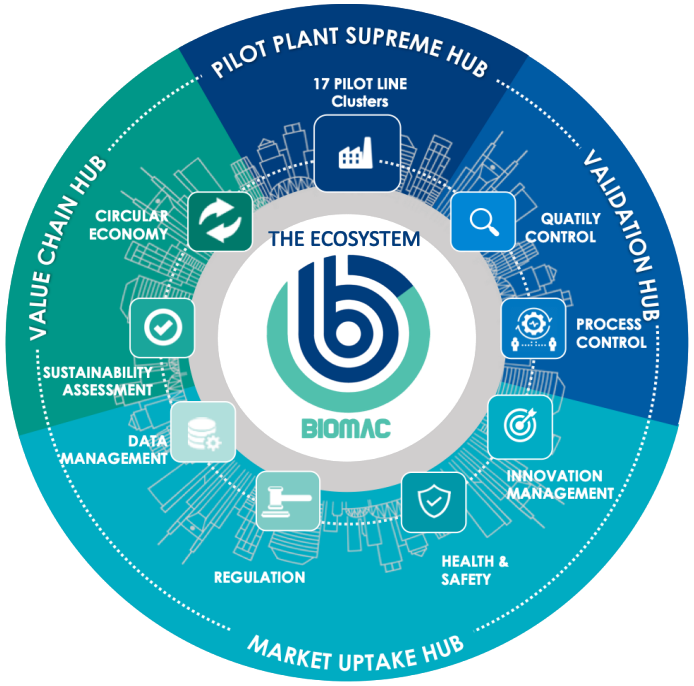
1. ***Sustainability Assessment***
   - *Life Cycle Assessment (LCA)*: estimating the environmental impacts of a product throughout its life cycle
   - *Life Cycle Costing (LCC)*: identifying the economic hotspots during the life cycle to determine actions to the product economically feasible.
2. ***Supply management***
   - *Decision Support Tool*: an optimization model that performs a holistic value chain analysis with the goal to minimize and/or maximize a value of interest
   - *Decision Support Online Platform*: an online assessment tool includes which gives the possibility of non-optimization experts to run on their own the different studies



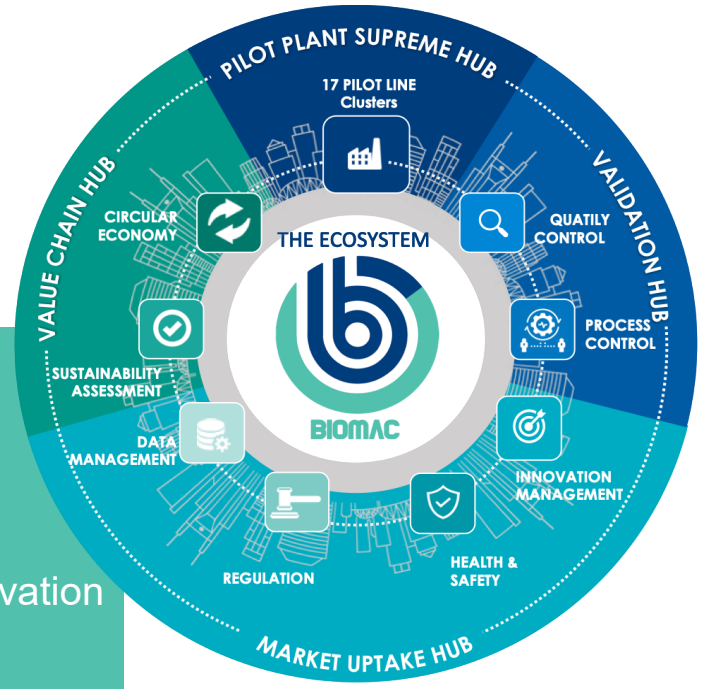
Value Chain Hub (cont.)

AIM: providing services around the environmental monitoring, resource efficiency, logistics and cost analysis

3. ***Circular Economy:*** definition of sustainable recycling and end-of-life (EoL) management strategies
   - *Evaluation of reference EoL management strategies for target biobased (nano)material wastes within a European framework*
   - *Evaluation of current practices for EoL management of target biobased (nano)materials in reference to benchmark BIOMAC practices.*
   - *Definition of end-of-life management guidelines to be provided to OITB users*



Market Uptake Hub

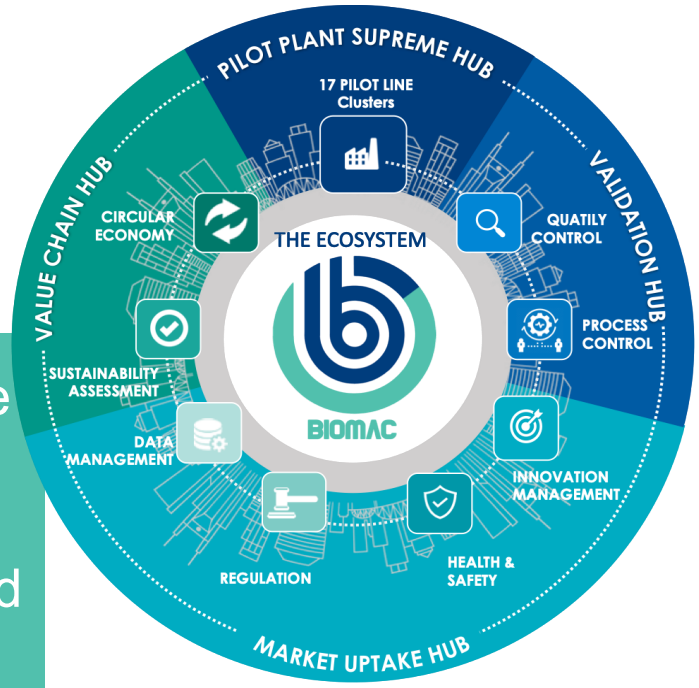


AIM: supporting business, regulatory compliance, and data handling issues.

1. *Innovation Management Services*

   - *Business plan environment:* development of business plans to assess the innovation potential of the test case involved in the project.
   - *Exploitation risk assessment:* Analysis of all potential exploitation risks associated with the clients' projects
   - *Intellectual Property Rights management and patent mapping analysis:* market discovery analysis with descriptive analytics of patents, focusing on different technological classes and assignees, in different years and countries, operating, and identifying key players.
   - *Investment need assessment:* Evaluating the financial sustainability of the clients, client's investment need, identification of appropriate funding instruments to cover those investment

Market Uptake Hub (cont.)



2. *Standardization and Regulation*: Assessment of existing rules in the field of nano-enabled biomaterials to ensure partnering in the commercialization phase of a technology, securing compatibility, and reducing market uncertainties.
3. *Health and Safety:* Reduction of potential health and safety risks via a Safe-by-Design approach across the value chains and identification and management of uncertainties and potential risks
4. *Data management:* Data governance, Analysis and Design, Database Management, Security, and quality assurance.

