INN-PRESSME Project and Pilot lines for nano-enabled bio-based materials

Ulla Forsström, VTT

ulla.forsstrom@vtt.fi

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Facts & Figures

Developing materials & solutions for industry to replace fossil resources with sustainable, efficient, & cost-competitive bio-based materials.

European Union
H2020 Funding:

16.338.121,95 €

Start:
1st
January 2021

End:
31st
January 2025

49 months

Lead by VTT from Finland

VTT

Ulla Forsström (coordinator)

www.inn-pressme.eu

27
Partners

9
Countries

9
Demosites

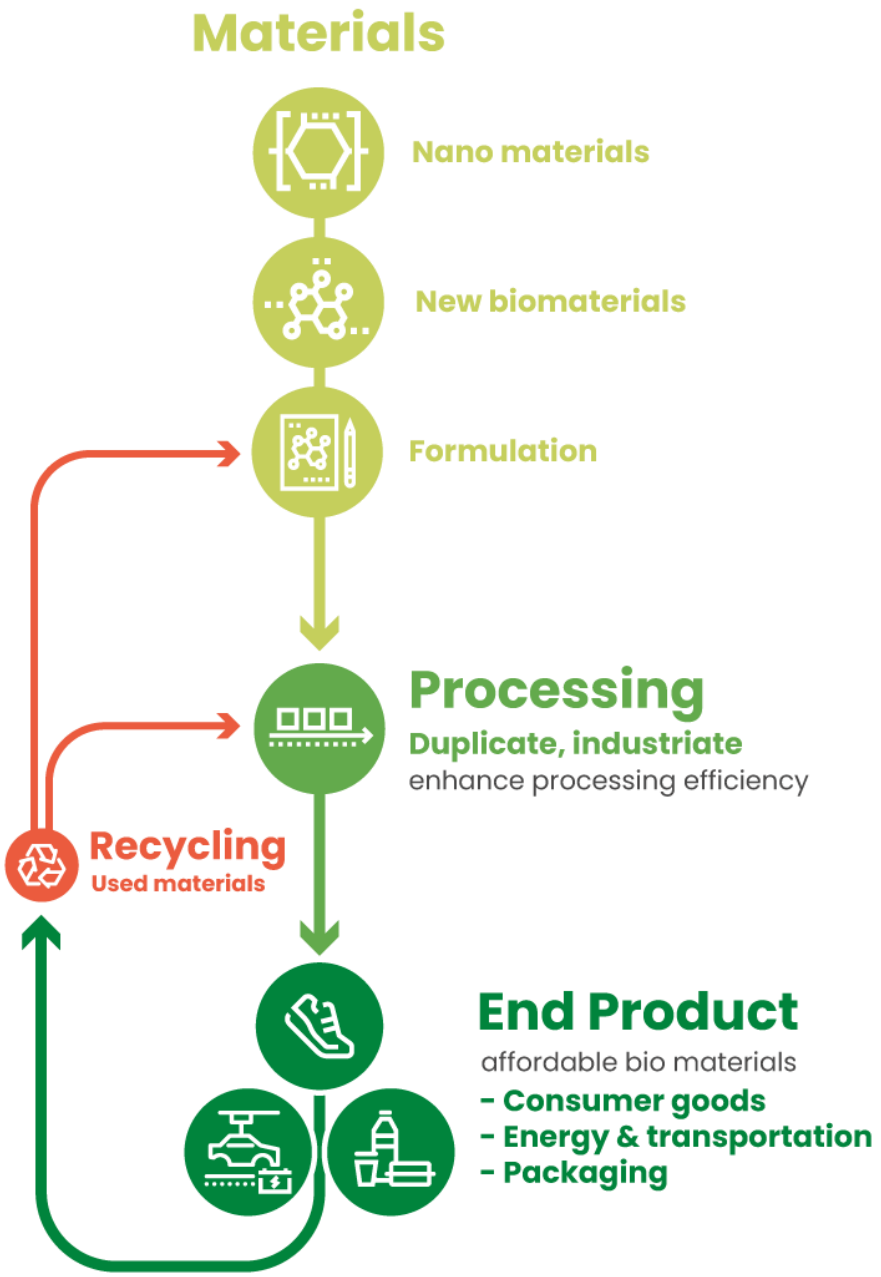
This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement N°952972

The Project

INN-PRESSME aims at

developing & implementing a sustainable OITB to support European companies to **scale up their nano-enabled biomaterials & processes**

from TRL 4-5 to 7.

