Coordinator

Partners

Website

https://www.interreg-duratex.eu/

Would you like to know more?

For more information on superhydrophobic and oleophobic finishes, do not hesitate to contact us.
Info: dds@centexbel.be

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https://www.interreg-fwvl.eu

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DURATEX

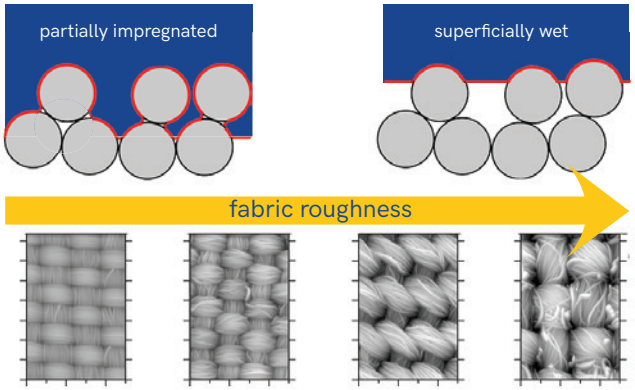
Within Duratex, an Interreg France-Wallonia-Flanders project, we were able to develop ecofriendly hydrophobic and oleophobic textile finishes.

Indeed, the European legislation will prohibit and limit the use of (long chain) fluorocarbons. The alternative superhydrophobic or oleophobic finish can be applied via padding or spray.

It is well known that hydrophobic surfaces become more hydrophobic as their roughness increases. Fabrics have an intrinsic surface roughness due to the weave pattern and the stacking of fibres in the yarns. Duratex partners UCLouvain and Centexbel, focused on possible correlations between the surface roughness of fabrics and their water-repellency.

In this respect experimental methods have been developed to characterize the roughness of fabrics, as well as mathematical models to predict the water contact and roll-off angles on fabric surfaces modified by a range of hydrophobic formulations.

These models and related experiments show that properties close to superhydrophobicity can be obtained by using fabrics with a tailored roughness that are coated with fluor-free formulations.[1]

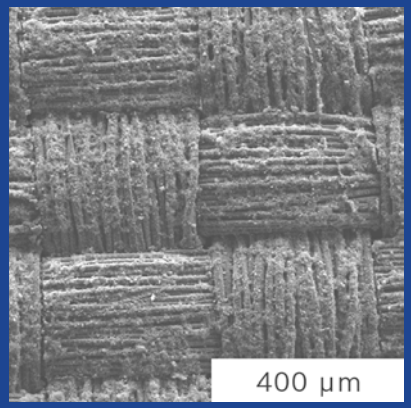


The appropriate weaving of textiles increases their roughness and thus their water resistance under certain circumstances, without the addition of fluorine compounds.

1 These results were published in open access in a scientific journal
- "How roughness controls the water repellency of woven fabrics", Materials & Design 2020, 187, 108389 https://doi.org/10.1016/j.matdes.2019.108389

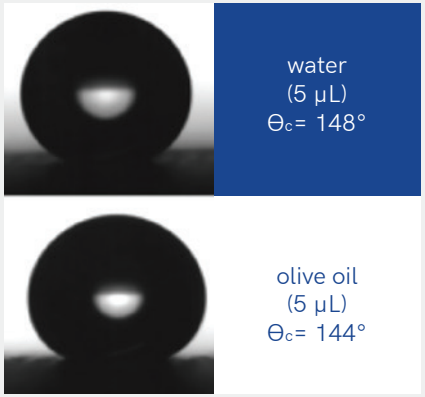
It has also been shown that it is possible to further increase this roughness by depositing silica particles, which increase the surface roughness of the fibres and thus produce superhydrophobic textiles, even without the addition of fluorinated compounds.

A strong oleophobicity can also be obtained by using C4 rather than C6 or C8 fluorinated compounds. [2]



scanning electron microscopy image showing the increased roughness of a fabric following the deposition of a superhydrophobic formulation containing silica particles.

2 These studies were published in open access in two scientific journals
- "Environmentally Friendly Super-Water-Repellent Fabrics Prepared from Water-Based Suspensions" , ACS Appl. Mater. Interfaces 2018, 10, 18 https://doi.org/10.1021/acsami.8b02707;
- "One-Step Aqueous Spraying Process for the Fabrication of Omniphobic Fabrics Free of Long Perfluoroalkyl Chains", ACS Omega 2019, 4, 16660 https://doi.org/10.1021/acsomega.9b02583



water and oil droplets on treated fabric

The results demonstrate that it is possible to rationally design fabric surfaces to obtain a high water-repellency without fluorocarbons, either by selecting fabrics of proper intrinsic roughness, or by boosting fabric roughness by tailoring the roughness of fibre surfaces.