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The BIOMAC Test Cases: How to make use of the BIOMAC services

Professor Daniel F. Schmidt

LUXEMBOURG INSTITUTE OF SCIENCE AND TECHNOLOGY | LIST

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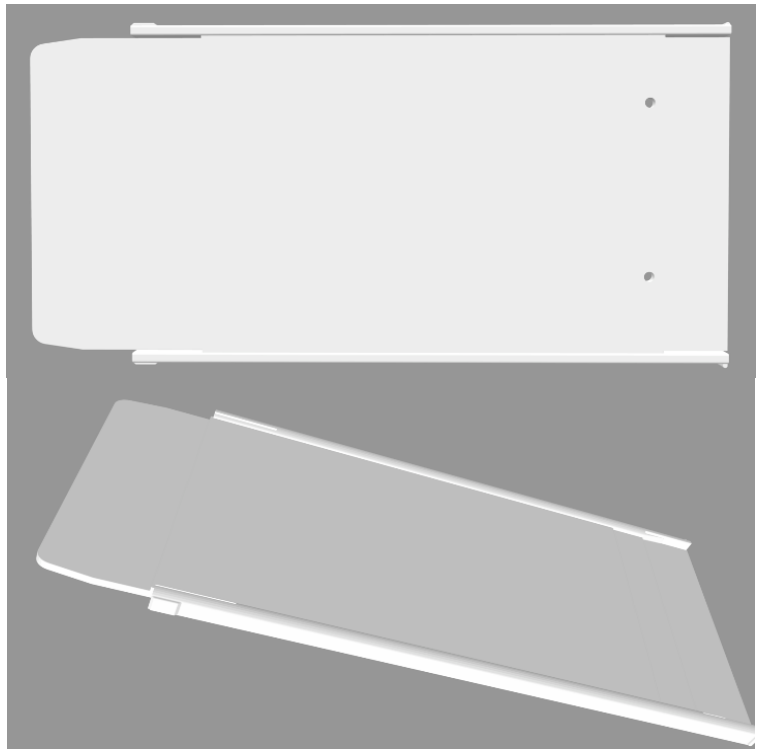
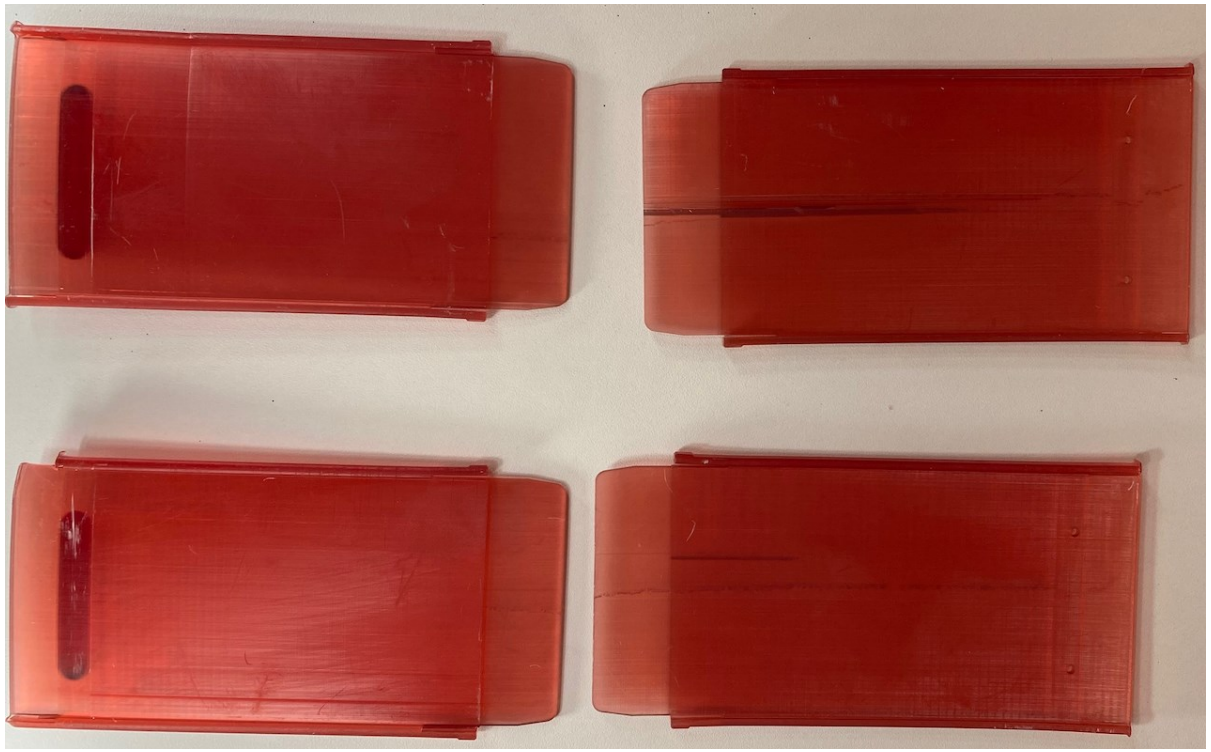
Test Cases

Partner	Role	PL (Partner, Country)	TeC1: Automotive (DIAD)	TeC2: Agricultural applications (NOVAM)	TeC3: Food packaging (EVERSIA)	TeC4: Construction (ACCIONA)	TeC5: PE (PRECURE)
LTU	Biomass organosolv-steam explostion pretreatment	PL1 (LTU, SE)	X		X		X
RISE	Hydrolysis of fibre sludge and BNC production	PL2 (PRO, SE)			X		X
AUTH	Hydrogenation/hydrogenolysis, of sugars towards polyols	PL3 (AUTH, GR)	X	X			X
CNano	US assisted reactor for NL	PL4 (Cnano, GR)		X	X		
BBEPP	Pre-treatment of biomass	PL5 (BBEPP, BE)		X	X	X	
BBEPP	Recovery / Seperation PL	PL6: (BBEPP, BE)	X	X			
ATB	Enzymatic Hydrolysis & Fermentation for SA and LA	PL7 (ATB, DE)	X	X	X		
Uedin	Pyrolysis of Lignin (Biochar)	PL8 (UEdin, UK)		X		X	X
LIST	Reactive Extrusion for TPU	PL9 (LIST, LU)				X	X
LIST	Cellulose mechanical treatment	PL10 (LIST, LU)	X			X	
AIMP	Reactive extrusion for PLA	PL11 (AIMPLAS, ES)		X	X		
FH-WKI	Polymer resins polyester and PU resins	PL12 (FH-WKI, DE)	X				X
ITENE	Cellulose mechanical treatment	PL13 (ITENE, ES)		X	X		X
ITENE	Nanocellulose based coatings	PL14 (ITENE, ES)			X		X
AIMEN	Additive Manufacruting	PL15 (AIMEN, ES)	X			X	
DTI	Bio based Printed electronics	PL16 (DTI, DK)					X
NNT	R2R NIL Thermoforming	PL17 (NNT, GR)			X		

