

C6C8 turn GREEN – An eco-friendly alternative to fluorocarbon finishes

Motivation

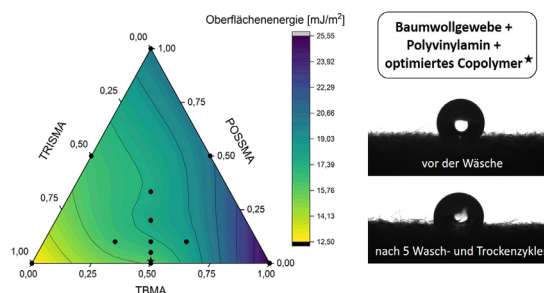
According to the current state of the art, the demand for permanent water-, soil- and oil-repellent properties in functional textiles is met through the application of fluorinated polymers or perfluorinated and polyfluorinated low-molecular-weight chemicals (PFCs). The beneficial properties achieved in textiles through this method are offset by environmental and human health risks. Leading manufacturers of textile auxiliaries are currently working on the development of high-performance fluorine-free products. Unfortunately, studies show that these products do not meet the requirements for oil repellency when compared to fluorocarbon treatments.

The aim of the project was to develop liquid-applied dispersions and solutions for the fluorine-free functionalisation of textiles. The objective was to achieve a water- and oil-repellent effect that met the necessary requirements for use in protective and outdoor clothing.



Approach and results

The project focused on the use of POSS (polyhedral oligomeric silsesquioxanes) and TRIS compounds ([Tris(trimethylsiloxy)silyl]) to achieve a water- and oil-repellent effect. Copolymer systems consisting of tert-butyl methacrylate (TBMA) and methacrylate functionalised POSS (POSSMA) and TRIS (TRISMA) were synthesised. For textile finishing, aqueous dispersions of the copolymer systems were produced using mini-emulsion polymerisation. Functionalisation of the textiles



Copolymer composition and images of the finished textile with a drop of ethylene glycol.

began with the application of an adhesion-promoting polyamine finish comprising cross-linking agent-containing aqueous polyvinylamine or chitosan formulations. In a second process step, functionalisation was carried out using the copolymer dispersion. Application was performed in each case using a foulard, followed by thermal drying and cross-linking.

Functionalised cotton fabrics achieved contact angles with water of up to 129° before and 112° after five wash (60 °C) and dry (70 °C) cycles. Contact angles with ethylene glycol of up to 123° (before washing) and 106° (after washing) demonstrated an oleophobic effect.

These developments are aimed at SMEs in the technical textiles, HOMETECH, SPORTTECH, MEDTECH, PROTECH and MOBILETECH sectors. The main areas of application are seen in protective, work and outdoor clothing. The fundamental added value of PFC-free equipment lies in reducing the burden on ecosystems. By creating an ecological alternative, the release of pollutants into the air, water and soil can be reduced.

Acknowledgement

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The final report on this project is available on request.

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