

Project partners





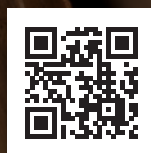
10 Organizations
5 Countries
7.63M Project Budget

Project coordinator




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Bioinspired and
advanced fibres
and materials for
sustainable
outdoor textiles
with biomimetic
functionalities

Project details

Start date: MAY 1, 2024

Duration: 4 YEARS

Project Budget: EUR 7.63M



Our fibers

Biocelsol fibers

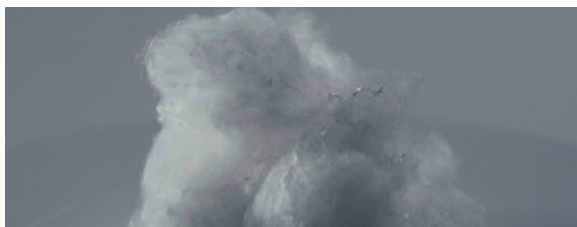
Biocelsol fibres are classified as **man-made cellulosic fibres (MMCF)** that are produced by dissolving a cellulose-based feedstock, typically wood pulp, and regenerating the biobased polymers into textile fibres through a spinning process, where the fineness can be adjusted. In terms of fibre properties, Biocelsol fibres are similar to commercial viscose fibres.

Main properties:

- **Unique porous structure** that gives it excellent natural moisture absorption capacity and, in turn, facilitates the efficient absorption of chemical dyes and finishes.
- The production process naturally yields a pure, uncoloured fibre that eliminates the need for a bleaching step, significantly reducing chemical usage, water consumption, and overall process complexity.

What have **PENGUIN** been working on?

- Develop **Biocelsol** fibres better suited for applications currently dominated by synthetic fibres, such as insulation materials.
- Including alterations in the cross-sectional geometry of the fibres and testing of novel biobased finishing chemistries and covalent fibre modifications to enhance fibre hydrophobicity.
- Biobased finishing chemistries
- Enhance hydrophobicity without compromising tenacity, processability or soft handfeel of the fibres.



The PENGUIN project seeks to create high-performance, sustainable textiles inspired by nature (biomimicry). Instead of synthetics, we use advanced cellulose fibers (SPINNOVA® and Biocelsol) and enhance their properties to replicate nature's efficiency, such as water repellency and thermal insulation.

How our fibres differ

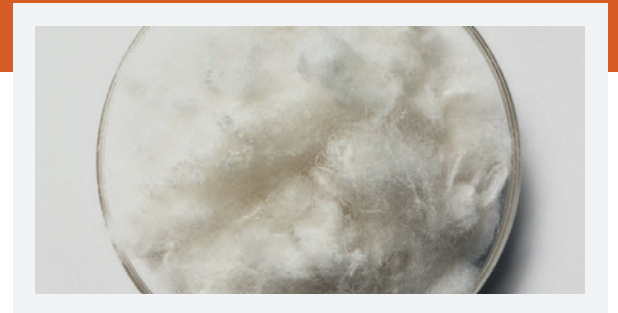
Unlike synthetic fibres derived from nonrenewable fossil resources such as polyester or nylon, our SPINNOVA® and Biocelsol fibres are made from cellulose sourced from wood pulp, a renewable and biodegradable material with a significantly lower environmental footprint.

What we aim to achieve?

Both technologies seek to offer sustainable alternatives to synthetics without compromising performance. SPINNOVA® focuses on producing cellulose fibres through a purely mechanical process, eliminating harmful chemical solvents, while Biocelsol focuses on enhancing cellulose properties to reach specific functionalities, such as hydrophobicity for insulation applications.

Key differences

SPINNOVA® represents an innovation in how the fibre is made: through a clean, mechanical spinning process. Biocelsol represents an innovation in what the fibre can do: by chemically and physically modifying cellulose to provide new technical properties.



SPINNOVA® fibers

SPINNOVA® fibres are a sustainable textile fiber made from wood pulp or waste materials like agricultural or leather waste, using a chemical-free, mechanical process. This process involves refining the raw material into **microfibrillated cellulose (MFC)**, which is then pushed through nozzles to form a continuous fiber, resulting in a material with a feel similar to natural fibers like cotton.

Main properties:

- Based on the mechanical refining of the raw material, technology is the only process in the world that converts cellulose into textile fibre in this way.
- Minimal CO2 emissions and water use, as well as being biodegradable and recyclable.
- Adjustable moisture management is contributing to comfortable, dry and warmer feeling

What have **PENGUIN** been working on?

- Replace synthetic insulation layers with materials made from **bio-based cellulose fibers**
- Improved **water repellence** for advanced fabrics and higher structural integrity