BIOENGINEERING AND MEDICAL-SURGICAL SCIENCES

CRT/DISAT - Engineered particles for advanced tissue regeneration applications

Funded By	Dipartimento DISAT FONDAZIONE CRT CASSA DI RISPARMIO DI TORINO [P.iva/CF:06655250014]
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Context of the research activity	Innovative solutions in the biomedical fields often requires the in situ, sustained release of drugs, therapeutic ions, nutrients and active molecules to support biological functions and exert a therapeutic effect. This goal can be achieved through the use of particles loaded with active ingredients, serving as functional agents within a composite formulation designed for localised delivery. The development of these particles and their innovative content will be framed within an environmentally and economically sustainable framework.
Objectives	This thesis will focus on the development of a platform of micro- and nano-particles designed to incorporate drugs, ions and molecules. The particles will be synthesised using spray-drying, electrospraying, and emulsion techniques, employing environmentally friendly and sustainable sources. They will be fully characterised in terms of their physicochemical properties, drugs, ion and molecule incorporation, release kinetics, and overall efficacy. The functional particles developed will be integrated into biocompatible and resorbable polymeric formulations, enabling the 3D printing of composite layers. These composites formulations are expected to have potential applications in tissue regeneration, particularly in the restoration of colorectal mucosa and submucosa tissues. Throughout the PhD research, these applications will be investigated, and new potentially fields of application may also be explored.
Skills and competencies for the development of the activity	Background in Biomedical Engineering. Expertise in the synthesis of drugs and therapeutic ions containing particles using spray-drying, electrospinning/electrospraying technologies, as well as sol-gel and emulsion processes. Experience in in vitro cell testing, including cell isolation, expansion and in vitro assays.