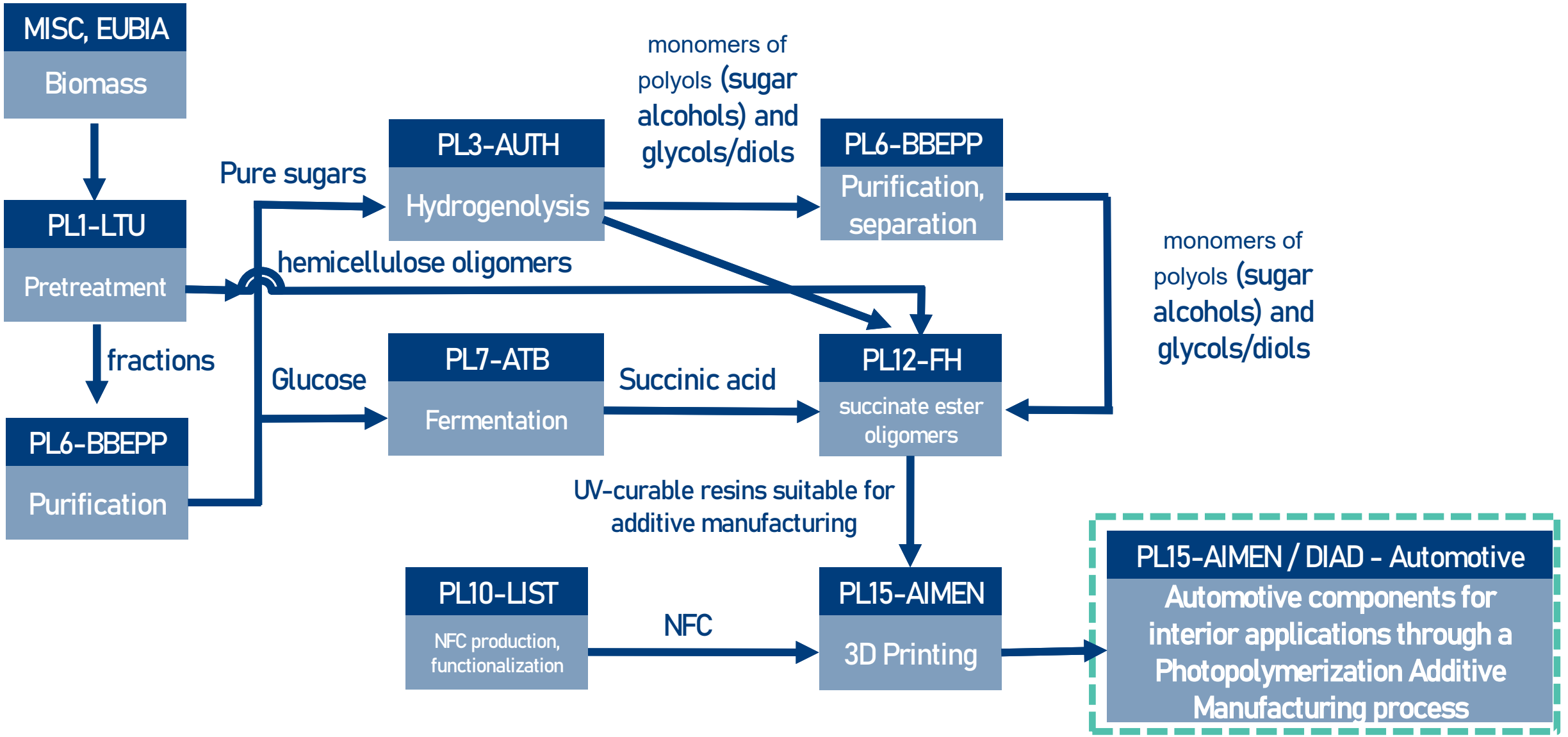
WP3: TeC1 – Automotive

TARGET: Tough, flexible, abrasion-resistant biomass-based UV-curable polyesterurethane (LA, SA-derived) / NFC (reactive, 3-5 wt%) nanocomposites suitable for additive manufacturing



