

Reference

1. Li D and Xia Y N. Electrospinning of microfibers: Reinventing the wheel [J]. *Advanced Materials*, 2004; 16(14): 1151-1170.
2. Kriel H, Sanderson RD and Smit E. Coaxial Electrospinning of Miscible PLLA-Core and PDLLA-Shell Solutions and Indirect Visualisation of the Core-Shell Fibres Obtained. *Fibres and Textiles in Eastern Europe* 2012; 20, 2(91): 28-33.
3. Avella M, Martuscelli E and Raimo M. Properties of blends and composites based on poly(3-hydroxy) butyrate (PHB) and poly(3-hydroxybutyrate-hydroxyvalerate) (PHBV) copolymers. *Journal of Materials Science* 2000; 35(3): 523-545.
4. Anderson JM and Shive MS. Biodegradation and biocompatibility of PLA and PLGA microspheres. *Advanced Drug Delivery Reviews* 1997; 28(1): 5-24.
5. Gaudio CD, Ercolani E and Nanni R et al. Assessment of poly(epsilon-caprolactone) / poly(3-hydroxybutyrate-co-3-hydroxyvalerate) blends processed by solvent casting and electrospinning. *Materials Science and Engineering A-Structural Materials Properties Microstructure and Processing* 2011; 528(3): 1764-1772.
6. Han J, Branford-White CJ and Zhu LML. Preparation of poly(epsilon-caprolactone) / poly(trimethylene carbonate) blend microfibers by electrospinning. *Carbohydr Polymer* 2010; 79: 214-218.
7. Ju YM, Choi JS and Aboushwarcb T et al. Bilayered vascular scaffolds for engineering cellularized small diameter blood vessels[J] *Journal Of The American College Of Surgeons* 2010; 211(3): 144-145.
8. Ruoslahti E and Pierschbacher MD. *New Perspectives in Cell-Adhesion-RGD and Integrins*. Science, 1987; 238(4826): 491-497.
9. Rayleigh FRS. On the equilibrium of liquid conducting masses charged with electricity. *Edinburgh and Dublin Philosophical Magazine and Journal* 1984; 44: 184.
10. Min BM, Jeong L and Nam YS et al. Formation of silk fibroin matrices with different texture and its cellular response to normal human keratinocytes [J]. *International Journal of Biological Macromolecules* 2004; 34(5): 281-288.
11. Araujo ES, Nascimento MLF and de Oliveira HP. Influence of Triton X-100 on PVA Fibres Production by the Electrospinning Technique. *Fibres and Textiles in Eastern Europe* 2013; 21; 4(100): 39-43.
12. Chien HS and Wang C. Effects of Temperature and Carbon Microcapsules (CNCs) on the Production of Poly(D,L-lactic acid) (PLA) Nonwoven Microfibre Mat. *Fibres and Textiles in Eastern Europe* 2013; 21, 1(97): 72-77.
13. Peng LL, Yang Q and Shen XY et al. Electrospinning research of polycaprolactone / polyethylene glycol blending microfiber [J]. *Synthetic Fiber* 2008; 37: 25.
14. Boland ED, Pawlowski KJ and Barnes CP et al. Electrospinning of bioresorbable polymer for tissue engineering scaffolds[M]. *USA Washington: AMER CHEMICAL SOC* 2006, 918: 188-204.
15. Yang F, Mumgan R and Wang S et al. Electrospinning of micro/micro scale poly(L-lactic acid) aligned fibers and their potential in neural tissue engineering. *Biomaterials* 2005; 26(15): 2603-2610.
16. Zeinab Karemi, Iraj Rezaeian and Payam Zahedi, et al. Preparation and Performance Evaluation of Electrospun Poly(epsilon-caprolactone), Poly(lactic acid), and Their Hybrid(50/50) Microfibrous Mats Containing Thymol as an Herbal Drug for Effective Wound Healing [J]. *Journal of Applied Polymer Science* 2013; 129(2): 756-766.
17. Oliveira JE, Mattoso LHC and Orts W J et al. Structural and morphological characterization of micro and microfibers produced by electrospinning and solution blow spinning: A Comparative Study [J]. *Advances in Materials Science and Engineering*, 2013; (409572).
18. Haroosh HJ, Chaudhary DS and Dong Y. Electrospun PLA/PCL fibers with tubular microclay: Morphological and structural analysis [J]. *Journal of Applied Polymer Science* 2012; 124(5): 3930-3939.
19. Ye H, Lam H and Titehenal N et al. Reinforcement and rupture behavior of carbon Microtubese Polymer microfibers [J]. *Applied Physics Letters*, 2004; 85(10):1775-1777.
20. Krupa A, Sobczyk AT and Jaworek A. Surface Properties of Plasma-Modified Poly(vinylidene fluoride) and Poly(vinyl chloride) Microfibres. *Fibres and Textiles in Eastern Europe* 2014; 22, 2(104): 35-39.
21. Kriel H, Sanderson RD and Smit E. Single Polymer Composite Yarns and Films Prepared from Heat Bondable Poly(lactic acid) Core-shell Fibres with Submicron Fibre Diameters. *Fibres and Textiles in eastern Europe* 2013; 21; 4(100): 44-47.

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The **Laboratory** is active in testing fibres, yarns, textiles and medical products. The usability and physico-mechanical properties of textiles and medical products are tested in accordance with European EN, International ISO and Polish PN standards.

Tests within the accreditation procedure:

- linear density of fibres and yarns, ■ mass per unit area using small samples, ■ elasticity of yarns, ■ breaking force and elongation of fibres, yarns and medical products, ■ loop tenacity of fibres and yarns, ■ bending length and specific flexural rigidity of textile and medical products

Other tests:

- **for fibres:** ■ diameter of fibres, ■ staple length and its distribution of fibres, ■ linear shrinkage of fibres, ■ elasticity and initial modulus of drawn fibres, ■ crimp index, ■ tenacity
- **for yarn:** ■ yarn twist, ■ contractility of multifilament yarns, ■ tenacity,
- **for textiles:** ■ mass per unit area using small samples, ■ thickness
- **for films:** ■ thickness-mechanical scanning method, ■ mechanical properties under static tension
- **for medical products:** ■ determination of the compressive strength of skull bones, ■ determination of breaking strength and elongation at break, ■ suture retention strength of medical products, ■ perforation strength and dislocation at perforation

The Laboratory of Metrology carries out analyses for:

- research and development work, ■ consultancy and expertise

Main equipment:

- Instron tensile testing machines, ■ electrical capacitance tester for the determination of linear density unevenness - Uster type C, ■ lanometer