



PhD in BIOINGEGNERIA / BIOENGINEERING - 38th cycle

THEMATIC Research Field: HUMAN IMMUNOCOMPETENT LUNG-ON-CHIP MODELS TO RECAPITULATE INFECTIOUS RESPIRATORY DISEASES

Monthly net income of PhDscholarship (max 36 months)

€ 1325.0

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 a 3D lung-on-chip platform able to mimic the human alveolar functions. Specifically, the platform will host the main components of the immune system of the lung. Therefore, the platform will recapitulate the events underlying infectious respiratory diseases.

BANDO INPS

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 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. The proposed research plan is divided into 3 Actions.



	<p>divided into 3 Actions.</p> <p>A1: Development of lung epithelial barrier on chip.</p> <p>A2: Integration of immune components in the lung model.</p> <p>A3: Definition of a protocol for the infection of the lung and evaluation of immune system response.</p> <p>The research will be implemented at the MiMic Lab, Department of Electronics, Information and Bioengineering of Politecnico di Milano, while secondment periods are envisioned.</p> <p>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),</p>
Educational objectives	<p>To train the PhD student in organs-on-chip technology, microfluidics, microfabrication, soft-lithography, cell culture applications, micro-bioreactors. http://www.biomech.polimi.it/mimiclab https://www.polifab.polimi.it/</p>
Job opportunities	<p>The research will be carried out in strong cooperation with BiomimX Srl, spinoff of Politecnico di Milano, developing organ-on-chip models. Moreover, a secondment period is foreseen at the facilities of the University Hospital of Basel (CH). The Consortium involved will thus offer large opportunities for interdisciplinary research careers.</p>
Composition of the research group	<p>0 Full Professors 1 Associated Professors 1 Assistant Professors 5 PhD Students</p>
Name of the research directors	PROF. MARCO RASPONI

Contacts
<i>Prof. Marco Rasponi</i>



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Additional support - Financial aid per PhD student per year (gross amount)

Housing - Foreign Students	--
Housing - Out-of-town residents (more than 80Km out of Milano)	--

Scholarship Increase for a period abroad

Amount monthly	662.5 €
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.

Computer and desk availability: the student will be allowed to access facilities of both CBLab and μ BSLab of the DEIB.

Bando di Concorso Inps

Dottorati di ricerca in materia di

- Industria 4.0;
- Sviluppo sostenibile;
- Welfare e Benessere.

Per la erogazione di borse di studio in favore dei figli e orfani di:

- Dipendenti e pensionati della pubblica amministrazione iscritti alla Gestione Unitaria delle Prestazioni creditizie e sociali;
- Pensionati utenti della Gestione Dipendenti Pubblici.

(<https://www.inps.it/Welfare/default.aspx?sPathID=%3b0%3b46013%3b46039%3b46046%3b46047%3b&lastMenu=46047&iMenu=13&iNodo=46047&ipagina=1&sregione=&stipologia=&ianno=0&inumeroelementi=12&itipologia=11&idettaglio=545>)