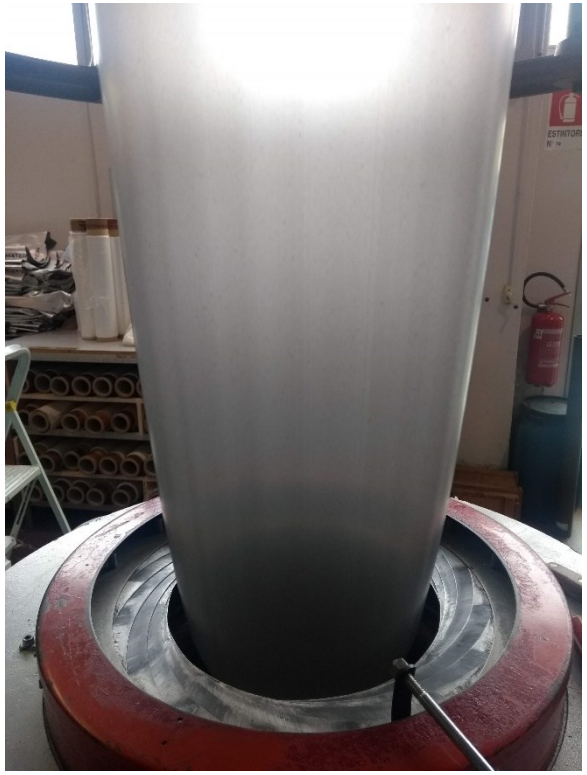


TeC1 process flow scheme

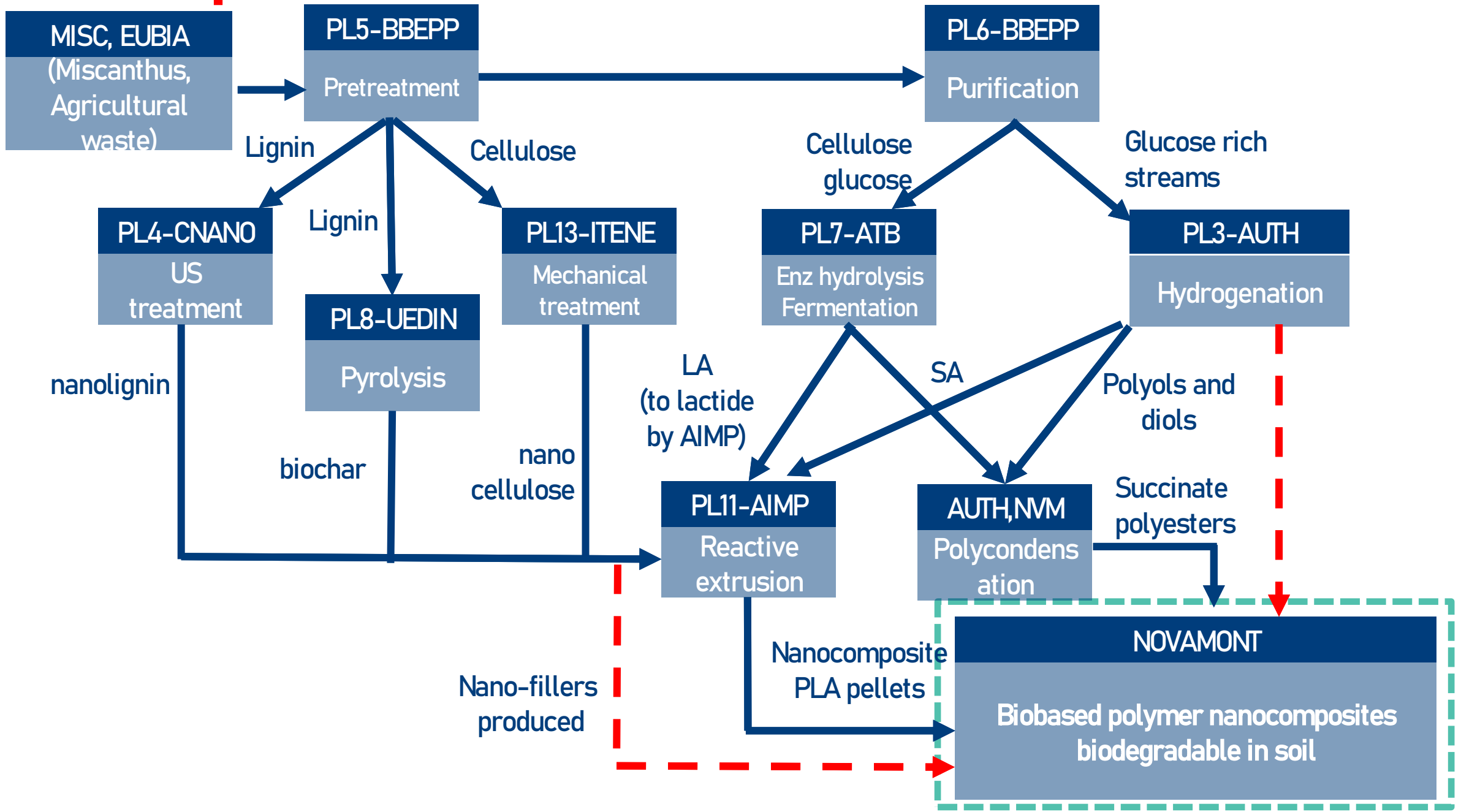


WP3: TeC2 – Agricultural

TARGET: Biodegradable bioplastics based on biopolymer (LA, SA-derived) nanocomposites with NFC, NL (1-3%) and biochar



TeC2 process flow scheme

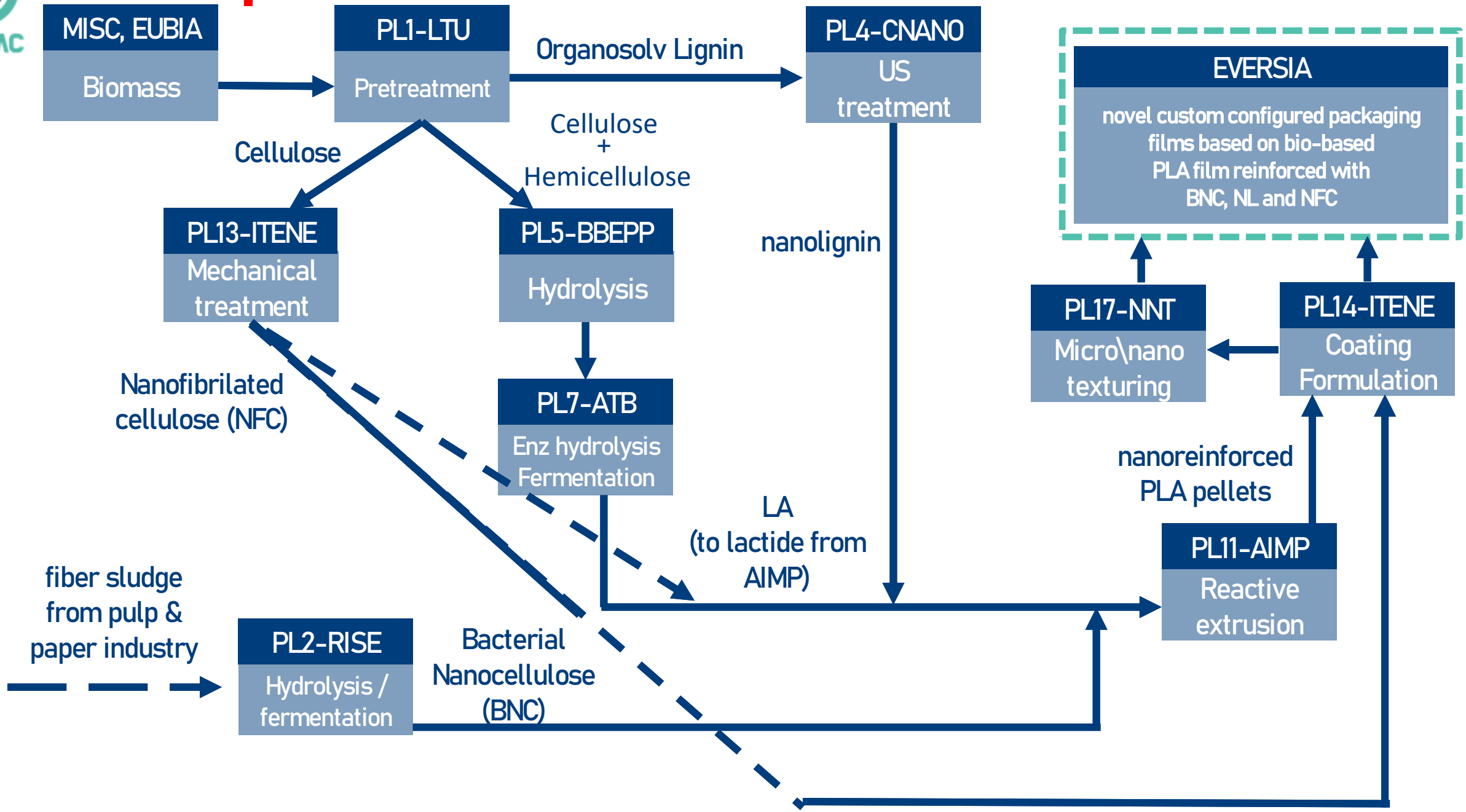


WP3: TeC3 - Food Packaging

TARGET: Transparent compostable / biodegradable PLA film

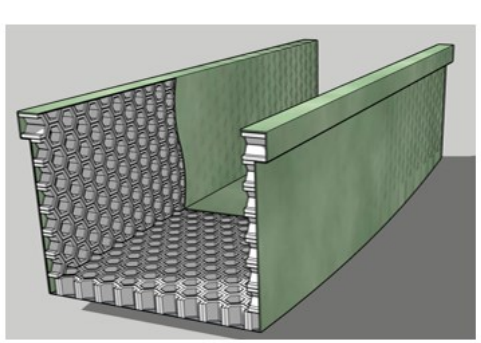
- Bacterial nanocellulose (BNC) should provide high oxygen barrier, sealing strength, tear resistance, stiffness and surface gloss while maintaining transparency, compostability and biodegradability.
- Nanolignin (NL) should increase storage stability while maintaining compostability and biodegradability.
- Nanoimprint lithography (NIL) should provide self-cleaning, antibacterial / bacteria repelling surface.

