

## Marco Rasponi - Curriculum vitae

### Biosketch

Marco Rasponi serves as Associate Professor at the Department of Electronics, Information and Bioengineering of Politecnico di Milano. His teaching activities are in the field of Microfluidics for cell culture applications.

Once attained his PhD title in 2006, he was awarded a fellowship for research activity at Massachusetts Institute of Technology, where he spent 16 months as Postdoctoral Fellow. In 2008 thanks to a Fondazione Cariplo research grant he went back to Politecnico di Milano starting, and subsequently consolidating, the microfabrication and experimental microfluidics research activities.

Since then: i) he coordinated or managed research projects for a total amount greater than €8M; ii) he supervised the activity of 10 PhD students (9 graduated CUM LAUDE) and is currently supervising or co-supervising 9 PhD students; iii) he submitted 6 patent applications in the field of microtechnologies (of which, 3 granted and 2 transferred); and iv) he contributed to the publication of more than 60 peer reviewed international papers (H-index 23 from Scopus on 12/04/2023), 6 book chapters in the field of microfluidics and edited a book on Organs-on-Chip. In 2020 he became executive board member of the European Organ-on-Chip Society.

In 2022 he was awarded with the national scientific qualification to function as a Full Professor of Bioengineering (competition sector 09/G2)

His main scientific interest is the development of microfluidic technologies for the development of enabling tools in the fields of cell and tissue bioengineering, with particular focus on in vitro patho-physiological models and Organs-on-Chip devices.

### Education

2006 "Dottorato di Ricerca" (PhD) Bioengineering at the Interpolytechnic School of Doctorate, consortium of Politecnico di Bari, Politecnico di Milano and Politecnico di Torino. Title of the thesis: "Novel techniques for bioMEMS design".

2002 Master degree in Biomedical Engineering at Politecnico di Milano, Milan, Italy (final degree: 96/100). Title of the thesis: "Design, realization and validation of a prototype of a flexible left ventricle for a pulsatile benchmark" (Advisor: Prof. Alberto Redaelli).

### Professional Experiences

Dec 2022 - present **Associate professor** at the Department of Electronics, Information and Bioengineering of Politecnico di Milano (Milan, Italy).

Aug 2021 - present **Panelist of the ANVUR**, the National Agency for the Evaluation of Universities and Research, in the Area "Industrial and Information Engineering"

July 2020 - present **Executive Board Member** of the European Society of Organ-on-Chip

May 2017 - present **Co-founder and President at BiomimX Srl**

Oct 2015 - Dec 2022 **Assistant professor** at the Department of Electronics, Information and Bioengineering of Politecnico di Milano (Milan, Italy).

Jun 2008 - Sep 2015 **Postdoctoral fellow** at the Bioengineering Department of Politecnico di Milano (Milan, Italy)

Principal investigator in several projects on Microfluidics for biological applications.

Feb 2007 - May 2008 **Postdoctoral fellow** at the Microfluidic modeling and design laboratory of MIT (Boston, MA, US)

Design and development of a microfluidic artificial lung, for the whole blood oxygenation based on photocatalytic activity.

Mar 2006 - Jan 2007 **Postdoctoral fellow** at the Bioengineering Department of Politecnico di Milano (Milan, Italy)

Implementation of advanced computational models of microfluidic devices.

- Feb 2003 – Mar 2006 **PhD candidate in Bioengineering** at Politecnico di Milano (Milan, Italy).  
Novel techniques for BioMEMS design
- Sep 2005 - Dec 2005 **Visiting PhD student** at the Microfluidic modeling and design laboratory of MIT (Boston, MA, US)  
Oxygenation and emolysis of blood in microscale artificial lung models
- Jan 2005 - Jul 2005 **Visiting PhD student** at the Biofluidic Micro Systems Carnegie Mellon University (Pittsburgh, PA, USA)  
Cells and particles sorting in microfluidic devices
- Sep 2003 – Dec 2003 **Visiting PhD student** at the Biozentrum (Basel, Switzerland)  
Implementation of indentation-type atomic force microscopy strategies to measure elastic modulus of biological samples (e.g. cartilage)

### **Experiences in project coordination**

#### *European projects*

- 2019 - 2023 Coordinator of the European Project “SINERGIA” (Horizon 2020 – MSCA-ITN-2019 - 860715).
- 2019 - 2021 Local Coordinator of the the European Project “BrainCircuit-on-chip” (ERC-2018-PoC - 842423)
- 2019 - 2021 Coordinator of the European Project “uKNEEversal” (Horizon 2020 – MSCA-IF 2018 - 841975)
- 2015 - 2018 Project Manager of the European Project “MUSICA” (Horizon 2020 – MSCA-ITN-2014 -642458).

#### *Projects financed by other international bodies*

- 2017 - 2021 Local coordinator of the project “A 3D microfluidic osteochondral model to investigate mechanisms triggering osteoarthritis and therapeutic effects of bioactive factors produced by human nasal chondrocytes” funded by the Swiss National Foundation.

