

**Izvirni znanstveni članek** *Original Scientific Paper*Beni Pavličič<sup>1</sup>, Lidija Černe<sup>2</sup>, Sabina Bračko<sup>2</sup> in Vesna Ferik Savec<sup>3</sup><sup>1</sup> Univerza v Ljubljani, Naravoslovnotehniška fakulteta, Oddelek za tekstilstvo, Snežniška 5, 1000 Ljubljana, Slovenija/*University of Ljubljana, Faculty of Natural Sciences and Engineering, Department of Textiles, Snežniška 5, SI – 1000 Ljubljana, Slovenia*<sup>2</sup> Univerza v Ljubljani, Naravoslovnotehniška fakulteta, Oddelek za tekstilstvo Snežniška 5, 1000 Ljubljana/*University of Ljubljana, Faculty of Natural Sciences and Engineering, Department of Textiles, Snežniška 5, SI–1000 Ljubljana, Slovenia*<sup>3</sup> Univerza v Ljubljani, Naravoslovnotehniška fakulteta, Oddelek za kemijsko izobraževanje in informatiko, Vegova 4, 1000 Ljubljana/*University of Ljubljana, Faculty of Natural Sciences and Engineering, Department of Chemical Education and Informatics, Vegova 4, SI–1000 Ljubljana, Slovenia***Vpliv UV-sevanja na obarvanja bombažnih tkanin z naravnimi barvili***Influence of UV Radiation on Cotton Fabrics Dyed with Natural Dyes*

Človek si od nekdaj poskuša popestriti življenje z barvami. Naravna barvila so neobstoja, še zlasti če so neposredno izpostavljena soncu, zato so se najbolj ohranili predvsem izdelki, ki so jih našli zakopane v zemlji ali globoko v jamah. Cilj raziskave je bilo barvnometrično vrednotenje sprememb obarvanj z barvili iz naravnih virov, ki so jih ljudje najpogosteje uporabljali, po različnih časih izpostavljenosti UV-sevanju. Uporabljena so bila barvila, pridobljena iz rdeče pese (*Beta vulgaris*), rdečega zelja (*Brassica oleracea*), črnega ribeza (*Ribes nigrum*), čebule (*Allium cepa*), hibiskusa (*Hibiscus*) ter žafranike (*Carthamus tinctorius*). Raziskava je pokazala, da so barvila iz skupine derivatov kinona, ki so prisotna v žafraniki, najbolj obstojna na UV-sevanje v primerjavi z drugimi izbranimi naravnimi barvili.

**Ključne besede:** naravna barvila, UV-sevanje, barvna metrika, barvanje bombaža

*The human being has always tried to variegate its life with colours. All natural dyes are not resilient, especially when they are directly exposed to sunlight. In most cases, only those products have remained preserved which were found buried in soil or in deep caves. The aim of this research was a colorimetric evaluation of the changes in the colourings from natural sources people have been using most frequently with regard to different periods of exposure to UV radiation. The dyes used were obtained from red beet (*Beta vulgaris*), red cabbage (*Brassica oleracea*), black currant (*Ribes nigrum*), onions (*Allium cepa*), hibiscus (*Hibiscus*) and safflower (*Carthamus tinctorius*). The research has shown that the dyes from the group of derivatives from quinone present in safflower are the most resistant to UV radiation in comparison with the rest of the chosen natural dyes.*

**Keywords:** natural dyes, UV radiation, colorimetry, dyeing of cotton

**Izvirni znanstveni članek** *Original Scientific Paper*Marica Starešinič<sup>1</sup>, Boštjan Šumiga<sup>2,3</sup>, Bojana Boh<sup>3</sup><sup>1</sup> Univerza v Ljubljani, Naravoslovnotehniška fakulteta, Oddelek za tekstilstvo, Snežniška 5, 1000 Ljubljana, Slovenija/*University of Ljubljana, Faculty of Natural Sciences and Engineering, Department of Textiles, Snežniška 5, SI – 1000 Ljubljana, Slovenia*<sup>2</sup> AERO, kemična, grafična in papirna industrija, d.d., Ipavčeva ulica 32, 3000 Celje/AERO, Chemical, Graphic and Paper Manufacturers, d.d., Ipavčeva 32, SI–3000 Celje, Slovenia<sup>3</sup> Univerza v Ljubljani, Naravoslovnotehniška fakulteta, Oddelek za kemijsko izobraževanje in informatiko, Vegova 4, 1000 Ljubljana/*University of Ljubljana, Faculty of Natural Sciences and Engineering, Department of Chemical Education and Informatics, Vegova 4, SI–1000 Ljubljana, Slovenia***Mikrokapsuliranje za tekstilno uporabo in uporaba analize SEM posnetkov za vizualizacijo mikrokapsul***Microencapsulation for Textile Applications and Use of SEM Image Analysis for Visualisation of Microcapsules*