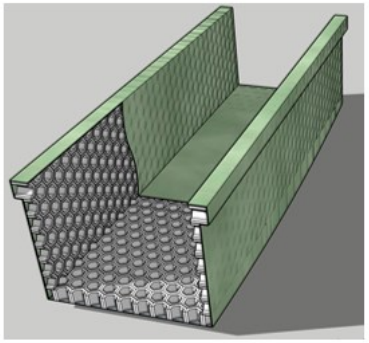
TeC3 process flow scheme

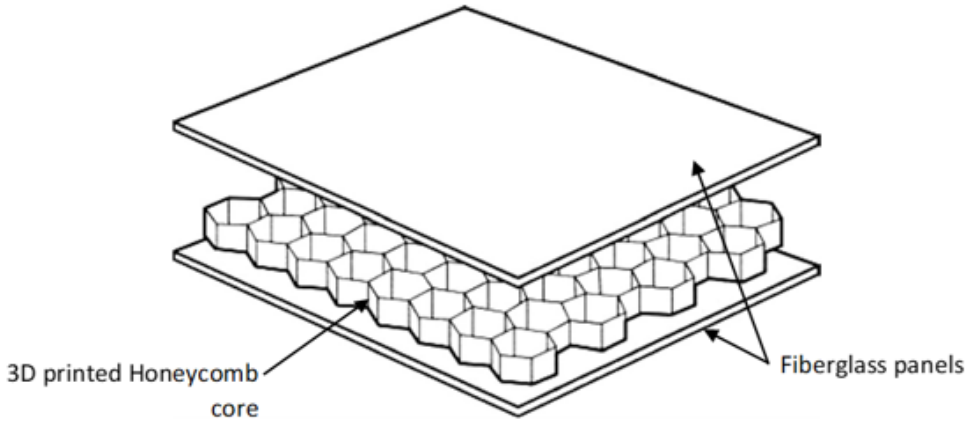


WP3: TeC4 - Construction

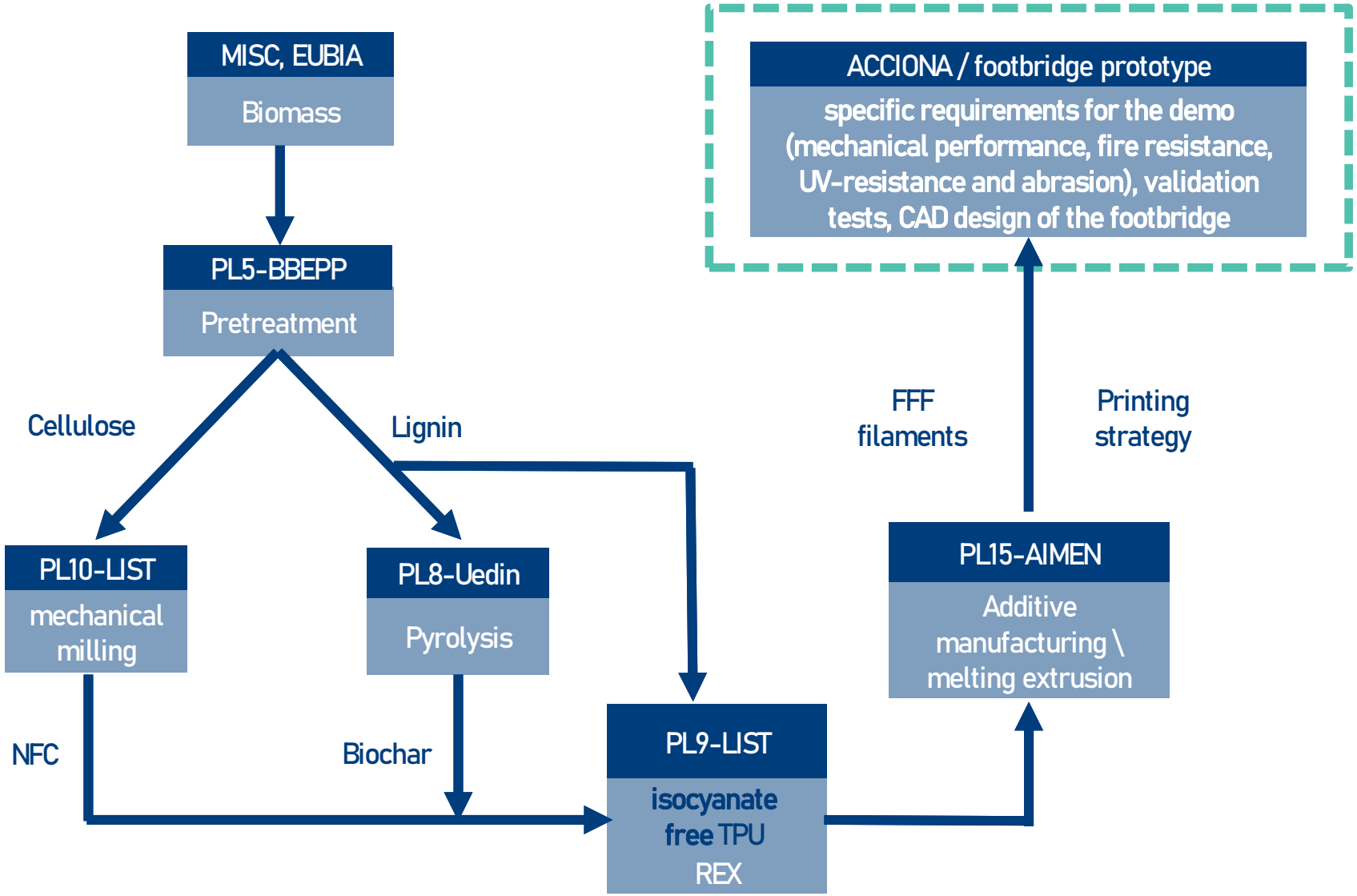
TARGET: Biomass-based UV and fire-resistant, anti-fouling / easy-to-clean footbridge module defined for production via multi-material AM







