

- taining conductive yarns. *Journal of Electrostatics* 1997; 39(4): 253-275.
9. Marozas V, Daukantas S, Lukosevicius A. A comparison of conductive textile-based and silver/silver-chloride gel electrodes in exercise electrocardiogram recordings. *Journal of Electrocardiology* 2011; 44(2): 57-58.
 10. Yuan C, Hou L, Li D. *et al.* Synthesis of flexible and porous cobalt hydroxide/conductive cotton textile sheet and its application in electrochemical capacitors. *Electrochimica Acta* 2011; 56; 6683.
 11. Khumpuang S, Miyake K, Itoh T. Characterization of a SWNT-reinforced conductive polymer and patterning technique for applications of electronic textile. *Sensors and Actuators A: Physical* 2011; 169: 378-382.
 12. Krucińska I, Urbaniak-Domagala W, Skoneczna M. *et al.* Possibility of the Application of Low Temperature Plasma for the Deposition of a Polypyrrole Insulating Layer to Construct a Textile-Based Organic Field Effect Transistor. *Fibres & Textiles in Eastern Europe* 2011; 19, 1(84): 78-83.
 13. Babu KF, Senthilkumar R, Noel M. *et al.* Polypyrrole microstructure deposited by chemical and electrochemical methods on cotton fabrics. *Synthetic metals* 2009; 159(13): 1353-1358.
 14. Cucchi I, Boschi A, Arosio C. *et al.* Bio-based conductive composites: Preparation and properties of polypyrrole (PPy)-coated silk fabrics. *Synthetic metals* 2009; 159(3-4): 246-253.
 15. Al-Ghamdi AA, El-Tantawy F. New Electromagnetic Wave Shielding Effectiveness at Microwave Frequency of Polyvinyl Chloride Reinforced Graphite/Copper Nanoparticles. *Composites Part A: Applied Science and Manufacturing*, 2010.
 16. Chen HC, Lee KC, Lin JH. Electromagnetic and electrostatic shielding properties of co-weaving-knitting fabrics reinforced composites. *Composites Part A: Applied Science and Manufacturing* 2004; 35(11): 1249-1256.
 17. Perumalraj R, Dasaradan BS. Electromagnetic Shielding Effectiveness of Doubled Copper Cotton Yarn Woven Materials. *Fibres & Textiles in Eastern Europe* 2010; 18, 3(80): 74-80.
 18. Brzeziński S, Rybicki T, Karbownik I. *et al.* Textile Multi-layer Systems for Protection Against Electromagnetic Radiation. *Fibres & Textiles in Eastern Europe* 2009; 17, 2(73): 66-71.
 19. Brzeziński T, Rybicki T, Malinowska G. *et al.* Effectiveness of Shielding Electromagnetic Radiation, and Assumptions for Designing the Multi-layer Structures of Textile Shielding Materials. *Fibres & Textiles in Eastern Europe* 2009; 17, 1(72): 60-65.
 20. Kim MS, Kim HK, Byun SW. *et al.*, PET fabric/polypyrrole composite with high electrical conductivity for EMI shielding. *Synthetic metals* 2002; 126(2-3): 233-239.
 21. Dall'Acqua L, Tonin C, Varesano A. *et al.* Vapour phase polymerisation of pyrrole on cellulose-based textile substrates. *Synthetic metals* 2006; 156(5-6): 379-386.
 22. Najar SS, Kaynak A, Foitzik RC. Conductive wool yarns by continuous vapour phase polymerization of pyrrole. *Synthetic metals* 2007; 157(1): 1-4.
 23. Im JS, Kim JG, Lee SH. *et al.* Enhanced adhesion and dispersion of carbon nanotube in PANI/PEO electrospun fibers for shielding effectiveness of electromagnetic interference. *Colloids and Surfaces A: Physicochemical and Engineering Aspects* 2010; 364(1-3): 151-157.
 24. Stejskal J, Trchová M, Kováčová J. *et al.* Polyaniline-coated cellulose fibers decorated with silver nanoparticles. *Chemical Papers* 2008; 62(2): 181-186.
 25. *TS EN ISO 2062: Textiles-Yarns from packages-Determination of single-end breaking force and elongation at break using constant rate of extension (CRE) tester*, 2010.
 26. Kaynak A, Najar SS, Foitzik RC. Conducting nylon, cotton and wool yarns by continuous vapor polymerization of pyrrole. *Synthetic metals* 2008; 158(1-2): 1-5.
 27. *ASTM D257-07: Standard Test Methods for DC Resistance or Conductance of Insulating Materials*, 2007.
 28. *ASTM D4935-10: Standard Test Method for Measuring the Electromagnetic Shielding Effectiveness of Planar Materials*, 2010.
 29. Brzeziński S, Rybicki T, Karbownik I. *et al.* Usability of a Modified Method for Testing Emissivity to Assess the Real Shielding Properties of Textiles. *Fibres & Textiles in Eastern Europe* 2010; 18, 5(82): 76-80.
 30. Kaynak A, Wang L, Hurren C. *et al.* Characterization of conductive polypyrrole coated wool yarns. *Fibers and Polymers* 2002; 3(1): 24-30.
 31. Kaynak A, Beltran R. Effect of synthesis parameters on the electrical conductivity of polypyrrole-coated poly (ethylene terephthalate) fabrics. *Polymer international* 2003; 52(6): 1021-1026.

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UNIVERSITY OF BIELSKO-BIAŁA

Faculty of Textile Engineering and Environmental Protection

The Faculty was founded in 1969 as the Faculty of Textile Engineering of the Technical University of Łódź, Branch in Bielsko-Biała. It offers several courses for a Bachelor of Science degree and a Master of Science degree in the field of Textile Engineering and Environmental Engineering and Protection.

The Faculty considers modern trends in science and technology as well as the current needs of regional and national industries. At present, the Faculty consists of:

- The Institute of Textile Engineering and Polymer Materials, divided into the following Departments:
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 - Physics and Structural Research
 - Textile Engineering and Commodity
 - Applied Informatics
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 - Sustainable Development
 - Processes and Environmental Technology
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