

# Nanochemistry and Nanobiotechnology

## Wound dressing based on nonwoven fabrics with multilayered biologically active polymeric coating and silver nanoparticles

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Development of effective, with high therapeutic performance and cheap dressings to accelerate the healing of wounds, burns, injuries, to provide effective medical care in pre-hospital and at home is urgent task for today. Among the variety of dressings gel materials are the most preferred as they provide optimal conditions for wound healing (create a moist environment, provide gas and water vapor permeability, absorb exudate, non-traumatic etc.). The fabric reinforcement of gels provides strength to the dressing and the drug loaded dressings offer precise control of the release behavior. Application of inorganic nanoparticles and their nanocomposites can open up a new opportunity for anti-microbial and multi-functional modification of textiles. Silver nanoparticles are a non-toxic and non-tolerant disinfectant. Using silver nanoparticles leads to increase in number of particles per unit area and, thus, anti-bacterial effects can be maximized.

The manufacturing technology of multilayer coated non-woven fabric with silver nanoparticles for the treatment of wounds and burns at various stages of healing was developed in this paper. The process of wound dressing manufacture includes textile processing using the developed installation by passing through baths of working solutions and subsequent drying, followed by packaging of produced material. The coating of designed materials consists of alternating layers of natural and synthetic biocompatible polymers, which form gel on the fabrics surface during impregnation of textile support by hydrophilic polymers solutions. The upper layer of dressing is chitosan gel with antimicrobial activity. Polymeric coating contains plasticizer, crosslinking agents, anti-microbial agents such as drugs and silver nanoparticles, anesthetics.

The structure and properties of obtained materials have been characterized by methods of microscopy, optical spectroscopy, swelling ability, sorption capacity, water vapor permeability, capillarity. In a humid environment the gel is transformed into a hydrogel and allocates wound healing agents directly to the site of application with reduced pharmacological load on the whole body within the controlled time intervals. Designed wound dressings have prolonged desorption kinetics of biologically active and medicinal substances - up to 2 days.