

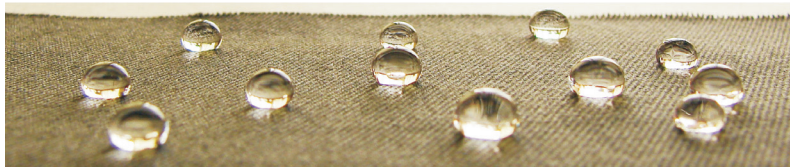
7. Atav R and Ozdogan E. Tavsan soyuna ait hayvanlardan elde edilen lifler – Angora. *Tekstil ve Konfeksiyon* 2004; 14: 75-80.
8. Atav R and Yurdakul A. Solvent assisted low temperature dyeing. Part I: Results for mohair (Angora Goat) fibres. *Fibres and Textiles in Eastern Europe* 2011; 19 6(89): 112-117.
9. Shao J, Liua J and Carr CM. Investigation into the synergistic effect between uv/ ozone exposure and peroxide pad-batch bleaching on the printability of wool. *Color. Technol.* 2001; 117: 270-275.
10. Akalın M, Merdan N, Kocak D, et al. Effects of ultrasonic energy on the wash fastness of reactive dyes. *Ultrasonics* 2004; 42: 161-164.
11. Kamel MM, El-Shishtawy RM, Hana HL, et al. Ultrasonic-assisted dyeing: I. Nylon dyeability with reactive dyes. *Polym. Int.* 2003; 52: 373-380.
12. Vajnhandl S, and Le Marechal AM. Ultrasound in textile dyeing and the decoloration/mineralization of textile dyes. *Dyes Pigm.* 2005; 65: 89-101.
13. <http://www.ntcresearch.org/pdf-rpts/anrp98/c95-g13.pdf> / 12.08.2008
14. Kamel MM, El-Shishtawy RM, Yussef BM, et al. Ultrasonic assisted dyeing III. Dyeing of wool with lac as a natural dye. *Dyes Pigm.* 2005; 65: 103-110.
15. El-Shishtawy RM, Kamel MM, Hana HL, et al. Ahmed, Ultrasonic-assisted dyeing: II. Nylon fibre structure and comparative dyeing rate with reactive dyes. *Polym. Int.* 2003; 52: 381-388.
16. Kamel MM, El-Shishtawy RM, Yussef BM, et al. Ultrasonic assisted dyeing: IV. Dyeing of cationised cotton with lac natural dye. *Dyes Pigm.* 2007; 73: 279-284.
17. Kamel MM, Helmy HM, Mashaly HM, et al. Ultrasonic assisted dyeing: Dyeing of acrylic fabrics C.I. Astrazon Basic Red 5BL 200%. *Ultrason. Sonochem.* 2010; 17: 92-97.
18. Atav R and Yurdakul A. The Use of Ultrasound in Dyeing of Mohair Fibres. In: *11th World Textile Conference AUTEX*, Moulhouse-France, 8-10 June 2011, pp. 277-280
19. Perincek S, Bahtiyari MI, Körlü AE, et al. Effect of ozone and ultrasound on the fibre properties of angora rabbit. *J. Appl. Polym. Sci.* 2011; 120: 3119-3125.
20. McNeil, S.J., McCall, R.A., Ultrasound for Wool Dyeing and Finishing. *Ultrasonics Sonochemistry* 2011; 18, 401-406.
21. Ferrero, F., Periolatto, M., Ultrasound for Low Temperature Dyeing of Wool with Acid Dye. *Ultrasonics Sonochemistry* 2012; 19, 601-606,
22. Pailthorpe MT. The theoretical basis for wool dyeing. In: Lewis DM (Ed.) *Wool Dyeing Society of Dyers and Colourists* 1992, pp. 69.

The Scientific Department of Unconventional Technologies and Textiles specialises in interdisciplinary research on innovative techniques, functional textiles and textile composites including nanotechnologies and surface modification.

Research are performed on modern apparatus, *inter alia*:

- Scanning electron microscope VEGA 3 LMU, Tescan with EDS INCA X-ray microanalyser, Oxford
- Raman InVia Reflex spectrometer, Renishaw
- Vertex 70 FTIR spectrometer with Hyperion 2000 microscope, Brüker
- Differential scanning calorimeter DSC 204 F1 Phenix, Netzsch
- Thermogravimetric analyser TG 209 F1 Libra, Netzsch with FT-IR gas cuvette
- Sigma 701 tensiometer, KSV
- Automatic drop shape analyser DSA 100, Krüss
- PGX goniometer, Fibro Systems
- Particle size analyser Zetasizer Nano ZS, Malvern
- Labcoater LTE-S, Werner Mathis
- Corona discharge activator, Metalchem
- Ultrasonic homogenizer UP 200 st, Hielscher

The equipment was purchased under key project - POIG.01.03.01-00-004/08 Functional nano- and micro textile materials - NANOMITEX, co-financed by the European Union under the European Regional Development Fund and the National Centre for Research and Development, and Project WND-RPLD 03.01.00-001/09 co-financed by the European Union under the European Regional Development Fund and the Ministry of Culture and National Heritage.



Textile Research Institute
Scientific Department of Unconventional Technologies and Textiles
Tel. (+48 42) 25 34 405
e-mail: cieslakh@iw.lodz.pl