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BioScaff - Structural and mechanical properties of electrospun scaffolds dedicated to soft tissue engineering

Since the early 2000s, major efforts are being made to develop new scaffolds dedicated to cell growth for tissue regeneration but very few concern the reconstruction of soft tissues such as striated muscle, fibrous tissue, blood vessels or peripheral nervous system for instance. The major constraint on the reconstruction of such tissues is to give these supports simultaneously a bioresorbable character, a biomimetic structure and a mechanical behavior close to that of the tissue to regenerate. Such scaffolds must ensure the preservation of the mechanical properties but also allow the flow of biological fluids and therefore the transport of nutrients and cells that are essential for the process of cell growth and healing. The strategy adopted to reach this goal is to produce highly elastic scaffolds composed of nanofibers based on biodegradable and biocompatible polymers. Their mechanical properties are controlled both by the intrinsic property of the polymers and by the structure of the fibrous network. New scaffolds made on polycaprolacton, PCL and triblock copolymers with poly (lactic acid)s, PLAs, blocks separated by a Poly (ethylene glycol), PEG, block in the center were obtained. These polymers were electrospun in 3D nanofibrous structures. We succeeded in structuring the non-woven mats that control their porosity by using structured collectors providing different regular and reproducible mesh. Their mechanical properties under tensile test have been characterized and a correlation with the deformation of the elementary cell of the structure is proposed.

Biography

Frederic Bossard has completed his PhD of Physics from the Université de Bretagne Occidentale, France and a Post-doctoral position at the ICEHT-FORTH of Patras, Greece in 2002. He has joined the University of Grenoble in 2006 as Associate Professor and became full Proffessor in 2012. He was specialized in Rheology and Polymer processing. He is the Secretary General of the French Group of Rheology. Since 2010, his research activity focuses on the development of biopolymer-based nanomaterials dedicated to tissue engineering and regenerative medicine applications.

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