Marco Rasponi - Curriculum vitae

Biosketch

Marco Rasponi serves as Assistant Professor at the Department of Electronics, Information and Bioengineering of Politecnico di Milano since 2015. 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 consolidatig, the microfabrication and experimental microfluidics research activities.
Since then: i) he coordinated research projects on microfluidics for cell culture and regenerative medicine, for a total amount greater than 1M€; ii) he co-supervised the activity of 3 PhD students and is currently supervising 4 PhD students; iii) he submitted 6 patent applications in the field of microtechnologies; and iv) he contributed to the publication of 42 peer reviewed international papers (H-index 15) and 4 book chapters in the field of microfluidics.
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.

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

May 2017 - present	**Co-founder and CTO at BiomimX Srl**
Oct 2015 - present	**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 Zooprophylactic 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.
- *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).

Past experience as teaching assistant in:

- *Cellular Bioengineering and Bio-Nanotechnologies* (Bachelor course level) Prof. S Vesentini in Biomedical Engineering of Politecnico di Torino
- *Micro diffusion and fluid-dynamics, fluid-structure interaction* (Master post-lauream course level) within the programme “Fundamentals of design in micro and nano technologies for bioartificial systems”
- *Fundamentals of Mechanical Bioengineering* (Bachelor course level) Prof. FM Montevecchi and Prof. G Dubini in Biomedical Engineering
- *Fundamentals of Chemical Bioengineering* (Bachelor course level) Prof. S Mantero and Prof. MC Tanzi in Biomedical Engineering

Honors

2015	Prize awarded at the ESB Conference for the best poster.
2013-2015	Mentor of 3 Master theses which got a national or international award.

Mentoring activities

- ❒ Supervisor or co-supervisor of the PhD graduates Paola Occhetta, Francesco Piraino, Giovanni Stefano Ugolini, Roberta Visone.

- ❒ Supervisor of the PhD students Daniela Cruz-Moreira, Andrea Mainardi, Federica Colombo, Mattia Ballerini, Erika Ferrari.
- ❒ Supervisor or co-supervisor for 26 Master theses, 12 Bachelor Theses in the years 2005-2019.

Articles in international peer-reviewed journals

1. 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).
2. Marcuzzo S, Terragni B, Bonanno S, Isaia D, Cavalcante P, Cappelletti C, Ciusani E, Rizzo A, Regalia G, Yoshimura N, Ugolini GS, Rasponi M, Bechi G, Mantegazza M, Mantegazza R, Bernasconi P, Minati L. Hyperexcitability in Cultured Cortical Neuron Networks from the *G93A-SOD1* Amyotrophic Lateral Sclerosis Model Mouse and its Molecular Correlates. Neuroscience 2019, 416: 88-99.
3. Ungaro F, Colombo P, Massimino L, Ugolini GS, Correale C, Rasponi M, Garlatti V, Rubbino F, Tacconi C, Spaggiari P, Spinelli A, Carvello M, Sacchi M, Span S, Vetrano S, Malesci A, Peyrin-Biroulet L, Danese S, D'Alessio S. Lymphatic endothelium contributes to colorectal cancer growth via the soluble matrisome component GDF11. International Journal of Cancer, 2019 (DOI:10.1002/ijc.32286).
4. 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.
5. 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.
6. Visone R, Talò G, Lopa S, Rasponi M, Moretti M. Enhancing all-in-one bioreactors by combining interstitial perfusion, electrical stimulation, on-line monitoring and testing within a single chamber for cardiac constructs. Scientific Reports, 2018; 8:16944.
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. Occhetta P, Isu G, Lemme M, Conficconi C, Oertle P, Räz C, Visone R, Cerino G, Plodinec M, Rasponi M, Marsano A. A three-dimensional in vitro dynamic micro-tissue model of cardiac scar formation. Integr. Biol., 2018 (DOI: 10.1039/C7IB00199A).
9. Ugolini GS, Occhetta P, Saccani A, Re F, Krol S, Rasponi M*, Redaelli A*. Design and validation of a microfluidic device for blood-brain barrier monitoring and transport studies. J. Micromech. Microeng, 2018; 28 044001.
10. Ugolini GS, Visone R, Redaelli A, Moretti M, Rasponi M. Generating Multicompartmental 3D Biological Constructs Interfaced through Sequential Injections in Microfluidic Devices. Adv Healthc Mater. 2017; 6 (DOI: 10.1002/adhm.201601170).
11. Ugolini GS, Pavesi A, Rasponi M, Fiore GB, Kamm R, Soncini M. Human cardiac fibroblasts adaptive responses to controlled combined mechanical strain and oxygen changes in vitro. Elife. 2017; 6:e22847 (DOI: 10.7554/eLife.22847).
12. Ugolini GS, Visone R, Cruz-Moreira D, Redaelli A, Rasponi M. Tailoring cardiac environment in microphysiological systems: an outlook on current and perspective heart-on-chip platforms. Future Sci OA. 2017; 3(2):FSO191 (DOI: 10.4155/fsoa-2017-0024).
13. 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 microfibrous scaffolds for engineering endothelialized myocardium and heart-on-a-chip. Biomaterials. 2016; 110:45-59 (DOI:

