Polish-Israeli Conference on Electrospinning and Tissue Engineering

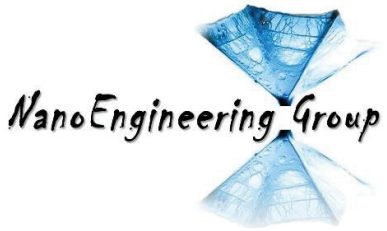
Programme and Abstracts

04 - 05 October 2018

Warsaw, Poland

Organizers

Laboratory of Polymers & Biomaterials at Institute of Fundamental Technological Research Polish Academy of Sciences (IPPT PAN) based on the fundamental knowledge in the area of polymer physics, materials science, chemistry and biotechnology, focuses its recent activity on biomaterials for tissue engineering. Great part of our activity is related to polymeric biodegradable scaffolds, mostly formed by electrospinning as nanofibrous structures, both for tissue regeneration and materials for controlled drug release.



Nano Engineering Group at Technion Israel Institute of Technology is focused on research in the field of molecular engineering of soft matter. The particular activities are related to the electrospinning including optimization of the parameters of the process, deep understanding of the fundamental physical facets of electrospinning as well as designing a composite materials for tissue engineering applications.

Objectives

The goal of PICETE conference is to bring together experts from around the world in order to exchange their knowledge, experience and research innovation in the basics of the electrospinning and the broad area of biomedical materials covering topics related to designing, fabrication, characterisation and tissue engineering applications.

The conference will include the following topics:

- Fundaments of electrospinning
- Optimization of electrospinning
- Properties of electrospun nanofibers
- Functionalization of electrospun nanofibers
- Electrospun nanofibers as scaffolds for tissue engineering/drug delivery systems
- Current trends in designing of polymeric biomaterials for tissue engineering/drug delivery systems

Surface functionalization of polymer nanofibers for tissue engineering applications

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Abstract

Polyesters, such as polycaprolactone, polylactide and poly(lactide-co-caprolactone) are commonly used polymers in tissue engineering applications, especially in the form of electrospun nanofibers scaffolds. Their attractiveness is associated with good mechanical properties as well as appropriate morphology, which is similar to extracellular matrix (ECM) architecture. However, hydrophobicity and the lack of reactive functional groups on their surface limit their effective interactions with cells [1]. To overcome this problem, polymer nanofibers are subjected to different kinds of surface modifications. One of them is aminolysis combined with immobilization of cells-adhesive proteins. Aminolysis reaction improves wettability of nanofibers and provides free amino groups, which are exposed on the surface for further functionalization with biological molecules, such as collagen, gelatin or fibronectin [2].

In this study, polycaprolactone, polylactide and poly(lactide-co-caprolactone) electrospun nanofibers were aminolyzed using ethylenediamine solution. After that, gelatin immobilization was carried out. At given conditions surface modification did not cause change of morphology. On the basis of ninhydrin test for detection of amino groups and measurements of contact angle (Fig.1.) it was confirmed that surface modification was effective for polylactide and poly(lactide-co-caprolactone) electrospun nanofibers. Aminolysis seems to be uneffective for polycaprolactone nanofibers, but the explanation of this phenomena requires further studies.

Image

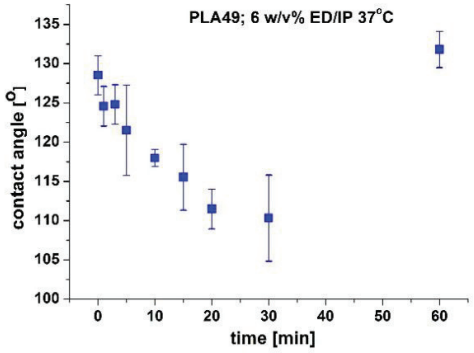

Fig. 1. Decrease of water contact angle of polylactide nanofibers after aminolysis reaction.

References

1. Vasita R., Shanmugam K., Katti D.S. Improved biomaterials for tissue engineering applications: surface modification of polymers. *Current Topics in Medical Chemistry* 2008, *8*: 341-353.
2. Ma Z., Mao Z., Gao C. Surface modification and property analysis of biomedical polymers used for tissue engineering. Colloids and Surfaces B: Biointerfaces 2007, 60: 137-157.

Acknowledgments

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functionalization by chemical methods of nanofibers made of polycaprolactone formed in electrospinning (UMO-2016/23/B/ST8/03409) operated by the
National Science Centre.

Biography

Oliwia Jeznach graduated from Warsaw University of Technology with Master's degree in Material Engineering. Currently, she is PhD student at Institute of Fundamental Technological Research, Polish Academy of Sciences. Her research interests are focused on surface modification of electrospun nanofibers for improvement of cells-scaffold interaction.

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