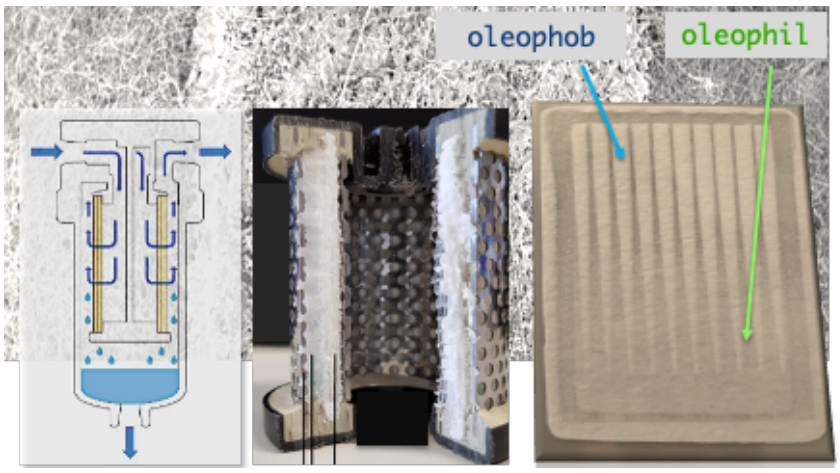
Tailor-made structural and chemical optimisation of drainage and coalescence filter media to improve the energy balance of compressed air filtration

Motivation

The efficiency of air pressure filtration determines the energy consumption and thus has an impact on the overall sustainability of the entire facility. Coalescing filters are conventionally made from glass fibre nonwovens, with an oleophobic finish providing the most efficient coalescence of oil aerosols and drainage. The industry faces the challenge of finding fluorine-free but equally effective approaches to meet new regulatory standards.

The project aims to improve the energy balance of pressure filtration by considering the following key issues:

- Testing the effect of patterned surface modification on channelling and accelerating oil drainage into selected filter media. Validating the effect of geometry and depth of the pattern, as well as the differences in the surface energy and topography.
- Investigation and validation of the additional transport effect by media combinations with a drainage layer with a pronounced capillary effect through aligned fibres.
- Development of environmentally friendly, fluorine-free or low-fluorine formulations and corresponding coating processes to create tailored, structured wetting properties using digital printing or precise spraying techniques. The key objective is to determine the minimum amount of fluorine per unit area to achieve the wetting gradient required to accelerate oil transport.
- Further development of coalescing and drainage filter media through a combination of the above measures to improve the energy balance of compressed air filtration, elaboration of a design and evaluation rules to control the drainage process.



Intersectoral usage and direct exploitation of the research results can be expected in the fields of environmental technology, air pollution control and filter technology as well as in filter and textile production and textile finishing. Energy saving, environmental sustainability as well as innovative approaches to surface functionalization will contribute to increasing the profitability of SMEs.

Joint project with Institute for Energy and Environmental Technology e.V.

Project Information:

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