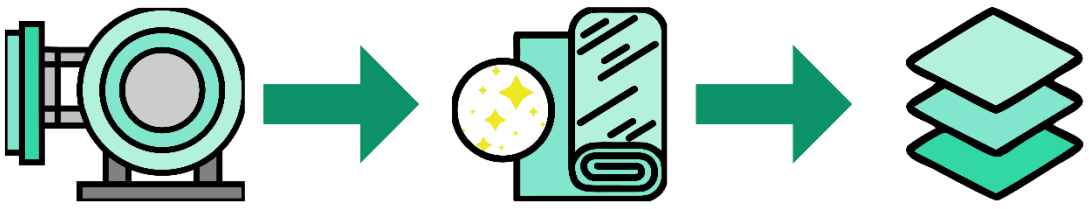
LIGHTLINING
A lightweight super-insulating nonwoven for sportswear

The LIGHTLINING project investigates a new material to better insulate clothing. With its commitment to sustainable and circular practices, the project aligns with the EU Green Deal and Germany's National Research Strategy 2030, addressing both ecological and social responsibilities. By exploring the properties of new textile aerogels and their textile applications, LIGHTLINING promises a more sustainable product for the fashion industry, reducing environmental impact and fostering innovative solutions that prioritize animal welfare and carbon neutrality. By prioritizing the use of renewable resources, the project contributes to the overarching goal of achieving carbon neutrality in Europe by 2050. The utilization of a novel, sustainable process, and the usage of cellulose showcases a commitment to sustainable and resource-efficient solutions.

In addition to ecological responsibility, the project recognizes the importance of social responsibility in the fashion industry. The extraction of goose-down feathers, a common insulation material, has raised concerns about animal cruelty. By shifting to innovative bio-based materials, the LIGHTLINING project aims to reduce animal cruelty as well.

Within the project year, the primary objective of the LIGHTLINING project is to showcase a proof of concept for the innovative cellulose aerogel textile. In detail, the scientific and technical objectives of the LIGHTLINING project revolve around exploring the qualitative properties of the novel aerogel textiles. By investigating parameters such as porosity, thermal conductivity, and tensile strength, the project aims to demonstrate the potential of these aerogel textiles for clothing. The combination of the novel textile process in combination with supercritical CO2 drying enables the production of a lightweight and highly porous aerogel textile that offers unique properties. The following illustration visualizes the LIGHTLINING approach.



Supercritical Drying of an cellulose nonwoven precursor to solidify the nanoporous structure in the material

Finishing of the dried nonwoven in regards to apparel requirements like washability or antibacterial behaviour

Implementation into a demonstrator garment in combination with other fabrics

The LIGHTLINING project envisions an aerogel textile with reduced weight, enhanced flexibility, improved sustainability, and exceptional heat insulation. The cellulose-based aerogel nonwovens, produced through an innovative and sustainable process, offer a bio-based alternative that is cost-competitive and can be dyed. The insulation potential can be optimized by adjusting the nonwoven's grammage in combination with the number of layers, microstructure, and necessary additives. Additionally, the novel textile should provide excellent breathability, moisture absorption, and antibacterial properties.

Beyond its scientific and technical contributions, the LIGHTLINING project aims to foster collaboration and knowledge exchange between society and the textile industry. Through cooperation with the TransitionLab, social requirements and framework conditions for such a new aerogel textile are to be collected in addition to the technical requirements. This will be done within the framework of workshops and surveys. The idea of Light Lining is to provide a holistic proof of concept for a potentially disruptive new material.

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