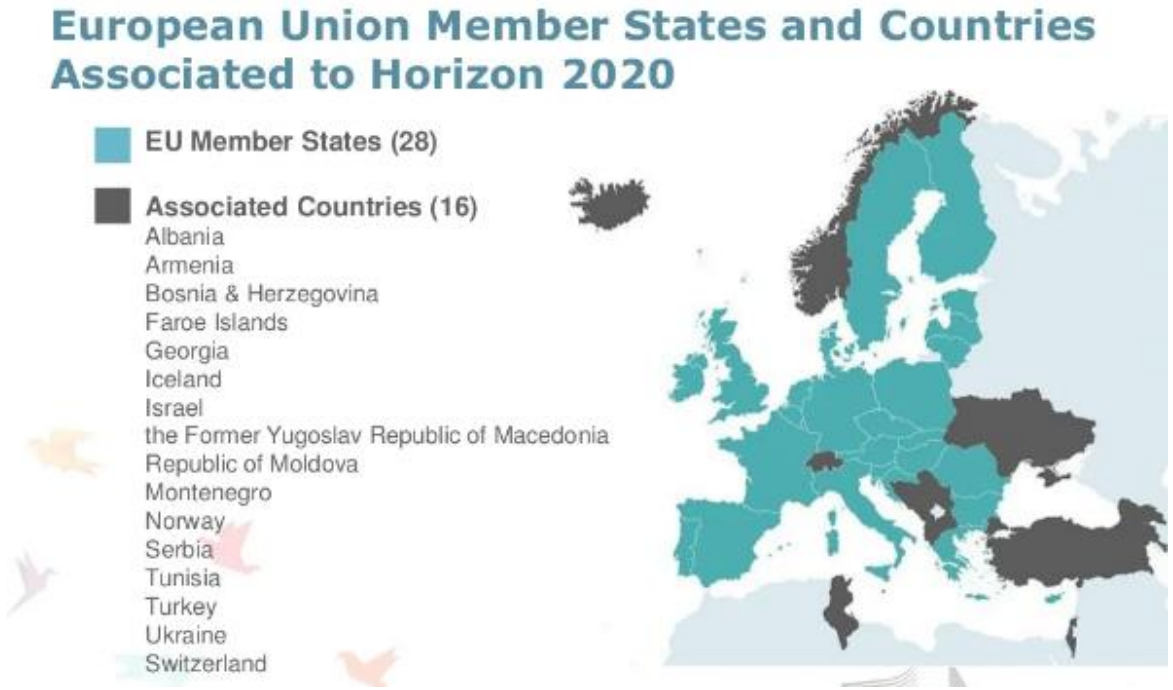


Horizon 2020 research and innovation programme under grant agreement N°952972

INN-PRESSME Open call : Eligible applicants

The Call is open for:

- **SMEs, start-ups, and Mid-caps, but also large industrial companies;**
- **For profit and non-profit organisations;**
- **Tech (innovative companies) or non-tech (traditional industries);**
- **For any product from all activities / fields / sectors that could benefit from greener solutions based on bio-materials;**
- **One partner or a consortium of max 2 partners**



Source: EC - Horizon H2020 – Open to the world (2018)

Eligible countries: EU Member States & associated countries & United Kingdom

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To produce bio-based nanomaterials

- **Cellulose Nano and Micro Fibrils, CNF and MFC PLs (VTT)**
  - Wide range of raw materials and production of trial samples from a few dozen grams upwards
  - Low and high consistency production


- **Cellulose Nano Crystals, CNC PL (RISE/Processum)**
  - Labscale (Capacity 1-50 L Glas/Hastelloy reactor
  - Pilot (Capacity 1400L)


- **Carbon-based nanomaterial PL (Gnanomat)**
  - **Formulation** and optimization of carbon-based nanomaterials functionalized with metal oxides.
  - Synthesis parameters adjusted as function of the **material characteristics of active electrode material.**


Reactor 5L

Reactor 50L

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To produce novel bio-based materials

