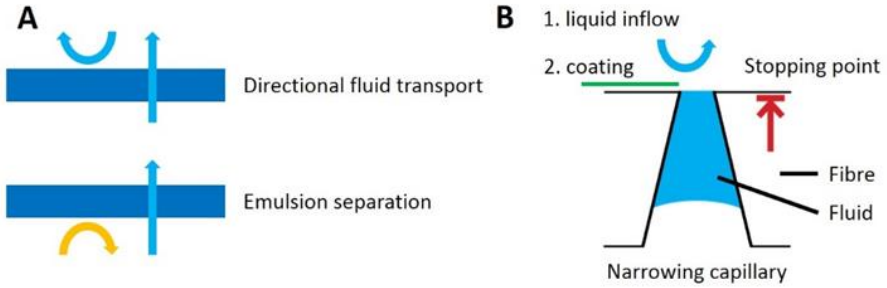
INNOVATION | RWTH AACHEN UNIVERSITY

RWTH Technology

Capillary Transport of Liquids



Challenge

Currently, there is no solution for a textile structure which can absorb liquid and transport it passively and directional, thus backflow of the liquid is prevented. The invention allows directional, passive liquid transport in a flexible product.
A directional passive liquid transport was first described for the skin of a moisture-harvesting lizard by members of the inventor team in 2011. This phenomenon results from two functional principles, periodically narrowing capillaries with specific interconnections. Both principles are considered in special geometries of the cavities between trilobal fibers or pores in films/foils. When materials are functionalized with such structures a liquid transport perpendicular to the material, i.e. from one surface to the other, becomes directional. The liquid is transported in one direction and halted in the opposite. Robustness is achieved by overcoming a stopping of the liquid transport in the desired direction at structural discontinuities.

Solution

The objective of liquid transport substantially perpendicular to a surface is achieved in the present invention by structured fibers arranged in a predefined pattern. Designed cross sections of the fibers are, e.g., trilobal, trapezoidal or semicircular. They are arranged preferably parallel to each other. Geometrical cross-linking of the capillaries is realized by individual cross sections as well as arrangement of the fibers relative to each other. The robustness of directionality is improved by overcoming discontinuities wherever the capillaries expand abruptly in diameter. Discontinuities are overcome by either realizing geometrical cross-linking of the capillary cavities (e.g. layers of the fiber plies) or via hydrophilic areas in order to maintain the liquid transport.

Advantages

- Extraordinary combination of textile technology and biomimetic expertise
- Related projects: LiNaBioFluid (EC-665337), Klima.exe (BMBF-031B0322)

Status

- European Patent application filed
- Ongoing development of further Proof-of-Concepts

RWTH Aachen University is looking for partners for patent exploitation or for research partners for joint development or contract research.

RWTH Innovation GmbH

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Fields of application
Healthcare, Textiles, Automotive, Environmental Engineering

Keywords
#passive liquid transport, #directional, #membrane, #absorption, #spreading, #plies

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