#### *National projects funded by national agencies*

- 2018 - 2021 Local coordinator of the project “Cholangiocytes-on-a-chip: a platform to identify medical therapy” funded by the Italian Ministry of Health under the Young Researcher 2016 call.
- 2017 - 2019 Local coordinator of the project “Creation of a national network of IIZZSS laboratories involved in the development and application of alternative methods, and in the implementation of the good laboratory practice system” funded by the Italian Ministry of Health.
- 2016 - 2017 Local coordinator of the project “Development of methodologies alternative to the animal use in the activities of diagnostics and control of biological products in Zooprophyllactic Institutes” funded by the Italian Ministry of Health.
- 2015 - 2020 Local coordinator of the project “Selective cerebrospinal fluid hypothermia: bioengineering development and in vivo study of an intraventricular cooling device (V-Cool) for acute stroke therapy” funded by the Italian Ministry of Health under the Young Researcher 2012 call.

#### *National projects funded by private agencies*

- 2019 - 2022 Coordinator of the project “uKNEEque: a 3D microfluidic osteochondral model to investigate mechanisms triggering age-related joint pathologies and therapeutic effects of bioactive factors produced by nasal chondrocytes” funded by Fondazione Cariplo.
- 2013 - 2016 Coordinator of the project “Smart nanostructured hydrogel systems for generation of contractile cardiac organoids” funded by Fondazione Cariplo.

- 2009 - 2011      Coordinator of the project "Microfluidic large scale integrated devices with individual chamber control functionalized with active polymers for high-throughput screening in microscale 3D tissue models" funded by Fondazione Cariplo.

### **Teaching Experience**

- Since AY 2015-16 Professor of the course *Bioartificial Systems at the Micro and Nano Scale I*, in Biomedical Engineering at Politecnico di Milano, Italy.
- Since AY 2019-20 Professor of the course *Technologies for Regenerative Medicine*, in Biomedical Engineering at Politecnico di Milano, Italy.
- In the AY 2018-19 Professor of the course *Perspectives In Biomedical Engineering Technologies* (PhD level), in collaboration with Prof. Justin Cooper-White (University of Queensland)
- *Introduction to Lab-on-Chip technologies and biological applications* (PhD level) Prof. A Redaelli and GB Fiore. I was co-organizer of the course, inviting international lecturers: Prof. Ali Khademhosseini (Harvard Medical School), Prof. Justin Cooper-White (University of Queensland), Prof. Winnie E. Svendsen (Technical University of Denmark).

### **Honors and Awards**

- First place in the Jr. Investigator Poster Contest at the Safety Pharmacology Society 2019 Annual Meeting
- Best poster award in the track "Biomaterials and tissue engineering" at the Sixth National Congress of Bioengineering in 2018
- Prize awarded at the ESB Conference 2015 for the best poster
- Mentor of 5 Master theses and 2 PhD theses receiving a national or international award
- First place awarded in the innovation contests StartCup Lombardia 2016 and Switch2Product 2018

### **Mentoring activities**

- Supervisor or co-supervisor of the PhD graduates Francesco Piraino, Paola Occhetta, Giovanni Stefano Ugolini, Roberta Visone, Daniela Cruz-Moreira, Federica Colombo, Andrea Mainardi, Mattia Ballerini, Chiara Mancino, Erika Ferrari.
- Supervisor 50+ Master theses, 20 Bachelor theses in the years 2015-2023.

### **Selected articles in international peer-reviewed journals**

1. Mainardi A, Carminati F, Ugolini GS, Occhetta P, Isu G, Robles Diaz D, Reid G, Visone R, Rasponi M\*, Marsano M\*. A dynamic microscale mid-throughput fibrosis model to investigate the effects of different ratios of cardiomyocytes and fibroblasts. *Lab on a Chip*, 2021,21, 4177-4195 (DOI: 10.1039/D1LC00092F).
2. Visone R, Ugolini GS, Cruz-Moreira D, Marzorati S, Piazza S, Pesenti E, Redaelli A, Moretti M, Occhetta P\*, Rasponi M\*. Micro-electrode channel guide ( $\mu$ ECG) technology: An online method for continuous electrical recording in a human beating heart-on-chip. *Biofabrication* 2021, 13(3):035026 (DOI: 1758-5090/abe4c4)
3. Mazzara PG, Muggeo S, Luoni M, Massimino L, Zaghi M, Tajalli-Tehrani Valverde P, Brusco S, Marzi MJ, Palma C, Colasante G, Iannielli A, Paulis M, Cordiglieri C, Giannelli SG, Podini P, Gellera C, Taroni F, Nicassio F, Rasponi M, Broccoli V. Frataxin gene editing rescues Friedreich's ataxia pathology in dorsal root ganglia organoid-derived sensory neurons. *Nature Communications* 2020 11: 4178 (DOI: 10.1038/s41467-020-17954-3).
4. Occhetta P, Mainardi A, Votta E, Vallmajo-Martin Q, Ehrbar M, Martin I, Barbero A, Rasponi M. Hyperphysiological compression of articular cartilage induces an osteoarthritic phenotype in a cartilage-on-a-chip model. *Nature Biomedical Engineering*, 2019 (DOI:10.1038/s41551-019-0406-3).
5. Visone R, Ugolini GS, Vinarsky V, Penati M, Redaelli A, Forte G, Rasponi M. A Simple Vacuum-Based Microfluidic Technique to Establish High-Throughput Organs-On-Chip and 3D Cell Cultures at the Microscale. *Advanced Materials Technologies* 2019; 4(1):1800319.
6. Visone R, Talò G, Occhetta P, Cruz-Moreira D, Lopa S, Pappalardo OA, Moretti M, Rasponi M. A microscale biomimetic platform for generation and electro-mechanical stimulation of 3D cardiac microtissues. *APL Bioengineering*, 2018; 2:046102.
7. Occhetta P, Pigeot S, Rasponi M, Dasen B, Mehrkens A, Ullrich T, Kramer I, Guth-Gundel S, Barbero A, Martin I. Developmentally inspired programming of adult human mesenchymal stromal cells toward stable chondrogenesis. *PNAS*, 2018; 115(18):4625-4630.
8. Ugolini GS, Visone R, Redaelli A, Moretti M, Rasponi M. Generating Multicompartmental 3D Biological

