

## Economical Production Routes for Air Filtration Media via Functionalization with Nanofiber Solutions Based on Green and Environmentally Friendly Solvents

Nonwoven structures made of nanofibers, fibers with diameters below 1  $\mu\text{m}$ , exhibit very fine pore structures at high porosity. This enables their use as efficient membranes or barrier layers and offers a wide range of applications, for example in filtration and medical technology. In view of increasing requirements for the cleanliness of processed air and process gas streams, the development of high-performance and efficient filter media is becoming increasingly important.

Conventional methods for producing nanofibers typically require specialized equipment and are often limited in productivity. Therefore, this project follows an alternative approach: nanofibers are generated via delamination processes in liquids or solvents and subsequently applied onto suitable filter media using established industrial techniques such as padding or knife coating. This allows the use of existing production infrastructure without the need for additional investment in new machinery.

The aim of the project is to develop suitable nanofiber solutions based on PA, PET, viscose, and aramid using green, environmentally friendly solvents. These systems are intended to be used as finishing agents for the functionalization of depth filter media for air filtration. The focus is on achieving high technical performance while ensuring industrial feasibility.

A key advantage of the approach is the use of environmentally friendly solvents with low risk for humans and the environment. In addition, the process enables the utilization of textile waste from manufacturing processes as a raw material for nanofiber production. The recovery and reuse of solvents further enhance both economic efficiency and environmental sustainability.

The project is carried out in cooperation with IUTA. By combining material development with application-oriented testing, the project aims to develop innovative nanofiber-based filter media for air filtration. In particular, small and medium-sized enterprises (SMEs) will benefit from new opportunities to establish sustainable and high-performance filtration products on the market.

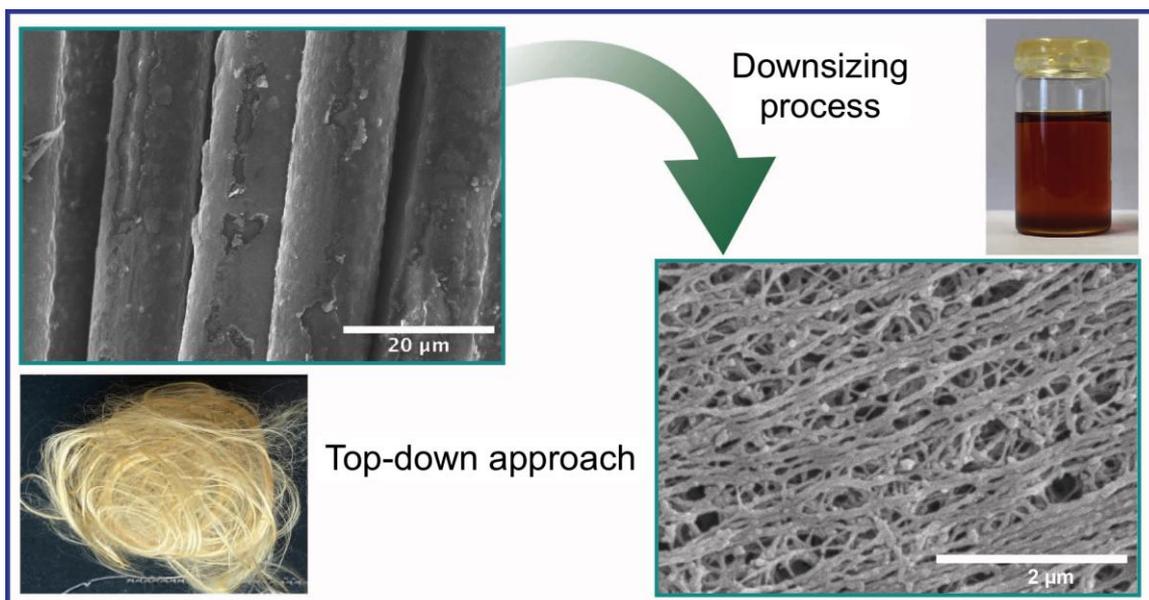


Figure 1: Top-down approach for nanofiber production using an ionic liquid: conversion of starting fibers into nanofiber-based structures by a downsizing process..

**Project Information:**

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