

BUTTERFLIES is structured around interdisciplinary collaboration among **13 partners from 9 countries**, including R&D centres, SMEs, industry leaders, and end users.

The project will run for **36 months** and covers the full value chain.

PARTNERS



ASSOCIATED PARTNER



BUTTERFLIES
Project Bio-Polymers &
Additive Manufacturing

Butterflies pioneers advanced, sustainable AM processes using **chitin** and **chitosan** to create high-performance, biocompatible products.

The project promotes sustainable, digital manufacturing by using natural biopolymers, chitin and chitosan, to reduce fossil-based materials.

It integrates bio-based materials with BJT and 2PP, supporting Europe's green and digital transition.



[/company/butterflies-project/](#)

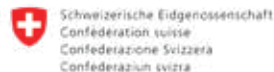


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HYBRID
MANUFACTURING
FOR
BIO-INTELLIGENT
FUTURES

The **BUTTERFLIES** project addresses the limited use of sustainable bio-polymers like chitin and chitosan in advanced additive manufacturing, due to technical and material barriers.

MAIN

OBJECTIVES

BUTTERFLIES aims to develop cutting-edge AM processes using chitin and chitosan to create sustainable, high-performance, and biocompatible products, especially for biomedical applications.

1 NOVEL BIO-BASED MATERIALS

- Develop chitin nanocrystal (ChNC) crosslinkers for use in BJT.
- Synthesize photo-curable chitosan polymers for high-resolution 2PP printing.

2 ADVANCED MANUFACTURING DESIGN

- Optimise parameters and binder interactions to enhance bioprinting quality.
- Create laser-based and beam-shaping methods for greater printing precision.

3 DIGITAL INTEGRATION AND SMART CONTROL

- Use AI to automate parameters and ensure quality control.
- Build a Digital Biosphere Platform to simulate and guide AM processes.

4 EQUIPMENT INNOVATION

- Design and prototype AM machines tailored to bio-based materials.
- Develop advanced scanning systems to boost 2PP printing throughput.

5 SCALABILITY AND DEMONSTRATION

- Validate biomedical use cases such as organoid scaffolds.
- Perform techno-economic and environmental assessments for industrial viability.

6 CAPACITY BUILDING

- Provide guidelines, training, and open data to support cross-sector replication and skills development.

IMPLEMENTATION

- Bio-based material development and adaptation of BJT and 2PP printing.
- Digital Biosphere Platform with AI/ML for optimisation, digital twins, and simulations.
- Case studies and demos in biomedical and industrial applications.
- Activities on dissemination, standardisation, training, and exploitation.



INNOVATION

The project advances AM with bio-based BJT binders, chitosan polymers for 2PP, and AI-optimised processes via the Digital Biosphere Platform

CASE STUDY 1

2PP-printed chitosan scaffolds mimic natural matrices, advancing regenerative medicine with AI-optimised precision.

CASE STUDY 2

BJT with chitin binders enables complex parts with proven performance and sustainability for diverse sectors.

IMPACT

BUTTERFLIES is expected to transform biointelligent manufacturing by introducing sustainable materials and AI-enhanced digital tools into AM processes.

SCIENTIFIC & TECHNOLOGICAL

Introduce bio-based materials and printing methods advancing resolution, sustainability, and biofunctionality. Demonstrate functional parts such as biomedical scaffolds with embedded biological features.

ENVIRONMENTAL

Replacing petroleum binders with renewable chitin and chitosan cuts emissions and waste, supporting a circular economy through renewable sourcing and biodegradation.

ECONOMIC & INDUSTRIAL

Create new value chains in biomaterials and advanced manufacturing across healthcare, regenerative medicine, aerospace, automotive, and packaging.

SOCIAL AND POLICY

Promote gender balance, inclusivity, and skills development, supporting EU digital and green transitions through responsible innovation and sustainability-driven entrepreneurship.