

Project Title: AntiFil
Partner: WKI Absaugtechnik GmbH
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Funding Agency: AiF Projekt GmbH

Univ.-Prof.
Prof. h.c. (MGU)
Dr.-Ing. Dipl.-Wirt. Ing.
Thomas Gries
 Director

Felix Krooß
 Research Associate

Ref.: FK
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Mission Statement

Air filter systems are used in a wide range of industries where particularly high product quality and purity are required. Microorganisms that accumulate in such filter systems often lead to an uncontrolled and excessive growth of bacteria, algae and fungi. Loss of quality, odour nuisance and contamination with pathogenic germs are the result. The removal and inactivation of microorganisms on the filter and in the filtered air is therefore essential to ensure a process under hygienic conditions.

With conventional disinfectants, the elimination of aerogenic pathogens is not possible. The development of self-disinfecting filter systems is an innovative concept, which is pursued within the scope of this project.

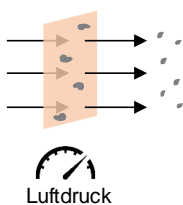
State of the Art

- UV radiation reduces the growth of microbes, but produces harmful ozone
- Bacteria develop resistance to biocides (e.g. Al, Ag ions and chlorine compounds)

Present Situation

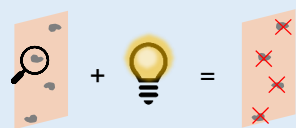
Filtered out microorganisms multiply on and in the filter material

- Shorter service duration
- Air pollution

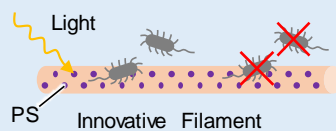


Development

Filter system against microbes



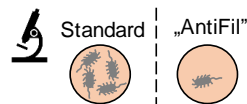
→ Incorporation of photosensitizers in filaments for the production of nonwovens



Goal

Reduction of microbial growth on the surface of the air filter

- 25 % less microbes*
- 25 % reduced pressure*



*after one month microbe incubation

SME Relevance

- Air purification systems in the food industry is a 2.16 billion USD market
- A total of more than 9100 buildings in Germany where antibacterial air filters are required

Approach

Fibres functionalized with photosensitizers can be activated with light to generate a cytotoxic reactive oxygen species (ROS). When the highly reactive ROS comes into contact with infectious agents, a chain of reactions is initiated, which ultimately causes the death of the microorganism. Such antibacterial fibres can be produced in the melt-spinning process. Further processing into filter fleeces enables the integration into air filter systems. At the same time, the filter systems must be adapted accordingly. The aim of these novel filters is to reduce the growth of microorganisms by 25 %.

Acknowledgement

We would like to thank the Federal Ministry of Economics and Energy for funding the research project "AntiFil - Development of a novel filter system for the removal of microbes from the air on the basis of antibacterial filter fleeces" as part of the Central Innovation Program for Medium-Sized Businesses.

Contact

Felix Krooß, M. Sc.
Email: felix.krooss@ita.rwth-aachen.de
Phone: +49 (0) 241 80 - 23270

Jonas Broening, M. Sc.
Email: jonas.broening@ita.rwth-aachen.de
Phone: +49 (0) 241 80 - 23479