- **Flax/hemp microfibre PL (IWNIRZ)**

  Pilot line combines following processes in semi-pilotscale:

  - Degumming of long flax and hemp fibres aiming to their separation, e.g. dividing technical fibres on elementary fibres with diameter 20-30 µm,
  - Silanization and crosslinking in order to improve adhesion between hydrophilic bast fibres and bioplastics
  - Cutting and grinding to obtain micro-size flax and hemp fibres as dry material

- **PLAX and other bioplastics (polymers, dispersion) (VTT)**
  - Reactors for preparation of **polymer dispersions and formulations**
  - Characterization of synthesized polymers and dispersions
  - Scale-up possibilities for polymers and dispersion from **10 L to 600 L**

- **PHA by fermentation of marine bacteria (Polymaris)**
  - The fermentation pilot for production of PHA powder by the fermentation of marine bacteria.
  - Two ultrafiltration units for dia-filtering biomass to increase consistency before drying.
  - Spray drying biomass before extraction of PHA






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OITB Pilot lines
- formulation of the materials to intermediate products

- To produce nanomaterials and novel bio-based materials
- **To formulate novel nano- and biobased materials**
- To process them and test product performance

Printing inks/pastes

Coating dispersions/colours

Granulates

Filaments

Lacquers

Foam beads

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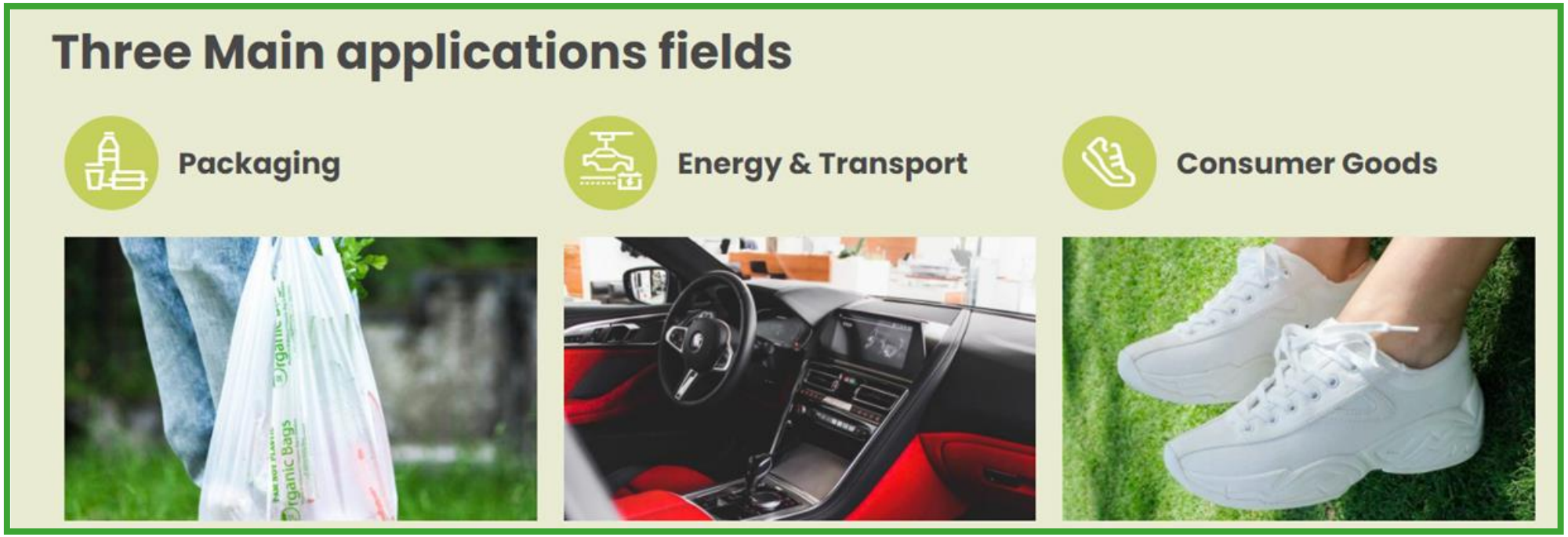
Example Test cases – validation on going

A set of **9 test-cases** will be used to validate the improved materials' performances & functionalities of the solutions developed by INN-PRESSME at real scale testing, & demonstrate the expected impacts, mainly those related to circularity.



