

## Predhodna objava *Preliminary Communication*

Alenka Pavko-Čuden, Anže Kupljenik

Univerza v Ljubljani, Naravoslovnotehniška fakulteta, Oddelek za tekstilstvo, Snežniška 5, SI-1000 Ljubljana/ *University of Ljubljana, Faculty of Natural Sciences and Engineering, Department of Textiles, Snežniška 5, SI – 1000 Ljubljana, Slovenia*

### Pletiva iz viskoze, pridobljene iz bambusove celuloze

*Knitted Fabrics from Bamboo Viscose*

V zadnjem desetletju narašča uporaba vlaken iz bambusa: naravnih bambusovih vlaken in predvsem regeneriranih celuloznih vlaken – viskoze iz bambusa. Prednost bambusa sta hitra in gosta rast ter možnost organske pridelave. Viskoza iz bambusa se pogosto uporablja za izdelavo pletiv za oblačila, hišne tekstilije in dodatke. Tekstilni izdelki iz viskoze, pridobljene iz bambusove celuloze, se odlikujejo po veliki vpojnosti, prijetnem otipu, poroznosti in zračni prepustnosti, pripisujejo pa jim tudi antimikrobni učinek ter UV-zaščitne lastnosti. V predhodni raziskavi so bila proučevana pletiva iz viskoze iz bambusa in mešanic z drugimi vlakni (organski bombaž, elastan, poliester) v različnih vezavah. Analizirani in primerjani so bili njihovi strukturni parametri, zračna prepustnost in vpojnost.

**Ključne besede:** bambus, viskoza iz bambusa, pletivo, zračna prepustnost, vpojnost

*In the last decade, the use of fibres from bamboo has been on the increase: natural bamboo fibres and regenerated cellulose fibres, bamboo viscose in particular. The advantage of the bamboo plant lies in its fast and dense growth and the possibility of organic production. Bamboo viscose is often used in the production of knitwear, home textiles and accessories. Textile products made of bamboo are characterised by high moisture absorption, pleasant hand, porosity and air permeability, as well as by the antibacterial effect, antifungal resistance and UV protection properties. In the preliminary research, knitted fabrics made from bamboo viscose and blends with other fibres (organic cotton, elastane, polyester) in various structures were analysed. Their structural parameters, air permeability and absorption properties were studied and compared.*

**Keywords:** bamboo, bamboo viscose, knitting, air permeability, moisture absorption

## Izvirni znanstveni članek *Original Scientific Paper*

Katja Kavkler<sup>1</sup>, Andrej Demšar<sup>2</sup>

<sup>1</sup> Zavod za varstvo kulturne dediščine Slovenije, Restavratorski center, Ljubljana, Slovenija, Poljanska 40, SI-1000 Ljubljana/*Institute for the Protection of Cultural Heritage of Slovenia, Restoration Centre, Ljubljana, Slovenia, Poljanska 40, SI-1000 Ljubljana*

<sup>2</sup> Univerza v Ljubljani, Naravoslovnotehniška fakulteta, Oddelek za tekstilstvo, Snežniška 5, SI-1000 Ljubljana/*University of*

*Ljubljana, Faculty of Natural Sciences and Engineering, Department of Textiles, Snežniška 5, SI – 1000 Ljubljana, Slovenia*

### Uporaba FTIR in ramanske spektroskopije pri kvalitativni analizi strukturnih sprememb celuloznih vlaken

*Application of FTIR and Raman Spectroscopy to Qualitative Analysis of Structural Changes in Cellulosic Fibres*

Vlakna spadajo v skupino organskih materialov, zato so občutljiva na zunanje vplive, ki povzročajo spremembe v strukturi materialov. Posledica strukturnih sprememb vlaken so tudi spremembe njihovih lastnosti. Na zunanje vplive so zelo občutljiva celulozna naravna vlakna, ki so bila v preteklosti pogosto uporabljena v oblačilih, uporabnih in okrasnih predmetih. Strukturno vlaken lahko analiziramo z vibracijskimi spektroskopskimi metodami. Infrardeča in ramanska spektroskopija sta komplementarni metodi, s katerima lahko analiziramo nadmolekulske strukturo vlaken (kristalinito in polimorfne oblike celuloze). V pričujoči raziskavi smo obe metodi uporabili za analizo staranih in z glivami okuženih celuloznih tekstilij. Izkazalo se je, da smo z izbranimi metodama lahko analizirali nadmolekulske strukturne spremembe v okuženih vzorcih, ki so se kazale kot depolimerizacija celuloznih makromolekul, in spremembe urejenosti nadmolekulske strukture vlaken. Ugotovili smo, da aktivna okužba, ki traja daljši čas, povzroči večje spremembe nadmolekulske strukture vlaken.

**Ključne besede:** celulozna vlakna, infrardeča spektroskopija, ramanska spektroskopija, struktura vlaken

*Fibres belong to organic materials and are therefore susceptible to external influences, causing structural changes in materials. The consequences of structural changes in fibres are the changes in their properties. Natural cellulosic fibres, which were in the past often used for clothing, decorative and applied arts, are very susceptible to external influences. The fibre structure can be analysed with vibrational spectroscopic methods. Infrared and Raman spectroscopies are complementary methods, allowing us to analyse the fibre supramolecular structure (crystallinity and different polymorph structures of cellulose). In the present work, both methods were applied for the analysis of aged cellulose textiles degraded by fungi. The selected methods turned out to be appropriate for the analysis of supramolecular structural changes in the biodegraded textiles, e.g. depolymerisation of cellulose macromolecules and changes in the arrangement of macromolecules. A prolonged time of active contamination with fungi led to more intensive supramolecular structural changes.*