10.1016/j.biomaterials.2016.09.003).
14. Visone R, Gilardi M, Marsano A, Rasponi M, Bersini S, Moretti M. Cardiac Meets Skeletal: What's New in Microfluidic Models for Muscle Tissue Engineering. Molecules. 2016; 21: E1128 (DOI: 10.3390/molecules21091128).
15. Gowran A, Rasponi M, Visone R, Nigro P, Perrucci GL, Righetti S, Zanobini M, Pompilio G. Young at Heart: Pioneering Approaches to Model Nonischaemic Cardiomyopathy with Induced Pluripotent Stem Cells. Stem Cells Int. 2016; 2016:4287158 (DOI: 10.1155/2016/4287158).
16. Consolo F, Dimasi A, Rasponi M, Valerio L, Pappalardo F, Bluestein D, Slepian MJ, Fiore GB, Redaelli A. Microfluidic approaches for the assessment of blood cell trauma: a focus on thrombotic risk in mechanical circulatory support devices. Int J Artif Organs. 2016; 39:184-93 (DOI: 10.5301/ijao.5000485).
17. Occhetta P, Glass N, Otte E, Rasponi M, Cooper-White JJ. Stoichiometric control of live cell mixing to enable fluidically-encoded co-culture models in perfused microbioreactor arrays. Integr Biol (Camb). 2016; 8:194-204 (DOI: 10.1039/c5ib00311c).
18. Russo L, Sgambato A, Visone R, Occhetta P, Moretti M, Rasponi M, Nicotra F, Cipolla L. Gelatin hydrogels via thiol-ene chemistry. Monatshefte fur Chemie. 2016; 147: 587-592 (DOI: 10.1007/s00706-015-1614-5).
19. 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 Chip. 2016; 16:599-610 (DOI: 10.1039/c5lc01356a).
20. Occhetta P, Licini M, Redaelli A, Rasponi M. Design of a microfluidic strategy for trapping and screening single cells. Med Eng Phys. 2016; 38:33-40 (DOI: 10.1016/j.medengphy.2015.10.009).
21. Ugolini GS, Cruz-Moreira D, Visone R, Redaelli A, Rasponi M. Document Microfabricated physiological models for in vitro drug screening applications. Micromachines. 2016; 7: 233 (DOI: 10.3390/mi7120233).
22. Dimasi A, Rasponi M, Sheriff J, Chiu WC, Bluestein D, Tran PL, Slepian MJ, Redaelli A. Microfluidic emulation of mechanical circulatory support device shear-mediated platelet activation. Biomed Microdevices. 2015;17:117 (DOI: 10.1007/s10544-015-0015-1).
23. Ugolini GS, Rasponi M, Pavesi A, Santoro R, Kamm R, Fiore GB, Pesce M, Soncini M. On-chip assessment of human primary cardiac fibroblasts proliferative responses to uniaxial cyclic mechanical strain. Biotechnol Bioeng. 2016; 113:859-69 (DOI: 10.1002/bit.25847).
24. Occhetta P, Centola M, Tonnarelli 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).
25. Pavesi A, Adriani G, Rasponi M, Zervantonakis IK, Fiore GB, Kamm R. Controlled electromechanical cell stimulation on-a-chip. Scientific Reports. 2015; 5: 11800 (DOI: 10.1038/srep11800).
26. Lopa S*, Piraino F*, Kemp RJ, Di Caro C, Lovati AB, Di Giancamillo A, Moroni L, Peretti GM, Rasponi M, Moretti M. Fabrication of multi-well chips for spheroid cultures and implantable constructs through rapid prototyping techniques. Biotechnol Bioeng. 2015; 112(7): 1457-1471 (DOI: 10.1002/bit.25557).
27. Rasponi M, Gazaneo A, Bonomi A, Ghiglietti A, Occhetta P, Fiore GB, Pessina A, Redaelli A. Lab-on-Chip for testing myelotoxic effect of drugs and chemicals. Microfluidics and Nanofluidics, 1015; 19: 935-940 (DOI: 10.1007/s10404-015-1622-0).
28. Occhetta P, Malloggi C, Gazaneo A, Redaelli A, Candiani G, Rasponi M. High-throughput microfluidic platform for adherent single cells non-viral gene delivery . RSC Advances. 2015; 5: 5087-5095 (DOI: 10.1039/C4RA12431F).
29. 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 Biomed Mater Res A. 2014; 103(6): 2109-17 (DOI: 10.1002/jbm.a.35346).
30. Boccafoschi F, Rasponi M, Ramella M, Ferreira AM, Vesentini S, Cannas M. Short-term effects of

