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Project Title:	DynaFil: Development of a novel filter system for the removal of microbes from liquids on the basis of antibacterial filter fleeces
Partner:	Oberlin Filter GmbH, Eschweiler
Duration:	03/2020 – 02/2024
Conveyor:	Zentrales Innovationsprogramm Mittelstand

Mission Statement

In many industrial processes there is a need to filter liquids to separate foreign matter. This can lead to uncontrolled and excessive growth of bacteria, algae and fungi in the filter system. The used pore size of the filters cannot be chosen arbitrarily small to avoid a fast clogging and a too high resistance of the filter. Due to their small size, microbes and micro-organisms can pass through the filter and thus contaminate other parts of the plant. The biomass produced by the large number of micro-organisms or microbes or their metabolic products leads to impairments of the processes.

The aim of the project is to develop novel filtration systems that reduce the concentration of micro-organisms and microbes in the filtration plant, avoid the impairment by microbial metabolites and increase the filter lifetime.

The innovation of the project presented here lies in the transfer of the photodynamic therapy approach known from cancer therapy to antimicrobial filters for industrial liquid filtration systems.

The abandonment of environmentally hazardous substances and energy-intensive technologies multiplies the ecological added value of the project results and is associated with a long-term sales potential in the seven-digit Euro range for the project partner.

Solution Path

Based on the photodynamic therapy approach, a filtration system for liquid filtration will be developed, which will be validated in the project using demonstrators. The main focus here is on the mechanical engineering implementation of the requirements placed on the novel filters. For this purpose,

filters based on novel, antimicrobial fibres will be developed. The antimicrobial properties are based on the photodynamic-therapeutic effect in which organic or inorganic, photodynamically active substances are introduced into the PAN fibres during wet spinning and generate cytotoxic, reactive oxygen species (ROS) when excited by light. Filter nonwovens and fabrics will be developed and validated with regard to their antimicrobial properties. The pore size, effective filter area, fibre fineness and consolidation, flow profile and permeability, capture efficiency and pressure drop are adapted to the liquid filtration. The end point of the development work of ITA are functional prototypes of antimicrobial filter fleeces and fabrics for implementation in liquid filtration systems.

The successful completion of the project will enable a cost-effective, efficient, persistent, environmentally friendly and energy-saving microbial control to maintain long filter service lives.

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