- Constructs Interfaced through Sequential Injections in Microfluidic Devices. *Advanced Healthcare Materials*. 2017; 6 (DOI: 10.1002/adhm.201601170).
9. Zhang YS, Arneri A, Bersini S, Shin SR, Zhu K, Goli-Malekabadi Z, Aleman J, Colosi C, Busignani F, Dell'Erba V, Bishop C, Shupe T, Demarchi D, Moretti M, Rasponi M, Dokmeci MR, Atala A, Khademhosseini A. Bioprinting 3D microfibrinous scaffolds for engineering endothelialized myocardium and heart-on-a-chip. *Biomaterials*. 2016; 110:45-59 (DOI: 10.1016/j.biomaterials.2016.09.003).
  10. Marsano A, Conficconi C, Lemme M, Occhetta P, Gaudiello E, Votta E, Cerino G, Redaelli A, Rasponi M. Beating heart on a chip: a novel microfluidic platform to generate functional 3D cardiac microtissues. *Lab on a Chip*. 2016; 16:599-610 (DOI: 10.1039/c5lc01356a).
  11. Occhetta P, Centola M, Tonarelli B, Redaelli A, Martin I, Rasponi M. High-Throughput Microfluidic Platform for 3D Cultures of Mesenchymal Stem Cells, Towards Engineering Developmental Processes. *Scientific Reports*. 2015; 5: 10288 (DOI: 10.1038/srep10288).
  12. Occhetta P, Visone R, Russo L, Cipolla L, Moretti M, Rasponi M. VA-086 methacrylate gelatine photopolymerizable hydrogels: A parametric study for highly biocompatible 3D cell embedding. *J Biomedical Materials Research Part A*. 2014; 103(6): 2109-17 (DOI: 10.1002/jbm.a.35346).
  13. Occhetta P, Sadr N, Piraino F, Redaelli A, Moretti M, Rasponi M. Fabrication of 3D cell-laden hydrogel microstructures through photo-mold patterning. *Biofabrication*. 2013. 5(3): 035002 (DOI: 10.1088/1758-5082/5/3/035002).
  14. Pavesi A, Piraino F, Fiore GB, Farino MK, Moretti M, Rasponi M: How to embed three-dimensional flexible electrodes in microfluidic devices for cell culture applications. *Lab on a Chip* 2011; 11(9):1593-5.

## **Patents**

Marco Rasponi activities led to the publication of 6 patent applications.

### *International Patents*

Visone R, Ugolini GS, Rasponi M. Microfluidic device for electrical measurement and/or stimulation. 2019 (DR/19161/PCT)

Ugolini GS, Visone R, Redaelli A, Moretti M, Rasponi M. 3D cellular constructs in micrometric scale. 2017 (PCT/IB2017/058458).

Rasponi M, Occhetta P, Redaelli A. Microfluidic device and relative method for the generation and/or culture and/or maturation of three-dimensional cell and/or tissue constructs. 2015 (PCT/IB2016/052410).

Slepian M, Bluestein D, Rasponi M, Redaelli A. Methods, devices, and systems for microfluidic stress emulation (WO2016033455, 2014-08-29).

Rasponi M, Pavesi A, Fiore GB, Redaelli A. A method to produce a microfluidic device having vertical electrodes and a device obtained from it. 2010 (WO2011121427A8).

### *National Patent*

Mastrangelo F, Montevecchi FM, Morbiducci U, Pennella F, Rasponi M. Dispositivo microfluidico di mescolamento convettivo. 2011 (ITTO20100550).