

# BIOENGINEERING AND MEDICAL-SURGICAL SCIENCES

## Ateneo - Carriers, hydrogels and electrospun structures to deliver drugs and molecules

<b>Funded By</b>	Politecnico di TORINO [P:iva/CF:00518460019]
<b>Supervisor</b>	VITALE BROVARONE CHIARA - chiara.vitalebrovarone@polito.it
<b>Contact</b>	FIORILLI SONIA LUCIA - sonia.fiorilli@polito.it
<b>Context of the research activity</b>	Innovative solutions in the biomedical fields often requires the in situ, sustained release of drugs and active molecules to promote specific biological functions and to exert a therapeutic effect. Several possible applications could benefits by in situ targeted release of drugs and active molecules provided by the platform of carriers and conveying strategies (e.g. hydrogels and 3D structures) that will be investigated during the PhD thesis unfolding.
<b>Objectives</b>	<p>The thesis will develop a platform of novel carriers to incorporate drugs and biomolecules. The carries will be synthesis and fully characterised in terms of phisical-chemical features, drug incorporation, release kinetics, sterilisation procedure and biocompatibility. The carriers will then be conveyed to the target site dispersed in a hydrogel or within and electrospun 3D structure, also exploiting core-sheath configuration. Both hydrogel and electrospun systems will be designed and fully characterised taking into consideration the rheological behaviour, injectability, cross-linking and degradation kinetics for the hydrogel and fibre orientation, diameter and patch thickness for the electrospun structure.</p> <p>The developed systems could find potential applications to target pathologies affecting several tissues such as heart tissue remodeling after myocardial infarction and the eye in the case of open angle glaucoma. Heart and circulatory diseases cause millions of death worldwide every year and the release of drugs such and anti-inflammatory, antifibrotics and cardiomyocytes proliferating agents in situ could help promoting a more functional tissue remodeling. Glaucoma is a disease that impairs progressively and permanently the vision of millions of people worldwide and is strictly connected with ageing and with the increase of the intraocular pressure. Also in this case, the delivery of drugs lowering intraocular pressure, preventing fibrosis and targeting ageing cells could be effective. During the course of the PhD thesis one or both applications will be targeted and potentially new field of applications investigated. Collaborations with clinicians and period abroad to complete the research activities are also foreseen.</p>

**Skills and competencies for the development of the activity**

Biomedical engineering background.  
Experience in the synthesis of nanoparticles such as polymeric ones (e.g., PLGA) and inorganic ones (mesoporous silica).  
Know-how on hydrogels and rheological characterisation  
Experience in the development of electrospun structures.  
Ability to work on a team.