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<p>name of the unit:</p> <p><b>DEPARTMENT OF MATERIAL AND COMMODITY SCIENCES AND TEXTILE METROLOGY</b></p> <p>Institute of Material Science of Textile and Polymer Composites, Lodz University of Technology</p>		<p>symbol:</p> <p><b>I-42</b></p> <p><a href="http://www.k48.p.lodz.pl/">http://www.k48.p.lodz.pl/</a></p>
<p>head of the unit:</p> <p><b>Prof. Izabella Krucińska, PhD, DSc</b></p>	<p>potential promoters:</p> <p><b>Prof. Izabella Krucińska, PhD, DSc Ewa Skrzetuska, PhD, DSc, TUL Prof.</b></p>	<p>contact person:</p> <p><b>Prof. Izabella Krucińska, PhD, DSc</b> phone: 42-631-33-17 <a href="mailto:izabella.krucinska@p.lodz.pl">izabella.krucinska@p.lodz.pl</a></p>
<p>scope of activities:</p> <p>The main areas of interest and research directions are the following issues falling within the general concept of textronics:</p> <ul style="list-style-type: none"> <li>• fiber-forming polymers with electrically conductive and sensory properties,</li> <li>• multifunctional ink compositions based on electrically conductive polymers and nanoparticles,</li> <li>• technology for the production of textronic materials by surface modification using sputtering, printing and embroidery techniques,</li> <li>• research on textronic materials for use in medical devices,</li> <li>• research on textronic materials for measuring sensory sensitivity to mechanical, chemical and physical stimuli.</li> </ul>		 
<p>present activities:</p> <p>Due to the constantly growing demand for new, multifunctional textile materials, conductive polymers and nanomaterials, visible in many areas of life and techniques, the Institute of Materials Science of Textiles and Polymer Composites is developing a number of material solutions for the construction of textronic systems. Textronic systems for electrostimulation are being prepared and can be used during rehabilitation. A textronic system for measuring pneumography is being developed. Work is underway on the development of sensory mats for children. In addition, research is carried out on the development of textile sensors that respond to changes in temperature, humidity, and vapors and liquids of polar and polar solvents. Heating systems are developed that can be used in sleeping bags as well as in wheelchairs. Works related to sensors for monitoring vital parameters such as pulse or electrodes for ECG measurement are also carried out.</p>		 <p>Resistance When Breathing – Test Sample 2 – Bust Ig</p> 
<p>Future activities:</p> <p>Developing the current and building new, more advanced textronic systems, along with data collection and control systems, which will better collect vital parameters for monitoring, improve the quality of life of potential users and ensure optimal biophysical comfort.</p>		<p>graphic material</p>



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Publications/patents, awards, projects:

