Abstract: Cellulose aerogel fibre based lightweight super-insulating non-woven for Sportswear

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In an era of increasing ecological challenges, the development of sustainable materials for the fashion industry is crucial. The LIGHT LINING project successfully developed an innovative lightweight cellulose aerogel nonwoven aimed at enhancing textile insulation. Aligned with the EU Green Deal and Germany's National Research Strategy 2030, this initiative emphasized sustainable and circular practices while addressing ecological and social responsibilities within the fashion industry.

The primary objectives included demonstrating the qualitative properties of these cellulose aerogel textiles through rigorous analyses of hydrophobicity, thermal resistance, and tensile strength. A unique production process involving super-critical CO2 drying resulted in a highly porous material that offered exceptional heat insulation alongside enhanced flexibility and sustainability. Benchmarking against state-of-the-art materials validated performance. The cellulose aerogel fiber based non-woven served as a cost-competitive bio-based alternative capable of additivation while optimizing insulation potential through adjustable grammage and layering.

Additionally, the project fostered collaboration between society and the textile industry within the context of the Biotexfuture innovation space through workshops and surveys conducted via the so-called TransitionLab. This holistic approach not only showcased scientific advancements but also addressed social requirements for integrating new materials into market practices.

Looking ahead, there are plans for further development through a start-up focused on industrial production of these aerogel textiles. This transition aims to scale up production capabilities while maintaining sustainable practices, ultimately bringing innovative solutions to the sportswear market.

Overall, this project established a proof of principle for a potentially disruptive material that redefines insulation in sportswear while prioritizing ethical considerations in production.