

Izvirni znanstveni članek *Original Scientific Paper*

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Tekstilije iz novih sojinih proteinskih vlaken (SPF)

Textiles from New Soybean Protein Fibres (SPF)

Nova sojina proteinska vlakna (SPF) so bikonstituentna vlakna, izdelana iz 5–23 % sojinih proteinov in 77–95 % polivinilalkohola. Uporabljeni sojini proteini so stranski proizvod pri pridobivanju sojinega olja. V članku so opisani kemična in nadmolekulska struktura sojinih beljakovin, postopek izdelave SPF-vlaklen in njihove lastnosti. Pričakovana biorazgradljivost SPF-vlaklen temelji na znani biorazgradljivosti sojinih beljakovin in polivinilalkohola, kakor tudi filmov iz sojinih beljakovin in polivinilalkohola. Preje iz 100-odstotnih SPF-vlaklen in tkanine iz bombaža v osnovi in SPF-vlaklen v votku so bile 21 dni zakopane v humusni zemlji pri temperaturi 30 °C, 65-odstotni relativni vlažnosti, pri pH 6. Razmere, v katerih nastopi hitra biorazgradnja čistih bombažnih tekstilij, so povzročile minimalno poslabšanje mehanskih lastnosti preje iz SPF-vlaklen. Spektri ATR FT–IR kažejo na oslabitev medmolekulskih vodikovih vezi med segmenti protein-protein, PVA–PVA in protein–PVA in posledično povečanje dezorientacije v vrhnjih plasteh SPF-vlaklen. Vsebnost SPF-vlaklen v tkanini v smeri votka je vplivala na podaljšano ohranitev mehanskih lastnosti in strukture tkanine kot celote.

Ključne besede: fitoproteinska vlakna, sojina proteinska vlakna, polivinilalkohol, razgradnja

New soybean protein fibres (SPF) are biconstituent fibres containing 5–23% of soybean proteins and 77–95% of polyvinyl alcohol (PVA). Soybean proteins used for the manufacture of SPF are by-products of the soybean oil production. The chemical and supramolecular structure of soybean proteins, the process of manufacture of SPF fibres, and their properties are described in the article. The expected biodegradability of SPF is based on the well-known biodegradability of soybean proteins and polyvinyl alcohol as well on the biodegradability of the films made from soybean proteins and polyvinyl alcohol. Yarns made from 100% SPF and 100% cotton, and fabrics made from 100% cotton fibres and from cotton fibres in warp and SPF in weft were buried for 21 days in humus soil with temperature 30 °C, relative humidity 65% and pH 6. The conditions under which rapid biodegradation of pure cotton textiles took place induced only a slight decrease of mechanical properties of the SPF yarn. ATR FT–IR spectra displayed a reduction of intermolecular hydrogen bonds between protein-protein, PVA–PVA and protein–PVA segments and, consequently, the increase of disorientation in the upper layers of soybean protein fibres. The content

of SPF in weft direction was responsible for the prolonged retention of mechanical properties and structure of the fabric as a whole.

Keywords: *phytoprotein fibres, soybean protein fibres (SPF), polyvinyl alcohol (PVA), degradation*

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Vpliv barvanja bombaža z reaktivnim barvilom na adsorpcijo srebra

Influence of Dyeing Cotton with Reactive Dye on Adsorption of Silver

V raziskavi smo proučili vpliv reaktivnega barvila na bombažni tkanini na adsorpcijo srebra protimikrobnega sredstva RucoBac AGP, ki smo ga na tkanino nanašali po izčrpalnem postopku. Primerjalno smo RucoBac AGP nanesli tudi na tkanine, obdelane v slepi kopeli, ki je vsebovala vsa pomožna sredstva razen barvila. Funkcionaliziranim tkaninam smo določili vsebnost srebra, protimikrobno učinkovitost in pralno obstojnost. Proučili smo tudi vpliv obdelave bombaža s srebrom na belino in barvo bombaža. Raziskava je pokazala, da barvanje z reaktivnim barvilom vpliva na povečanje adsorpcije srebra na beljeno/mercerizirano bombažno tkanino in posledično na njeno protimikrobno učinkovitost. Spremembe beline in barve tkanine so opaznejše pri funkcionalizaciji tkanine z višjo koncentracijo RucoBac-a AGP. **Ključne besede:** bombaž, reaktivno barvilo, nanodelci, srebro, adsorpcija

The influence of reactive dyeing on the silver adsorption of antimicrobial agent RucoBac AGP on a cotton fabric was investigated for the research purpose. RucoBac AGP was applied on a cotton fabric using the exhaustion method. For a comparison, RucoBac AGP was applied on fabrics treated in a blank dye bath which contained all auxiliaries except for the dye. The quantity of silver, the antibacterial efficiency and wash-fastness were determined for functionalized fabrics. The whiteness and colour change of silver treated cotton fabrics were investigated as well. The research results show that dyeing with a reactive dye causes higher adsorption of silver on a bleached/mercerized cotton fabric and its antimicrobial efficiency. The changes in the whiteness and colour of the fabric are more visible when treating cotton with a higher concentration of RucoBac AGP.

Keywords: *cotton, reactive dye, nanoparticles, silver, adsorption*

Strokovni članek *Professional Paper*

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Izdelava prototipa varnostnega oblačila „Safety Vest“

Making of Safety Vest Prototype

Pametne tekstilije, od vlaken s posebnimi lastnostmi do tkanin z vgrajenimi elektronskimi komponentami, se danes uporabljajo za izdelavo pametnih oblačil. V sestavku je predstavljenih nekaj primerov oblačil, ki se predstavljajo kot koncept za nadaljnji razvoj in oblikovanje. Prav tako je predstavljen prototip varnostnega oblačila z vgrajenimi fotovoltaičnimi celicami in LED-svetili (Light-Emitting Diode), narejeno na Oddelku za tekstilstvo NTF v Ljubljani. Oblačilo, ki je bilo predstavljeno na konferenci LOPE-C (Large Area Organic & Printed Electronic Convention) v Frankfurtu, je bilo v izboru petih najboljših univerzitetnih mednarodnih prispevkov.

Ključne besede: pametna oblačila, varnostno oblačilo, prevodna vlakna, fotovoltaična vlakna, printing dress

Smart textiles, from fibres to fabrics with integrated special electronics, are nowadays used to develop smart clothing. In this paper, some examples for future design and development are presented. The “safety vest” with integrated photovoltaic cells and LED lights is included as well. The prototype of a “safety vest” was developed at the Department of Textiles, Faculty of Natural Sciences and Engineering, University of Ljubljana and was presented at the LOPE-C Conference (Large Area Organic & Printed Electronic Convention) in Frankfurt as one of five best international university contributions.

Keywords: safety vest, smart textiles, conductive fibres, photovoltaic fibres, “printing dress”