1. Skrzetuska Ewa, Michalak D., Krucińska Izabella, „Design and analysis of electrodes for electrostimulation (TENS) using the technique of film printing and embroidery in textiles”, *Sensors*, 21(14):4789 (2021)
2. Wilgocka K., Skrzetuska Ewa, Krucińska Izabella, Sujka W., „Textronic solutions used for premature babies: A review”, *Autex Research Journal*, doi: 10.2478/aut-2021-0034 (2021)
3. Skrzetuska Ewa, Wojciechowski Jarosław, „Investigation of the impact of environmental parameters on breath frequency measurement by a textile sensor”, *Sensors*; 20(4), 1179; doi: 10.3390/s20041179 (2020)
4. Krucińska Izabella, Skrzetuska Ewa, Surma Beata, Gliścińska Eulalia Magdalena, „Technologies Involved in the Manufacture of Smart Nonwoven Fabrics”, Chapter 11. *Non-woven Fabrics* Edited by Han-Yong Jeon, ISBN 978-953-51-2271-5, 324 pages, Publisher: InTech, Chapters published March 24, 2016 under CC BY 3.0 license DOI: 10.5772/60468 Edited Volume <http://www.intechopen.com/books/non-woven-fabrics/technologies-involved-in-the-manufacture-of-smart-nonwoven-fabrics>
5. Krucińska Izabella, Puchalski Michał, Skrzetuska Ewa, M. Rogala, I. Własny, P. Dąbrowski, P. J. Kowalczyk, A. Busiakiewicz, W. Kozłowski, L. Lipińska, J. Jagiełło, M. Aksienionek, W. Strupinski, A. Krajewska, Z. Sieradzki and Z. Klusek, „Graphene oxide overprints for flexible and transparent electronics”, *Applied Physics Letters* 106, 041901, doi: 10.1063/1.4906593 (2015)
6. Skrzetuska Ewa, Puchalski Michał, Krucińska Izabella, „Chemically Driven Printed Textile Sensors Based on Graphene and Carbon Nanotubes”, *Sensors*, 014, 14(9), 16816-16828
7. Krucińska Izabella, Skrzetuska Ewa, Urbaniak-Domagala Wiesława, „Printed Textiles with Chemical Sensor Properties”, *FIBRES & TEXTILES in Eastern Europe* 2014; 22, 4(106): 68-72
8. Krucińska Izabella, Surma Beata, Chrzanowski Michał, Skrzetuska Ewa, Puchalski Michał, „Application of melt-blown technology for the manufacture of temperature-sensitive nonwoven fabrics composed of polymer blends PP/PCL loaded with multiwall carbon nanotubes”, *Journal of Applied Polymer Science*, Volume 127, Issue 2, 15 January 2013, Pages 869-878, IF=1,395
9. Krucińska Izabella, Surma Beata, Chrzanowski Michał, Skrzetuska Ewa, Puchalski Michał, „Application of melt-blown technology for the manufacture of temperature-sensitive nonwoven fabrics composed of polymer blends PP/PCL loaded with multiwall carbon nanotubes”, *Journal of Applied Polymer Science*, Volume 127, Issue 2, 15 January 2013, Pages 869-878
10. Krucińska Izabella, Surma Beata, Chrzanowski Michał, Skrzetuska Ewa, Puchalski Michał, „Application of melt-blown technology in the manufacturing of a solvent vapor-sensitive, non-woven fabric composed of poly(lactic acid) loaded with multi-walled carbon nanotubes”, *Textile Research Journal*, Volume 83, Issue 8, May 2013, Pages 859-870, IF=1,135
- P1. Krucińska Izabella, Skrzetuska Ewa, Hausman Sławomir, Januszkiewicz Łukasz, „Patent. nr P.408711. „ Textile sensor for monitoring the respiratory rate ” 30.06.2014
- P2. I. Krucińska, M. Puchalski, E. Skrzetuska, Z. Draczyński, J. Jagiełło, M. Aksienionek, L. Lipińska, Z. Klusek, P. Dąbrowski, I. Własny, M. Rogala, Z. Sieradzki, K. Kołodziejczyk, „ A method of finishing textiles made of synthetic fibers, giving them anti-electrostatic properties and surface conductivity ” P. 410786, 29.12.2014 r.
- P3. Krucińska Izabella, Urbaniak-Domagala Wiesława, Skrzetuska Ewa, Chrzanowski Michał, „Method for Multifunctional Finishing of Textiles of Cellulose or Synthetic Fibres and Blands Thereof”, Patent EP 2420614
- P4. Krucińska Izabella, Urbaniak-Domagala Wiesława, Skrzetuska Ewa, Chrzanowski Michał, „ Method for Multifunctional Finishing of Textiles of Cellulose or Synthetic Fibres and Blands Thereof ”, Patent P. 392144, 2012
- P5. Krucińska Izabella, Urbaniak-Domagala Wiesława, Skrzetuska Ewa, Chrzanowski Michał, “A method of multifunctional finishing of textiles made of cellulose and synthetic fibers and their blends”, P 392144,
- P6. Krucińska Izabella, Urbaniak-Domagala Wiesława, Skrzetuska Ewa, Nossent K., „ A method of producing hybrid material with bacteriostatic and antistatic properties and the use of this material ”, P-389642, 2009
- W1. Diploma awarded by the Minister of Science and Higher Education, professor Lena Kolarska-Bobińska at the XXIII Invention Exchange in Warsaw, for the invention The method of anti-electrostatic finishing of textiles made of synthetic fibers with the use of graphene oxide by digital printing, (I. Krucińska, M. Puchalski, E. Skrzetuska, Z. Draczyński, J. Jagiełło, M. Aksienionek, L. Lipińska, Z. Klusek, P. Dąbrowski-Wiewiórczyn, I. Własny, M. Rogala, Z. Sieradzki, K. Kołodziejczyk) 2016



