

Textile finishing based on nanotechnologies

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Utilization of nanotechnologies for functionalization of textiles belongs to frequently mentioned innovative and perspective ways to achieve interesting functional effects using both conventional and new advanced technologies realized by commonly used and newly developed nanomaterials, applied mostly in minimized level regarding to nanoparticles features (dematerialization). This presentation will demonstrate the real activities and experience of INOTEX company in the area of textile finishing using nanosystems, i.e. development and results achieved in the frame of national and international projects aimed to textile nanotechnologies.



INOTEX as a participant of the project ALTERBIO, CK TACR (Centre for alternative environment friendly high effective polymer antimicrobial agents for industrial applications, TE02000006, 01/2014-12/2019) in cooperation with Palacký University, Olomouc is dealing with modification of textile materials with Ag nanoparticles firmly anchored on the fibre by impregnation and coating processes with the aim to obtain the wash-stable antimicrobial effect without any release of biocide components into the environment during use and maintenance cycles. This project is dealing also with functionalization of textiles with photocatalytically-active Al, Zn phthalocyanines, biocide effect of which is based on the singlet oxygen production. Photocatalytic finishing of textiles based on TiO₂ (anatase) nanoparticles for commercial applications, has been developed in the frame of project NANOCOVER, TAČR (Water nanodispersion for functional surface treatment, TA0101613, 2011-2014). Textiles with photocatalytic properties are produced by finishing with a stabilized nanodisperse system nanoTiO₂ NPs in combination with a protective and fixing copolymer siloxane-urethane-acrylic dispersion which besides the NPs anchoring on the fibre protect the finished textiles against photocatalytic damage, i.e. protection of the colouration and other finishings (e.g. OBA). The photocatalytic finishing TEXACTIV TiO₂ is suitable for interior textiles (curtains, drapes) in offices, schools, kindergartens, etc., because air pollutants, mainly VOCs (e.g. formaldehyde) decomposition). This finishing can be combined with the wash-permanent flameproof finishing of polyester textiles.

Some results of coating applications of NPs based functional systems will be presented as well, namely the application of CNTs/graphite nanodispersions for heated and electroconductive textiles (grids), production or utilization of ammonium polyphosphate NPs for flameproof eco-friendly Br/Sb-free back coatings of upholstery textiles (BS 5852), and modification of waterproof coatings by addition of nanocellulose for water vapour transport increase without impact on water impermeability.

In the frame of the project E! 5799 BATAN (Barrier Textiles and Nanomaterials, MŠMT L 12028 2012-2014) in cooperation with a company SPUR a.s. (Zlín) the deposition and stabilization

of nanofibrous layers on textile carriers has been studied for development of nanofibrous filtering materials for cleaning of air and gasses (air conditioning, PPE-facemasks, plated filters), liquids (water and fuels filtration) and for sound absorptive (acoustic insulating) advanced fibrous materials based on composite nanofibrous membranes.

INOTEX as a member of TNK 144 (Technical Standardization Commission of Czech Office for Standards, Metrology and Testing) participates in creation and amendments of international standards for evaluation of nanoparticles based systems and technologies utilized in different industrial branches.