**Keywords:** cellulose fibres, infrared spectroscopy, Raman spectroscopy, structure of fibres

## Pregledni znanstveni članek *Scientific Review*

Damjana Celcar

Laboratorij za produktno oblikovanje in tekstilne materiale, Visoka šola za dizajn v Ljubljani, Samostojni visokošolski zavod, Pridružena članica Univerze na Primorskem, Vojkova 63, SI-1000 Ljubljana/Laboratory for Product Design and Textile Materials, Academy of Design in Ljubljana, An Independent Higher Education, Associated Member of University of Primorska, Vojkova 63, SI-1000 Ljubljana, Slovenia

### Inteligentne tekstilije s fazno spremenljivimi materiali in njihov vpliv na toplotno udobje oblačil

*Influence of Intelligent Textiles with Phase-Change Materials on Thermal Comfort of Clothing*

V prispevku so predstavljene inteligentne tekstilije s fazno spremenljivimi materiali (PCMs), ki z dinamičnim shranjevanjem in sproščanjem latentne toplote v temperaturnem območju blizu temperature kože – medtem ko so izpostavljene faznemu prehodu iz trdnega v tekoče ali iz tekočega v trdno agregatno stanje – omogočajo uravnavanje telesne temperature ter s tem zagotavljajo ustrezno toplotno fiziološko udobje pri nošenju oblačil. Predstavljeno je tudi stanje raziskav pri proučevanju učinka vgrajenih fazno spremenljivih materialov v oblačilih na toplotno udobje uporabnikov oblačil. Na podlagi ugotovitev iz raziskav lahko sklepamo, da tekstilije z vgrajenimi PCMs vplivajo na toplotno udobje pri nošenju oblačil, vendar so ti vplivi zaznani le kot kratkotrajni toplotni učinki. To pomeni, da ob spremembi temperature okolice ali telesne aktivnosti oblačila s PCMs le kratkotrajno pripomorejo k uravnavanju telesne temperature ter s tem k zagotavljanju toplotnega udobja pri nošenju oblačil.

**Ključne besede:** fazno spremenljivi materiali (PCMs), inteligentne tekstilije, toplotno udobje, oblačila

*The paper presents intelligent textiles with phase-change materials (PCMs), also called latent heat storage materials. PCMs are materials that can absorb, store and release thermal energy as latent heat, while they go through a solid-liquid transition. They were developed to regulate the human body temperature fluctuations, assuring the thermal physiological comfort of the wearer. The paper offers a basic overview of phase-change materials, with the state of research in the field of studying the impact of PCMs incorporated in clothing on the thermal comfort of the wearer. Based on the findings, it can be concluded that textiles with PCMs influence the thermal comfort of the wearer; however, the clothing with PCMs indicates only temporary thermal effects. In consequence, when changing the ambient temperature or physical activity, clothing in the combination with phase-change materials only temporarily helps regulating body temperature, providing thermal comfort of the wearer.*

**Keywords:** phase-change materials (PCMs), intelligent textiles, thermal comfort, clothing

## Strokovni članek *Professional Paper*

Urška Stankovič Elesini<sup>1</sup>, Breda Goršek<sup>2</sup>

<sup>1</sup> Univerza v Ljubljani, Naravoslovnotehniška fakulteta, Oddelek za tekstilstvo, Snežniška 5, SI-1000 Ljubljana/ *University of Ljubljana, Faculty of Natural Sciences and Engineering, Department of Textiles, Snežniška 5, SI – 1000 Ljubljana, Slovenia*

<sup>2</sup> Ministrstvo za gospodarski razvoj in tehnologijo, Kotnikova 5, SI-1000 Ljubljana/ *Ministry of Economic Development and Technology, Republic of Slovenia, Kotnikova 5, SI-1000 Ljubljana, Slovenia*

### Označevanje tekstilnih izdelkov pred 8. majem 2012 in po njem

*Labelling of Textile Products prior to 8 May 2012 and afterwards*

Osemnajstega oktobra 2011 je bila v Uradnem listu Evropske unije objavljena nova Uredba (EU) št. 1007/2011 o imenih tekstilnih vlaken in s tem povezanim etiketiranju in označevanju surovinske sestave tekstilnih izdelkov ter razveljavitvi Direktive Sveta 73/44/EGS in direktiv 96/73/ES in 2008/121/ES Evropskega parlamenta in Sveta. Pravila nove uredbe bodo začela veljati 8. maja 2012, zato je prav, da se nanje dobro pripravimo. Pravila označevanja tekstilnih izdelkov v grobem ostajajo enaka, zato so v sestavku podane informacije tudi o trenutnem stanju na področju označevanja tekstilnih izdelkov in nekatere zahteve, zaradi katerih pri označevanju pogosto nastajajo napake. Z novo uredbo prihajajo nekatere novosti, spremembe in dopolnitve, na katere želimo opozoriti. Pregledneje je urejena tudi struktura novega dokumenta.

**Ključne besede:** označevanje, etiketiranje, tekstilni izdelki, uredba, pravilnik

*On 18 October 2012, the new Regulation (EU) no. 1007/2011 on textile names and related labelling and marking of the composition of textile products, and the repeal of the Council Directive 73/44/EEC, and Directives 96/73/EC and 2008/121/EC of the European Parliament and Council was published in the Official Journal of the European Union. The rules of the new regulations will come into force on 8 May 2012. The rules on the labelling of textile products will basically remain the same; hence, the information about the current state of the labelling of textile products and certain requirements, which often leads to errors at the labelling, is explained in the article. The new regulation brings a few novelties, changes and additions, which we would like to point out. Moreover, the structure of the new document is more transparently organised.*

**Keywords:** labelling, marking, textile products, regulation, rule