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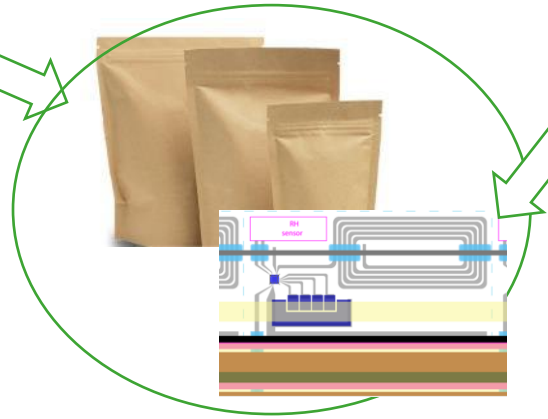
Examples of services

Packaging

Recyclable fibre-based pouches or labels



Barrier properties

Fraunhofer ISC

Polymer and/or dispersion formulations

VTT

Dispersion or extrusion coating from roll to roll on fibre-based materials

Formulation and Processing

Active fibre-based labels

cidetec surface engineering

Biobased functionalized pastes

cea

Functional printing from sheet to sheet

Formulation and Processing

End of Life

Recyclability testing

KCL

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Example of services

Packaging

Recyclable bio-based products

High barrier properties

- *Atmospheric **SiOx** roll to roll **coating***
- *Biobased, functional dispersion and extrusion **coatings***
- ***Multi-nano-layering** extrusion*

Fraunhofer ISC, VTT, IPC

Biobased foam

- *Foam bead extrusion*

Fraunhofer ICT

Formulations for the foaming of nano-functionalized bio-polymers, foaming processes for formulations in particle and extrusion foaming technology.

Processing

- *Cast extrusion 700mm*
- *Injection moulding & cast extrusion*
- *Single layer blown extrusion*
- *Lamination*
- *Dispersion & extrusion coating*

End of Life

- *Anaerobic / aerobic digestion*
- *Recyclability testing*

AIMPLAS PLASTICS TECHNOLOGY CENTRE

KCL

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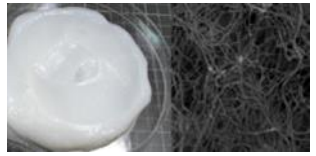
Example of services

Energy

Upscaling of bio-ultra-capacitors and others printed functionality



Could offer the following potential contributions:

- Waterborne bio-based (**CNF, CNC**) advanced electrodes for high performing (energy/power) energy storage devices.
- Novel bio-based formulations and slurries (i.e. **Carboxy Methyl Cellulose, *CMC-based***) for batteries, to replace toxic and non-recyclable components (i.e. PVDF)
- Formulation and optimization of carbon-based nanomaterials functionalized with metal oxides.
- Roll-to-roll continuous coating line for electrodes/electrolytes.

Cidetec Energy Storage Division, is specialized in creating **new battery technology** and facilitating its transfer to industry. In their facilities, they have the capacity to develop complete products and processes and to offer material validation, pilot manufacture, pack engineering and battery testing services.

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Example of services

Energy & Transport

Consumer Goods

Nanocellulose or Thermoplastic bio-based polymers, Hemp microfibres

VTT

INSTITUTE OF NATURAL FIBRES & MEDICINAL PLANTS – NATIONAL RESEARCH INSTITUTE

Extrusion compounding studies & integration of nano-additives and/or Extrusion of filaments

liten ceatech

IPC

Fungicide functionality added by a hybrid coating material..

Fraunhofer ISC

Fraunhofer ICT

Formulations for the foaming of nano-functionalised bio-polymers, foaming processes for formulations in **particle and extrusion foaming technology**

aitiip centro tecnológico

Additive Manufacturing technologies including fused filament fabrication and printing of large parts. Thermoset printing of large components with bio-based resins**.**

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INN PRESSME
Open Innovation Test Bed

Thank you!

Contact
Ulla Forsström
VTT
Ulla.Forsstrom@vtt.fi
+358 40 8202191

www.inn-pressme.eu

linkedIn.com/company/inn-pressme

twitter.com/inn-pressme