ArtiVasc 3D

HIGHLIGHT

AALTO, March 31, 2014

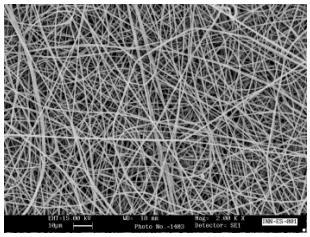

Figure 1: PLA fibers

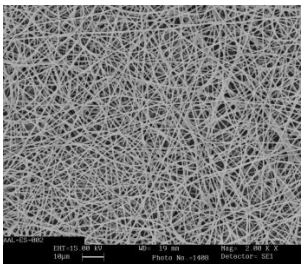

Figure 2: P(CL30/LLA70) copolymer fibers

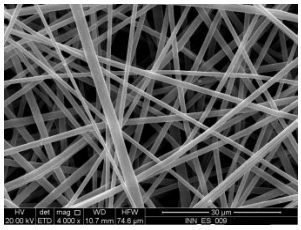

Figure 3: PLGA fibers

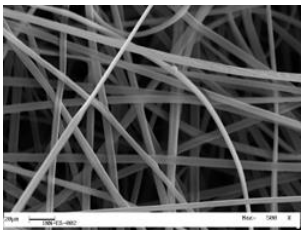

Figure 4: PS fibers

Polymeric material for production of supporting 3D scaffolds or surrounding fibers

After the first 24 months of the project more than 22 polymers, copolymers and polymer mixtures suitable for electrospinning were developed.

14 out of 22 polymers were synthesized- the synthesized and purchased polymers were divided in two groups: non-biodegradable and biodegradable materials. In addition, 2 polymer mixtures containing collagen were created and 6 materials were purchased from commercial suppliers.

Altogether there is large set of electrospinneable materials available for generating electrospun meshes for the project.

The electrospinning process was adapted and optimized to achieve the design and the fabrication of non-woven fleeces of commercial PCL, PLLA, PLGA, PS, PMMA and synthetic P(CL/LA) copolymers at different monomer ratios of caprolactone and lactide (both L-, and D,L-lactide). Additionally novel PEUU and PEU copolymers and PLA-collagen mixtures were transformed into fleeces.

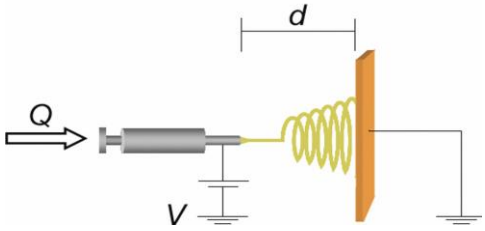

Figure 5: Typical electrospinning setup. Q, flow rate; d, distance between plate and needle; V, applied voltage. (Pham et al. 2006)

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Most of the fleeces showed morphologies characterized by uniform and bleadless fibers.
Fleeces fabricated at the partners institutions (more than 100 meshes in total) are under investigation for their cytotoxicity and cell proliferation. Experiments were carried out to modify the surface of polymer fibers in meshes to allow the attachment of biological active molecules like growth factors.

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