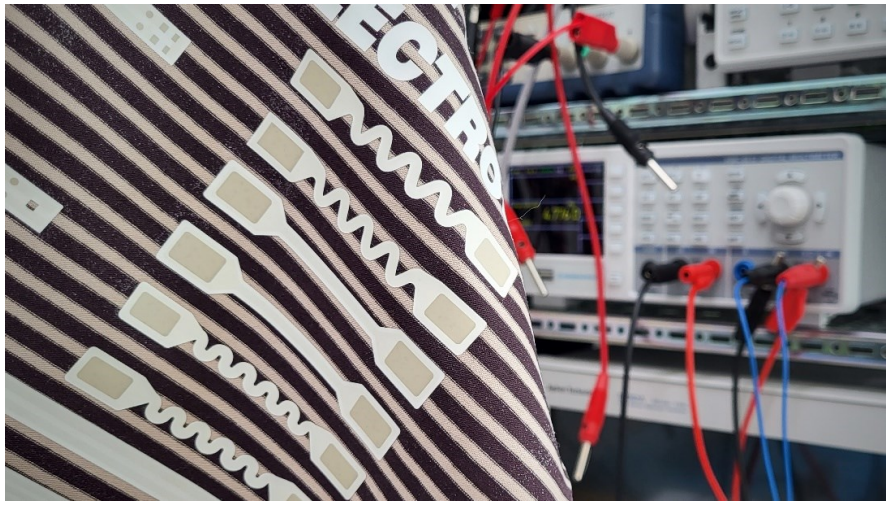
TeC4 process flow scheme



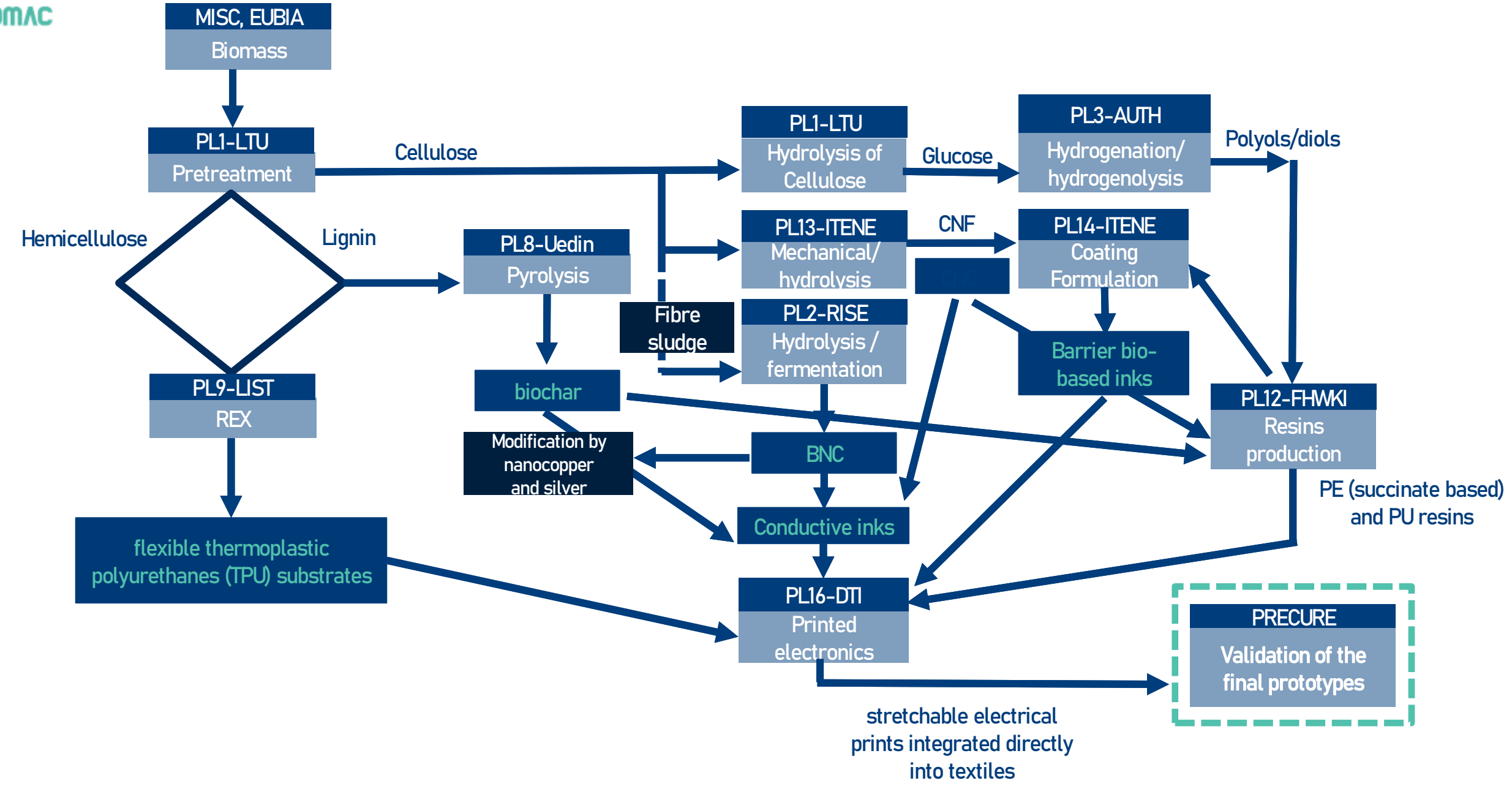
WP3: TeC5 – Flexible Electronics

TARGETS:

- Bio-based (conductive) inks reinforced by functionalized cellulose nanocrystals (CNC), bacterial nanocellulose (BNC), and (as needed) conductive biochar particles
- Flexible thermoplastic polyurethane (TPU) substrates produced via reactive extrusion (REX), similar basis to those prepared for TeC4 – Construction



TeC5 process flow scheme



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How to apply to the Open Call

Annika Frank, IBB Netzwerk GmbH

No. 952941

Important dates

15th of December, 2022: launch of the Open Call

30th of April, 2023: First cut-off date

Submission for preliminary evaluation by May 15th, Resubmission until the final cut-off