Prispevek predstavlja možnosti za uporabo elektronske vrstične mikroskopije (SEM) pri raziskovalnem delu na področju mikrokapsuliranja in za vizualizacijo mikrokapsul po nanašanju na tekstilije. Predstavljeni sta laboratorijska in industrijska sinteza aminoplastnih mikrokapsul z in situ polimerizacijo melamin-formaldehidnih prepolimerov za mikrokapsuliranje dišav, eteričnih olj in fazno spremenljivih materialov (PCM). Z uporabo SEM smo proučevali naslednje lastnosti mikrokapsul v kombinaciji in v primerjavi s klasičnimi metodami za evalvacijo mikrokapsul: (a) videz, velikost in morfologija mikrokapsul, vključno z določanjem debeline stene, (b) vizualizacija porazdelitve mikrokapsul z dišavami in/ali eteričnimi olji na netkanih in tkanih tekstilnih nosilcih, (c) evalvacija mehanske trdnosti PCM mikrokapsul pod pritiskom pri povišani temperaturi, (d) detekcija morfoloških sprememb mikrokapsuliranih PCM, ki jih povzroča dodajanje amoniaka kot lovilca ostankov formaldehida. Za grafično analizo SEM fotografij smo uporabili programsko opremo ImageJ software.

**Ključne besede:** mikrokapsule, tekstilije, vrstična elektronska mikroskopija SEM, slikovna analiza, morfologija, dišave, fazno spremenljivi materiali (PCM)

*The article presents the possibilities of using scanning electron microscopy (SEM) for the microencapsulation research purpose and for the visualisation of microcapsule applications on textiles. The laboratory and industrial scale synthesis of aminoplast microcapsules with in situ polymerisation of melamine-formaldehyde pre-*

polymers, containing fragrances, essential oils and phase change materials (PCM) as core materials, is presented. The following properties of microcapsules were studied with the use of SEM in combination and in comparison with classical methods of microcapsule properties evaluation: (a) appearance, size and morphology of microcapsules, including the determination of wall thickness, (b) visualisation of fragrance and/or essential oils containing aminoplast microcapsules on non-woven and woven textile carriers, (c) evaluation of mechanical resistance of PCM microcapsule walls under pressure at an elevated temperature, and (d) detection of morphological changes of PCM microcapsules caused by ammonia scavenger. For graphical analyses, the processing of SEM images was performed with ImageJ software.

**Keywords:** microcapsules, textiles, SEM image analysis, morphology, fragrances, phase change materials, textiles

### Strokovni članek Professional Paper

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### Vrvice in vezalke na otroških oblačilih – nevarnosti, zakonodaja in priporočila *Cords and Drawstrings on Children's Clothing – Risks, Legislation and Guidelines*

Otroška oblačila in ostali proizvodi morajo biti pri uporabi v normalnih ali realno predvidljivih pogojih uporabe varni. Za tovrstne izdelke morajo varnostne zahteve zagotoviti na trgu varen proizvod. Pri otrocih je še zlasti treba upoštevati njihovo obnašanje in ravnanje, tj. igrivost, sproščenost in razigranost. Raziskave so pokazale, da zadušitve pomenijo kar 30 odstotkov vseh smrtnih primerov otrok v Evropi. Tretjini smrtnih primerov bi se lahko izognili z upoštevanjem veljavnih standardov glede varnostnih zahtev za vrvice in vezalke na otroških oblačilih. Standard nazorno prikazuje primere pravilne in nepravilne uporabe vrvic in vezalk na otroških oblačilih ter zanje predpisuje minimalne varnostne zahteve.

**Gljučne besede:** otroška oblačila, vrvice, vezalke, standard SIST EN 14682:2008

*Children's clothing and other products should be safe when used at normal or realistically predictable conditions. In these cases, the safety requirements have to ensure a safe product on the market. With children, special attention should be paid to their behaviour and playfulness. Research has shown that choking as a cause*

*of death accounts for 30% of all deaths among children in Europe. One third of these deaths could be avoided just by paying regard to the standards in force which are connected to the safety requirements for cords and drawstrings on children's clothing. The standard clearly shows and illustrates examples of correct and incorrect use of cords and drawstrings on children's clothing and lays down the minimum safety requirements.*

**Keywords:** children's clothing, cords, drawstrings, standard SIST EN 14682:2008