CREATING TEXTILES WITH "INTELLIGENT" LIQUID MANAGEMENT PROPERTIES BY SURFACE MODIFICATION WITH STIMULI-RESPONSIVE MICROGEL

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The aim of this research is to prepare both cotton and polyester fabrics with "intelligent" liquid management properties by functional finishing with stimuli-responsive microgel. The targeted use of these fabrics is in performance apparel, where the added value of controlled ("on-demand") liquid management could enable labeling these materials as advanced materials. The functional finishing i.e. the surface modification approach is expected to introduce advanced properties to the material without impairing its intrinsic properties which currently make both cotton and polyester the most widely used textile materials.

The stimuli-responsive microgel of particle size ~200 nm (in dry state), based on biopolymer (chitosan) and synthetic polymer (poly-NiPAAm), has been prepared. Its specific volume phase-transition (swelling and shrinking), triggered by pH and temperature, was assessed by different methods (DLS, UV-Vis). The incorporation of microgel to textile fabric was achieved by a simple pad-dry-cure procedure, using the surface modifying system that contained aqueous microgel dispersion and 1,2,3,4-butanetetracarboxylic acid (BTCA) as a crosslinking agent. This application method provides a thin film coating of textile fibres with satisfying durability to washing (SEM, XPS).

Responsiveness of advanced materials to ambient conditions (pH, temperature and humidity) has been assessed by different methods: moisture content (MC); water uptake capacity (WUC); water retention value (WRV); drying rates by moisture analyzer; thin layer wicking (TLW); and water vapour transmission rate (WVTR).

The conclusions show that the controlled expansion or contraction of the surface incorporated microgel particles provides textile material with "intelligent" liquid management property and that advanced material obtained reacts satisfactorily to the changes in ambient conditions.

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