15th of June 2023: Final cut-off date

Last day for submission of new proposals or corrections

15th August, 2023: Notification of applicants

1st of September, 2023 – 31st of December, 2024: Project implementation *

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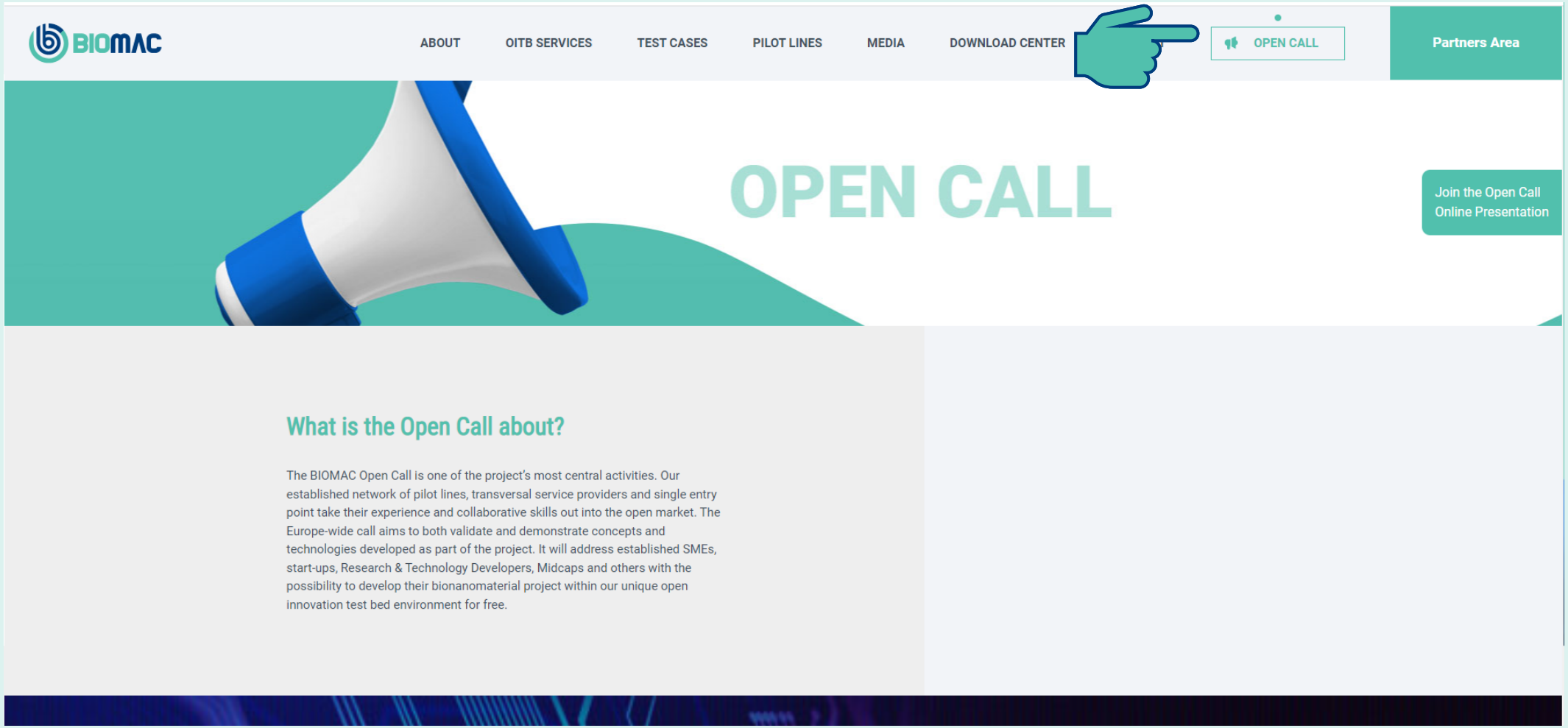
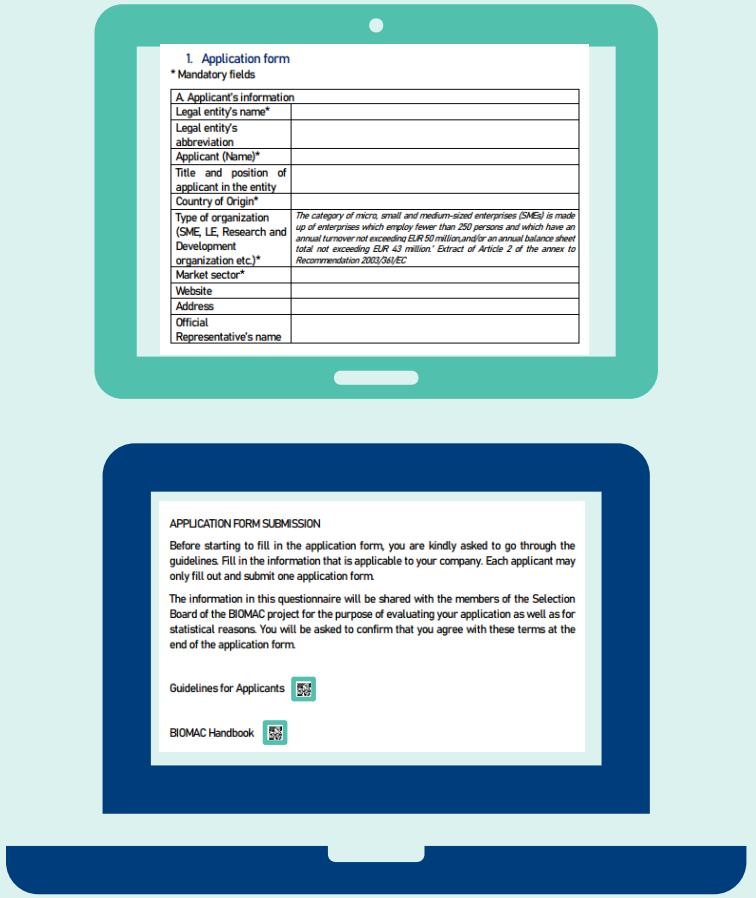
Accessing the BIOMAC Open Call



