

Annual Conference and Expo on **Biomaterials**

March 14-16, 2016 London, UK

Study the effect of pulsed e-beam on properties of biodegradable PLLA scaffolds prepared by different methods

V. L. Kudryavtseva¹, P.G. Kuznetsov¹, D. V. Ponomarev², G.E. Remnev², E. N. Bolbasov¹ and S.I. Tverdokhlebov¹

¹Institute of Physics and Technology, Tomsk Polytechnic University, Tomsk, Russia

²Institute of High Technology Physics, Tomsk Polytechnic University, Tomsk, Russia

The effect of nanosecond pulsed electron beam irradiation on properties of polylactic acid (PLLA) scaffolds was investigated. Nonwoven nanofiber materials were formed by solution blow spinning (SBS) method and electrospinning (ES) method with subsequent annealing at 90°C for 10 hours. The scaffolds modification was performed employing TEA-500 Pulsed Electron Beam Accelerator (Tomsk Polytechnic University) with absorbed dose from 26 to 260 kGy. The absorbed dose was monitored by the change in optical density of standard film badge dosimeter. Properties of the scaffolds were examined by means of viscosity measurement, XRD analysis, FTIR spectroscopy and scanning electron microscopy. It was shown that pulsed electron beam exposure leads to the reduction of polymer molecular weight, recrystallization, and changes in surface morphology: growth of mean fibers diameter under low absorbed doses and fibers damage under higher absorbed doses.

Pulsed electron beam modification of PLLA scaffolds significantly changes their physical and chemical properties that allows assuming this method as a potential technology for polymer degradation rate manipulation and production of polymer materials with required properties which may not be achieved by any other method.

This work was financially supported by the Ministry of Education and Science of the Russian Federation, Federal Target Program (agreement # 14.578.21.0031, unique identifier RFMEFI57814X0031).

Biography

Valeriya Kudryavtseva is completing her Master of Condensed Matter Physics degree from Institute of Physics and Technology, National Research Tomsk Polytechnic University (TPU), Russia.

kudr.valeriya@gmail.com

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