



# PhD in BIOINGEGNERIA / BIOENGINEERING - 40th cycle

## THEMATIC Research Field: DEVELOPMENT OF ADVANCED ORGAN-ON-CHIP PLATFORMS FOR RESEARCH ON PATHOPHYSIOLOGICAL MODELS

Monthly net income of PhDscholarship (max 36 months)
<b>€ 1400.0</b>
In case of a change of the welfare rates during the three-year period, the amount could be modified.

Context of the research activity	
<b>Motivation and objectives of the research in this field</b>	<p>Organ-on-Chip (OoC) technology combines the use of microfluidics, biomaterials, and advanced cell cultures in order to generate and monitor miniaturized replicas of human tissues and organs in vitro. It is an enabling technology involving interdisciplinary expertise from the fields of engineering, physics, and cell/molecular biology. Application areas include environmental assessment, toxicological evaluation of chemical agents, drug screening and disease modeling, among others. The aim of the project is to develop novel organs on chip platforms to extract patho-physiological parameters from different tissue models.</p>
<b>Methods and techniques that will be developed and used to carry out the research</b>	<p>The design and the development of new advanced microscale in vitro platforms will consider state-of-the-art technologies, micro- and nano-fabrication, including organ models previously developed by Prof. Rasponi group at Politecnico di Milano. Computational modeling will be used to optimize geometrical parameters.</p> <p>The proposed research plan is divided into 3 Actions.</p> <p>A1: Development of a new organ-on-chip platform able to host advanced tissue models, and definition of a protocol for mimicking healthy and pathological conditions</p> <p>A2: Development of new technologies to interrogate the generated microtissues and extract patho-physiological parameters</p> <p>A3: Integration of the sensing technologies into the organ-on-chip platform and their exploitation to dissect</p>



	<p>on-chip platform and their exploitation to dissect mechanism of pathologies and/or screen new therapies</p> <p>The research will be implemented at the MiMic and EvOoC Laboratories, Department of Electronics, Information and Bioengineering of Politecnico di Milano, while secondment periods may be considered.</p>
<b>Educational objectives</b>	<p>To train the PhD student in organs-on-chip technology, microfluidics, microfabrication, soft-lithography, cell culture applications, micro-bioreactors.</p> <p><a href="http://www.biomech.polimi.it/mimiclab">http://www.biomech.polimi.it/mimiclab</a></p> <p><a href="https://www.polifab.polimi.it/">https://www.polifab.polimi.it/</a></p>
<b>Job opportunities</b>	R&D Engineer in companies developing innovative solution in the drug development field
<b>Composition of the research group</b>	<p>0 Full Professors</p> <p>1 Associated Professors</p> <p>4 Assistant Professors</p> <p>6 PhD Students</p>
<b>Name of the research directors</b>	Prof. Marco Rasponi

<b>Contacts</b>	
<i>Prof. Marco Rasponi</i>	
marco.rasponi@polimi.it, +39-02-2399-3377	
paola.occhetta@polimi.it	

<b>Additional support - Financial aid per PhD student per year (gross amount)</b>	
<b>Housing - Foreign Students</b>	--
<b>Housing - Out-of-town residents (more than 80Km out of Milano)</b>	--

<b>Scholarship Increase for a period abroad</b>	
<b>Amount monthly</b>	700.0 €
<b>By number of months</b>	6



**Additional information: educational activity, teaching assistantship, computer availability, desk availability, any other information**

The research will be carried out by an interdisciplinary research group, bringing both basic and translational research expertise and long-lasting experience in the drug development process. Politecnico di Milano (IT) - POLIMI unit has access to microfabrication facilities. It has renowned experience in developing and studying biological models within custom-designed microfluidic devices for cell cultures and tissue engineering, with a focus in the field of cartilage tissue engineering. The PhD student will join the MiMic Lab research group (<http://www.biomech.polimi.it/mimiclab>), coordinated by Prof. Marco Rasponi, and the EvOoC Lab (headed by Prof. Paola Occhetta)

- 1. Educational activity:** The student will be encouraged to attend to courses with subjects in tissue engineering, cell and tissue culture, micro and nanofabrication either at POLIMI or abroad in International Schools.
- 2. Teaching assistantship:** There are various forms of financial aid for activities of support to the teaching practice. The PhD student is encouraged to take part in these activities, within the limits allowed by the regulations.
- 3. Computer and desk availability:** the student will be allowed to access facilities of both MiMic Lab and EvOoC Lab of the DEIB.