PhD in Electrical, Electronics and Communications Engineering

Research Title: Research and development active implantable drug delivery devices

Funded by	Politecnico di Torino and Houston Methodist Hospital

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Context of the research activity	• Development of a remotely/on-board controlled drug delivery platform • Designing and executing experiments demonstrating therapeutic/preventative efficacy • Drafting results for submission towards grant applications and reputable journals • Providing input on strategic planning for positioning the platform for commercialization and clinical translation • Working with graduate students, postdoc, and research staff to complete research • Assisting protocols preparation for and with experiments with both small and large animal models • Collecting both *in vitro* and *in vivo* data • Assuring compliance with Methodist policies, rules, and regulations to meet federal, state, and local standards • Performing other duties as assigned PhD Students will undertake their PhD training at both POLITO and at TMHRI. The Students' training at TMHRI shall be only a research component. The research activity that the Students will typically spend 24 months of the Programme at TMHRI in Houston. TMHRI will cover the salary of the student for this period, while the remaining 24 months will be paid by POLITO with the Ph.D scholarship. Any time spent at TMHRI in Houston beyond two (2) years shall be subject to TMHRI's written approval. Completion of

	all PhD studies is expected to be achieved by the end of 48 (forty-eight) months from the Student's commencement of his or her Ph.D. program at POLITO.

Objectives	The aim of the research is to opmtimize and validate a novel, remotly-controlled nanofluidic implant based on the nanochannel Delivery System (nDS) for in vivo drug delivery. The implant will enable tunable therapeutic release by modulating the nanochannel surface charge by means of an applied electrical potential across a silicon membrane. The implant will be remotly controlled, allowing modulation (activation and interruption) of drugs via radio-frequency (RF). The pivotal objectives of the project are: - Characterization of the implant investigating its tunable control release in vitro - Characterization of the RF-controlled implant in vivo by investigating the pharmacokinetics of selected molecule - Demonstrate tunable administration in vivo

Skills and competencies for the development of the activity	• Experience with electrochemistry, Bluetooth communications, and/or adaptive controllers • Familiarity of molecular transport and the micro- and nanoscale level • Comfortable familiarity with device design and relevant Computer-Aided Design software (SolidWorks, ProE, etc.) • Creativity, reliability, and a high amount of personal initiative • Strong track record of peer-reviewed publications • Excellent English speaker and writer • Familiarity with grant and fellowship applications • Adaptability to join a fast-paced research group • Ability to work effectively on a team • Strong interpersonal skills