Circular composite materials from recycled cotton fibers and bio-based polymer systems – partners sought for EIC Pathfinder consortium

Summary

Profile type

Research & Development Request

Company's country

Poland

POD reference

RDRPL20260319006

Profile status

PUBLISHED

Type of partnership

Research and development cooperation agreement

Targeted countries

- **Türkiye**
- **Sweden**
- **Italy**
- **Ukraine**
- **Finland**
- **Austria**
- **Spain**
- **Belgium**
- **Portugal**
- **Germany**
- **Serbia**
- **France**
- **Denmark**
- **Norway**
- **Switzerland**
- **Czechia**
- **Tunisia**
- **Bosnia and Herzegovina**
- **United Kingdom**
- **Romania**

Contact Person	Term of validity	Last update
Enrico FRANZIN	**19 Mar 2026** **19 Mar 2027**	**19 Mar 2026**

General Information

Short summary

A research organisation from Poland (Poznan Science and Technology Park – PPNT) is building a European consortium for an EIC Pathfinder project focused on next-generation circular composite materials based on recycled cotton fibers and bio-based polymer systems.
The project integrates advanced materials science, textile recycling, and digitalisation to develop scalable and reproducible composite solutions. Partners from textile recycling, polymer chemistry (including vitrimer systems), composite

Full description

Poznan Science and Technology Park (PPNT), through its Chemical Technology Incubator, is initiating the creation of a European consortium for an EIC Pathfinder proposal focused on advanced circular composite materials.
The project aims to address key challenges related to:
• increasing textile waste streams in Europe, especially cotton-based garments,
• dependency on fossil-based raw materials in composite manufacturing,
• lack of scalable circular solutions for high-performance materials.
The core concept is to develop and validate a new class of composite materials combining:
• recycled cotton fibers sourced from textile waste,
• bio-based or more sustainable polymer matrices, including dynamic polymer networks (e.g. vitrimer systems),
• advanced composite design enabling durability and improved end-of-life scenarios.
A major scientific and technological challenge lies in the variability of recycled cotton fibers (composition, dyes, treatments, prior use), which currently limits their use in reproducible industrial processes. The project will therefore develop methods for:
• fiber preparation, classification and standardisation,
• controlled and reproducible composite fabrication,
• performance validation (mechanical, thermal, durability, processability),
• circular end-of-life strategies (recyclability, reprocessing, and biodegradation where relevant).
A key innovation element is the integration of digitalisation of textile waste streams. This includes the development of practical and scalable classification systems (e.g. FTIR, NIR or vision-based approaches) and data-driven quality control linking input material parameters with composite performance. The goal is to establish simple, industry-relevant “smart sorting rules” enabling consistent material quality.
The project will also include the development of demonstrator components in collaboration with industrial partners, defining application requirements and validating the feasibility of the proposed materials in realistic use cases.
The expected outcome is a validated proof-of-concept for circular composite materials combining sustainability, competitive performance, and industrial relevance, with improved end-of-life options compared to conventional composite systems.

Advantages and innovations

• use of textile waste (cotton) as a resource for advanced materials
• integration of bio-based and dynamic polymer systems (including vitrimer chemistry) instead of petrochemical materials
• development of reproducible composite manufacturing despite raw material variability
• full circularity approach (from waste feedstock to end-of-life strategies)
• integration of digitalisation and smart sorting in the value chain
• development of practical, scalable and industry-oriented quality control systems
• potential for significant reduction of carbon footprint and waste streams

• alignment with EIC Pathfinder high-risk / high-gain research approach
• strong cross-sector application potential (automotive, construction, consumer goods)

Technical specification or expertise sought

Partners are expected to contribute expertise in one of the following areas:

Required partners (must-have):

1. Textile recycling partner (industrial)
• access to post-consumer and/or post-industrial cotton waste streams
• sorting capability (100% cotton vs blends)
• mechanical fiber recovery (opening, milling, fractionation)
• ability to deliver reproducible fiber batches (defined fractions)
• basic pre-treatment and process data (yield, energy, logistics)

2. Polymer science partner (academic/research)
• expertise in vitrimer chemistry and dynamic polymer networks
• support in selection and validation of dynamic bonding mechanisms
• rheology, stress relaxation and material behaviour analysis
• contribution to scientific validation (publication-level results)

3. LCA / sustainability partner
• life cycle assessment of circular composite systems
• benchmarking vs conventional materials
• support in defining environmental metrics and end-of-life scenarios

Optional partners:

4. Digitalisation / smart sorting (AI + sensors)
• development of classification methods for textile waste streams
• low-cost, scalable proof-of-concept solutions (e.g. FTIR, NIR, vision systems)
• correlation of input quality parameters with composite performance

5. Biodegradation / environmental testing partner
• biodegradation studies (soil, compost, aquatic environments)
• monitoring of mass loss and structural changes
• support in end-of-life assessment

6. Industrial end-user / demonstrator partner
• definition of application requirements and performance targets
• selection of demonstrator components
• feedback on industrial feasibility and potential implementation pathways
• optional pilot-scale processing support

Stage of development

Concept stage

Sustainable Development goals

• Goal 11: Sustainable Cities and Communities
• Goal 13: Climate Action
• Goal 12: Responsible Consumption and

Production
• Goal 9: Industry, Innovation and Infrastructure

IPR Status

No IPR applied

IPR Notes

Partner Sought

Expected role of the partner

The partners sought are expected to contribute complementary expertise to the consortium and actively support the development and validation of next-generation circular composite materials based on recycled cotton fibers and bio-based polymer systems.

Depending on their profile, partners are expected to:

- provide access to relevant textile waste streams and support sorting, fiber recovery, pre-treatment and batch standardisation,
- contribute scientific expertise in polymer chemistry, especially vitrimer systems and dynamic polymer networks, including validation of material concepts and mechanisms,
- support the design, processing, fabrication and testing of composite materials,
- carry out life cycle assessment and environmental benchmarking, including support in defining circular end-of-life scenarios,
- develop digitalisation and smart sorting approaches linking waste stream quality parameters with composite performance,
- perform biodegradation and end-of-life testing where relevant,
- define application requirements and support the development of industrial demonstrators,
- contribute to the preparation of the EIC Pathfinder proposal and to the future implementation of the project as consortium partners.

All partners are expected to collaborate in an interdisciplinary manner, contribute to the scientific and/or industrial excellence of the proposal, and support the development of a high-risk/high-gain research concept aligned with EIC Pathfinder objectives.

Type of partnership

Research and development cooperation agreement

Type and size of the partner

• University

• Other

• R&D Institution

Call Details

Framework program

Horizon Europe

Call title and identifier

EIC Pathfinder Open (HORIZON-EIC-2026-PATHFINDEROPEN)

Submission and evaluation scheme

Anticipated project budget

Coordinator required

No

Deadline for EoI

19 Apr 2026

Deadline of the call

12 May 2026

Project duration in weeks

Web link to the call

Project title and acronym

Dissemination

Technology keywords

- **02002002 - Coatings**
- **02007014 - Plastics, Polymers**
- **02007005 - Composite materials**
- **02007018 - Advanced Textile Materials**

Market keywords

- **09004003 - Textiles (synthetic and natural)**
- **09004008 - Other manufacturing (not elsewhere classified)**
- **08001009 - Speciality/performance materials: producers and fabricators**
- **08001023 - Other chemicals and materials (not elsewhere classified)**

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Sector groups involved

- **Textiles**