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W2. Golden medal at Concours Lépine Method of anti-electrostatic finishing of textiles made of synthetic fibers with the use of graphene oxide by digital printing method, 114th International Invention Fair „Concours Lépine”, (I. Krucińska, M. Puchalski, E. Skrzetuska, Z. Draczyński, J. Jagiełło, M. Aksienionek, L. Lipińska, Z. Klusek, P. Dąbrowski-Wiewiórczyn, I. Własny, M. Rogala, Z. Sieradzki, K. Kołodziejczyk) 2015

W3. Award granted by the Council for Higher Education and Science at the President of the City of Łódź for outstanding scientific, artistic and technical achievements "Łódzkie Eureka 2014" for "Outstanding achievements in the field of modern textile", Łódź, 2014, (I. Krucińska, W. Urbaniak - Domagała, E. Skrzetuska, M. Chrzanowski, E. Gliścińska, M. Michalak, D. Ciechańska, A. Błoda, J. Kazimierzak, E. Kopania, J. Wietecha)

W4. Gold medal at the 17th International Salon of Inventions and Innovative Technologies "Archimedes 2014" in Moscow for the invention "Modern personal protection of the KSRG rescue services based on the needs of end participants", Moskwa, (Main School of Fire Service (SGSP), Institute of Safety Technology "MORATEX", Lodz University of Technology, Central Institute for Labor Protection - National Research Institute (CIOP-PIB), Scientific and Research Center for Fire Protection (CNBOP), Medical University of Lodz, TEXA, Arlen SA, Firefighter Uniforms Factory, Kalisz Local Industry Works) 2014,

W5. Gold medal at the 42nd International Exhibition of Innovation Geneva Inventions (42st International Exhibition of Inventions of Geneva) 2014 for the invention "Modern personal protection of KSRG emergency services based on the needs of end participants", Geneva, (Main School of Fire Service (SGSP), Institute of Safety Technology "MORATEX", Lodz University of Technology, Central Institute for Labor Protection - National Research Institute (CIOP-PIB), Scientific and Research Center for Fire Protection (CNBOP), Medical University of Lodz, TEXA, Arlen SA, Firefighter Uniforms Factory, Kalisz Local Industry Works) 2014,

W6. Gold medal at International Engineering Invention & Innovation i-ENVEX 2014 in Malaysia for the invention "Modern personal protection of KSRG rescue services based on the needs of end participants", Malezja, ((Main School of Fire Service (SGSP), Institute of Safety Technology "MORATEX", Lodz University of Technology, Central Institute for Labor Protection - National Research Institute (CIOP-PIB), Scientific and Research Center for Fire Protection (CNBOP), Medical University of Lodz, TEXA, Arlen SA, Firefighter Uniforms Factory, Kalisz Local Industry Works) 2014,

W7. STATE SECURITY LEADER 2014 under the Honorary Patronage of the Head of the State Security Bureau for the invention "Modern personal protection of the KSRG rescue services based on the needs of end participants" (Main School of Fire Service (SGSP), Institute of Safety Technology "MORATEX", Lodz University of Technology, Central Institute for Labor Protection - National Research Institute (CIOP-PIB), Scientific and Research Center for Fire Protection (CNBOP), Medical University of Lodz, TEXA, Arlen SA, Firefighter Uniforms Factory, Kalisz Local Industry Works) 2014, The above medals were obtained as the results of inventive projects.

W1 and W2 are the result of the project "Production of printing inks and pastes based on graphene and development of a surface printing method for applications in printed flexible electronics", GRAF-TECH / NCBR / 15/25/2013, as a result of which the P2 patent application was filed.

W4 - W7 are the result of the project "Modern personal protection of the KSRG rescue services based on the needs of end users", O ROB 0014 01 / ID14 / 1, as a result of which the P1 patent application was filed.

1. „ Production of inks and printing pastes based on graphene and development of a surface printing method for applications in printed flexible electronics ”, GRAPH-PRINT, GRAF-TECH/NCBR/15/25/2013, 2013-2016,
2. „ Personalization of sports clothing by textronization with the assessment of the body's efficiency .”, PBS1/B9/2/2012, 2012-2015
3. Modern personal protection of KSRG rescue services based on the needs of end users , O ROB 0014 01/ID14/1, 2011-2014

Keywords:

textronics, sensors, flexible electronics, intelligent textiles

List of internship proposal in this research team:

Co-implementation of research works related to the development of textronic materials for health protection