

# Doctoral thesis

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Barbara Simončič+

## **Danijela Klemenčič : Antimicrobial protection of textiles with the use of nanosilver**

The doctoral thesis covers the research area of textile finishing and includes new processes of chemical modification of textiles with the aim of creating functional textile products with high added value. The study is interdisciplinary in which the research fields of textiles, chemistry, materials and microbiology are involved and interacted.

The main part of the research represents the development of a new universal procedure for the preparation of textile composites with antimicrobial, protective properties; this involved a coating containing silver (Ag). Chemical modification of cotton (CO), wool (WO), silk (SE), viscose (CV), polyamide (PA) and polyester (PES) fabrics as well as CO/PES and WO/PES fabric blends was performed in two steps, where a silica matrix was first created on the fibre surface by means of the application of an inorganic-organic binder (RB), silver chloride (AgCl) particles then being synthesised in situ. Properties of the coating were determined by SEM, EDS and ICP-MS analyses and microbiological tests. The results of the study show that the new procedure is suitable for the chemical modification of natural and synthetic fibres. The presence of the matrix increased the capacity of the fibres for AgCl adsorption, reduced the size of AgCl particles and enabled their physical embedding while not inhibiting their release from the fibres. Therefore, a higher concentration of the adsorbed AgCl in the silica matrix increased the antimicrobial activity of the coating even after repeated washing cycles.

The originality and contemporary nature of the doctoral thesis is proved by 8 scientific papers that Danijela Klemenčič and co-authors have published in internationally recognised journals, among them 5 in journals with an impact factor in the category of 1A1, which is recognised as scientific excellence.

Petra Eva Forte Tavčer+

## **Barbara Golja: Textile functionalisation by applying microcapsules**

Cotton fabrics were printed with microcapsules with a fragrance (essential oil), antimicrobial agent (triclosan) and flame-retarding agent (triphenylphosphate). Flame-retarding microcapsules were also printed onto PES nonwoven fabric. Impregnation and exhaustion processes were also used for fabrics treatment. The properties of treated fabrics and microcapsules were analysed before and after application and also after washing. The result of the research was a system for textile functionalisation with microcapsules for improvement of quality, functionality and usefulness of textile products.