BIOENGINEERING AND MEDICAL-SURGICAL SCIENCES

3D electrospun scaffolds

Funded By	Politecnico di TORINO [P.iva/CF:00518460019]
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Context of the research activity	The main objective of this research is related to the development of biomaterials and their processing with electrospinning to obtain fibrous structures that could exert specific physical and biological functions. In particular, the research will focus on the development of an implantable, non resorbable fibrous membrane for the treatment of open angle glaucoma able to allow a suitable filtration of aqueous humor to reduce intraocular pressure as well as to enable the controlled release of bioactive agents.
	Context of the research activity 3D fabrication technologies are gathering increasing interest in the biomedical field as they allow to obtain biomimetic, 3D structures (scaffolds). Electrospinning (ESP) is one of the most popular, versatile and affordable technology to fabricate nano-micro-fibrous thin scaffolds. In ESP, a charged polymer solution flowing out of a needle is drawn by a strong electrostatic field generating a jet that is collected on a charged collector. The process is governed by many variables and parameters and the final mat architecture is defined by the collector shape (e.g., flat or grooved plate, rotating drums, and spaced electrodes). In the last 10 years, a new set-up has emerged and

Objectives	holds great promise for several applications allowing for the fabrication of core-shell fibrous structure using a modified spinneret (co-axial ESP). In this case, two different solutions are delivered to a co-axial capillary and are then drawn generating a core-sheat fibre configuration. The use of coaxial electrospinning enable loading the fibre with different active molecules as well as tuning their release kinetics and the overall mechanical properties of the obtained scaffold thus offering a versatile technology to address several biomedical applications. In particular, the research will focus on the development of a fibrous membrane to tackle ocular glaucoma enabling a suitable filtration of aqueous humor to reduce the intraocular pressure and the release of antifibrotic drugs. The proposed technologies and the developed biomaterials might find applications also in another biomedical fields involving soft tissues (e.g. skin, heart).

Skills and competencies for the development of the activity	The candidate should preferably have laboratory experience in the synthesis and characterisation of materials as well as ability to work in team in the frame of a research project.