Programme

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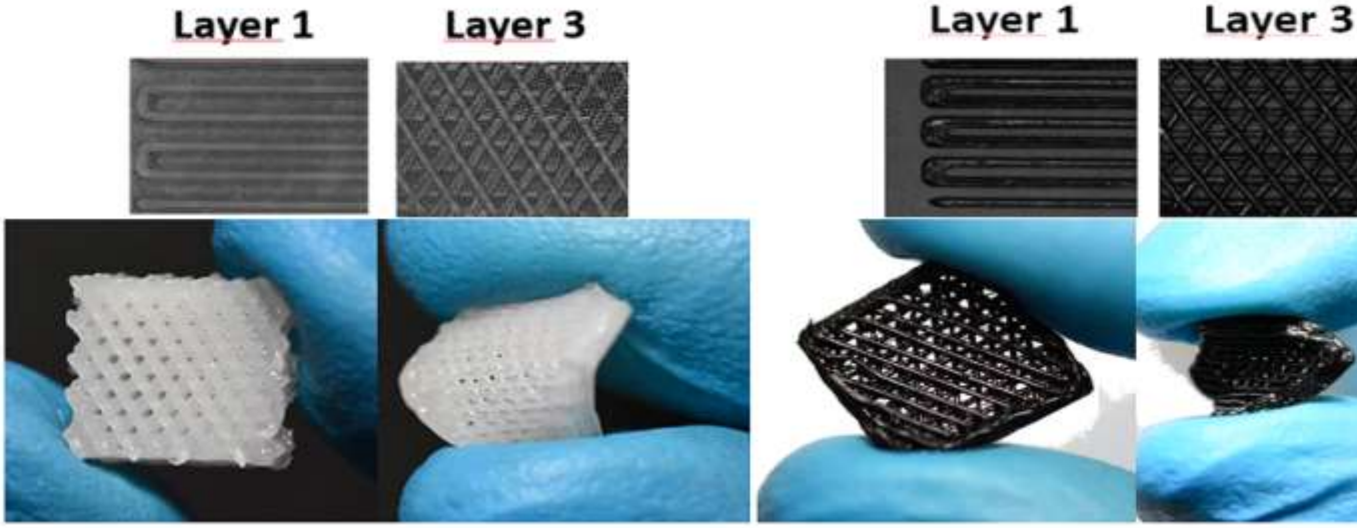
Picture 1:



Caption 1: Photographs of PCL scaffolds (left) and PCL/TrGO scaffolds (right)

Poster presentation session C 11:15 - 12:15 12/09/2018

Poster presentation

875 Effect of poly(glycerol succinate) addition on properties of PLA electrospun fibres

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INTRODUCTION:

Polylactic acid (PLA) is a biobased polymer, produced from renewable resources [1]. High tensile strength, biodegradability and non-toxicity of PLA, allows it to be used in medical applications. However, the problem of pure PLA is high brittleness. Therefore it is copolymerized or blended to improve elasticity, e.g: with polycaprolactone [2]. “Green” substitute for currently used components could be poly(glycerol) succinate (PGS), which is synthesized via polycondensation from bio-sourced monomers - glycerol and succinic acid [1]. It was shown that PGS and its modifications with maleic anhydride are effective enhancers elasticity of extruded PLA [1,3].

For the first time we show electrospun blends of PLA and PGS. Morphology, structure and mechanical properties of PLA/PGS electrospun fibers were evaluated.

METHODS:

PLA/PGS fibers with different PGS gel content (2-40 wt%) were obtained via electrospinning.Morphology was characterized using scanning electron microscope (JSM-6010PLUS/LV InTouchScope™Jeol). Structure and thermal properties were evaluated by X-ray diffraction (XRD, D8 Discover, Bruker) and differential scanning calorimetry (DSC, Pyris-1, Perkin-Elmer). Mechanical properties of 10x50 mm samples were measured by uniaxial testing machine (Lloyd EZ-50).

RESULTS AND DISCUSSION:

Addition of PGS did not affect fibers morphology significantly. Even in the case of 40 wt% content of PGS fibers are free of beads and uniform. XRD results indicated amorphous nature of obtained materials. Temperature of cold crystallization increased with the PGS addition, which can be caused by lower mobility of PLA chains in blends. Elongation at break was raised from 100% for pure PLA to 200% and 240% for PLA with 10% and 20% of PGS, respectively. Interestingly, also enhancement of stress at break and Young modulus was observed for sample with the highest amount of PGS.

As it was discussed in the literature, the phenomenon of enhancement of PLA elasticity could be related to molecular bonding interactions and entanglement between PLA and PGS chains [1].

CONCLUSION:

It was shown that it is feasible to obtain uniform electrospun PLA/PGS fibers. Investigations confirmed that PGS is effective enhancer of PLA elasticity, without changing amorphous nature of PLA. Due to suitable biomimetic structure of PLA/PGS electrospun fibers, the next step will be investigation of cytotoxicity.

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