



# PhD in BIOINGEGNERIA / BIOENGINEERING - 39th cycle

**PARTENARIATO PNRR Research Field: PHYSIOLOGICAL BARRIERS-ON-CHIP FOR THE EVALUATIONS OF ENVIRONMENTAL DETERMINANTS ON HEALTH**

**Monthly net income of PhDscholarship (max 36 months)**

**€ 1400.0**

In case of a change of the welfare rates during the three-year period, the amount could be modified.

## Context of the research activity

**Motivation and objectives of the research in this field**

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 introduce physiological barriers on chip models (e.g. lung-on-chip and gut-on-chip platform) able to recapitulate the mechanisms of absorption of molecules/particles.

This project research is in the framework of "ANTHEM: AdvANced Technologies for Human-centrEd Medicine" Codice PNC0000003 CUP B53C22006720001 PIANO NAZIONALE COMPLEMENTARE (PNC) Decreto Direttoriale n. 931 del 6 giugno 2022 AVVISO PER LA CONCESSIONE DI FINANZIAMENTI DESTINATI AD INIZIATIVE DI RICERCA PER TECNOLOGIE E PERCORSI INNOVATIVI IN AMBITO SANITARIO E ASSISTENZIALE da finanziare nell'ambito del PNC

**Methods and techniques that will be developed and used to carry out the research**

The design and the development of new advanced microscale in vitro platforms will consider state-of-the-art technologies, micro- and nano-fabrication. Computational



	technologies, micro- and nano-fabrication. Computational modeling will be used to optimize geometrical parameters. The design and the development of new advanced microscale in vitro platforms will consider state-of-the-art technologies, micro- and nano-fabrication. Computational modeling will be used to optimize geometrical parameters. Advanced cell culture protocols will be designed and optimized. The developed microphysiological systems will be used to assess the mechanisms of absorption of environmental determinants. The research will be implemented at the MiMic Lab, Department of Electronics, Information and Bioengineering of Politecnico di Milano, while secondment periods are envisioned.
<b>Educational objectives</b>	To train the PhD student in organs-on-chip technology, microfluidics, microfabrication, soft-lithography, cell culture applications, micro-bioreactors. <a href="http://www.biomech.polimi.it/mimiclab">http://www.biomech.polimi.it/mimiclab</a> <a href="https://www.polifab.polimi.it/">https://www.polifab.polimi.it/</a>
<b>Job opportunities</b>	The candidate will develop interdisciplinary knowledge and skills ranging from tissue engineering to cellular biology, besides working on cutting-edge methodologies and research. This will make the PhD candidate a highly attractive individual on the job market.
<b>Composition of the research group</b>	0 Full Professors 1 Associated Professors 1 Assistant Professors 5 PhD Students
<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	

<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>	--



Scholarship Increase for a period abroad	
Amount monthly	700.0 €
By number of months	6

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

- 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 CBLab and  $\mu$ BSLab of the DEIB.

The research will be carried out by an interdisciplinary consortium, 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 group, led by Prof. Marco Rasponi (<http://www.biomech.polimi.it/mimiclab>), and which counts on the following composition:

Number of Associate Professors: 1

Number of Assistant Professor: 1

Number of PhD students: 5

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