Accessing the BIOMAC Open Call

Please provide us with general information on your proposed project



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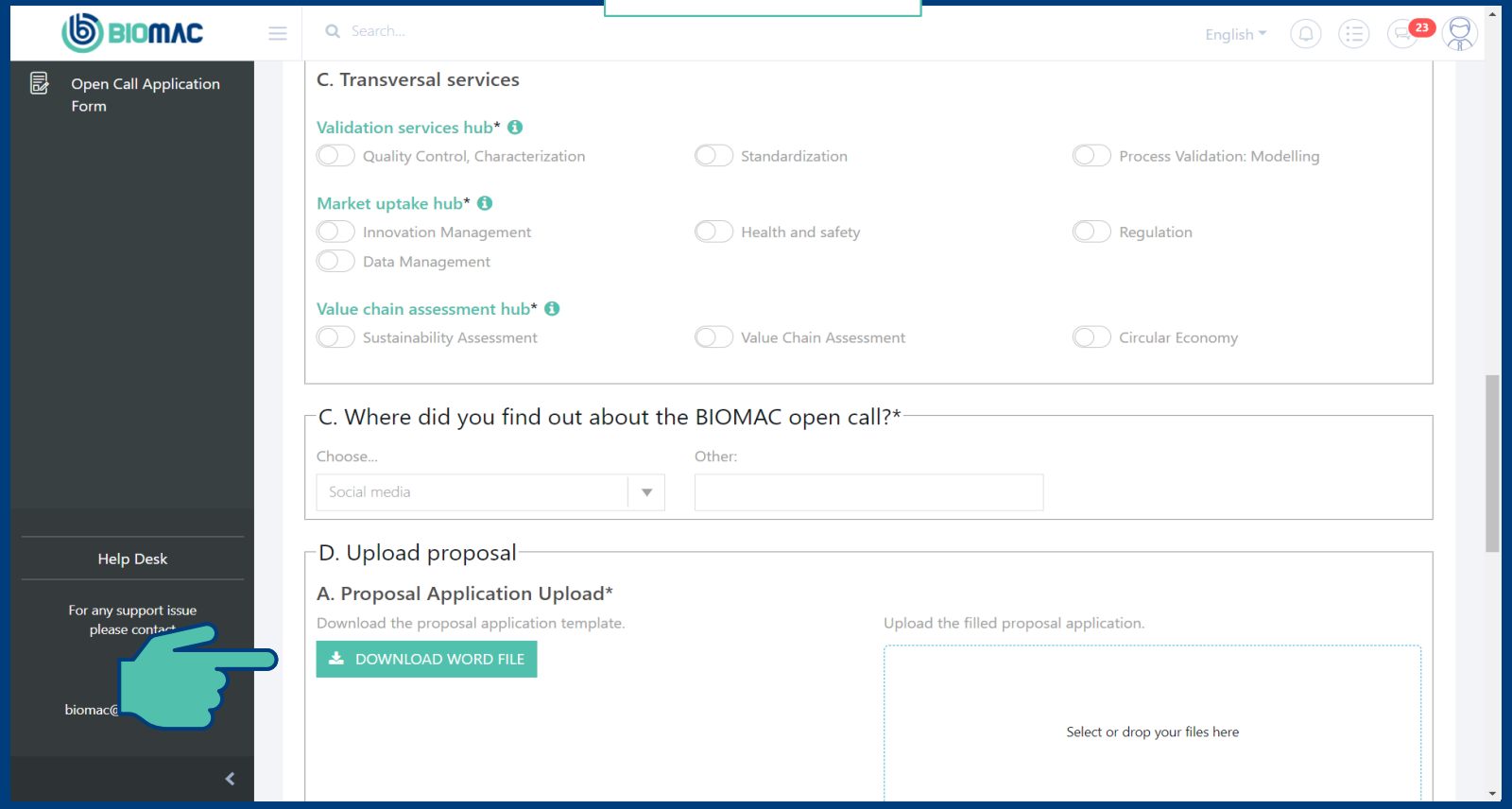
Accessing the BIOMAC Open Call

ONLINE



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Accessing the BIOMAC Open Call

- ★ Basic information and executive summary
- 1 Excellence
- 2 Implementation
- 3 Impact

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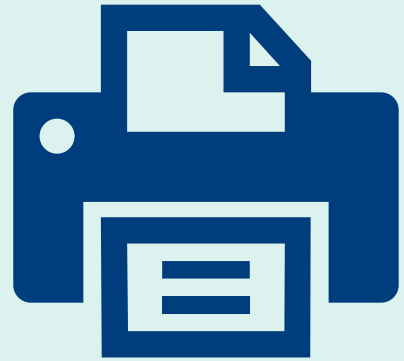
Open Call Proposal

Maximum length: up to 6 pages.

Basic information	
Proposal full name	*optional*
Proposal acronym	
Applicant entity	

Executive Summary
A short statement that addresses the proposal, and features background information, a concise analysis and a conclusion, optional, up to ~1/4 page.



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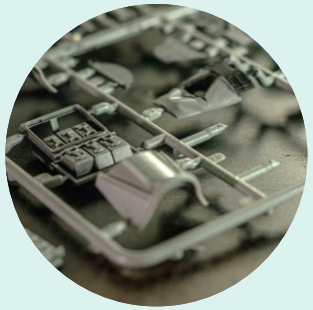
Applications welcome from all areas...

Automotive

Packaging



Material development

Biomedical Applications

Many, many more...

Agriculture

Information Technologies

Construction

Printed Electronics

No. 952941

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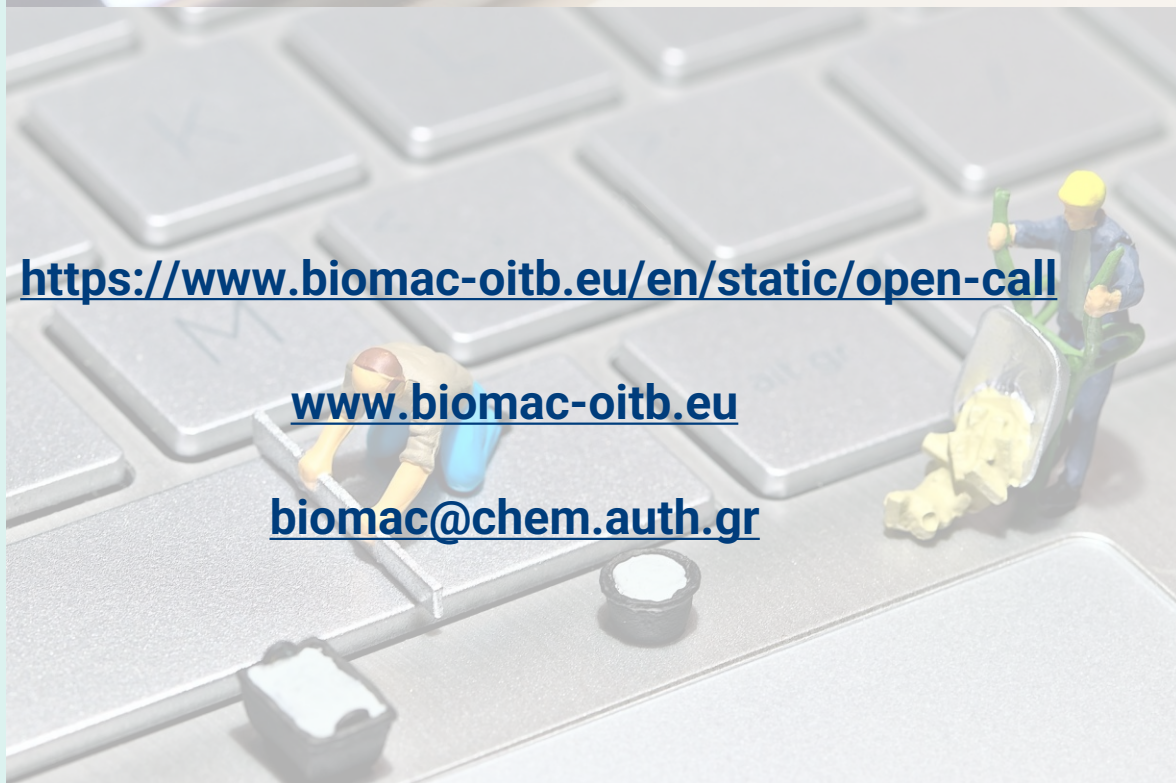

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