microstructured surfaces: role in cell differentiation toward a contractile phenotype. J Appl Biomater Funct Mater. 2014 (DOI: 10.5301/JABFM.5000186).
31. 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).
32. Pennella F, Rossi M, Ripandelli S, Rasponi M, Mastrangelo F, Deriu MA, Ridolfi L, Kähler CJ, Morbiducci U. Numerical and experimental characterization of a novel modular passive micromixer. Biomedical Microdevices. 2012. 14(5): 849-862 (DOI: 10.1007/s10544-012-9665-4).
33. Biffi E, Piraino F, Pedrocchi A, Fiore GB, Ferrigno G, Redaelli A, Menegon A, Rasponi M. A microfluidic platform for controlled biochemical stimulation of twin neuronal networks. Biomicrofluidics. 2012. 6 (2): 24106-2410610.
34. Piraino F*, Camci-Unal G*, Hancock MJ*, Rasponi M, Khademhosseini A. Multi-gradient hydrogels produced layer by layer with capillary flow and crosslinking in open microchannels. Lab on a Chip. 2012. 12(3): 659-661.
35. Biffi E, Menegon A, Piraino F, Pedrocchi A, Fiore GB, Rasponi M. Validation of long-term primary neuronal cultures and network activity through the integration of reversibly bonded microbioreactors and MEA substrates. 2011. Biotechnol Bioeng 2012; 109(1): 166-175.
36. Hancock MJ*, Piraino F*, Camci-Unal G*, Rasponi M, Khademhosseini A. Anisotropic material synthesis by capillary flow in a fluid stripe. Biomaterials 2011; 32(27):6493-504.
37. Selimović Ś*, Piraino F*, Bae H, Rasponi M, Redaelli A, Khademhosseini A. Microfabricated polyester conical microwells for cell culture applications. Lab on a Chip 2011; 11(14):2325-32.
38. 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.
39. Rasponi M, Piraino F*, Sadr N*, Laganà M, Redaelli A, Moretti M. Reliable magnetic reversible assembly of complex microfluidic devices: fabrication, characterization, and biological validation. Microfluidics and Nanofluidics 2011; 10(5):1097-1107.
40. Rasponi M, Ullah T, Gilbert RJ, Fiore GB, Thorsen TA. Realization and efficiency evaluation of a micro-photocatalytic cell prototype for real-time blood oxygenation. Med Eng Phys 2011; 33(7):887-92.
41. Gilbert R, Park H, Rasponi M, Redaelli A, Gellman B, Dasse KA, Thorsen TA. Computational and functional evaluation of a microfluidic blood flow device emulating the pulmonary capillary microcirculation, ASAIO Journal, 2007; 53(4):447-455.
42. Rasponi M, Fiore GB, Redaelli A, Montevecchi FM, Fumero R. A reliable method for prototyping flexible physilogic-like behaving left ventricles for studying mitral valve surgical corrections, Journal of Mechanics in Medicine and Biology. 2006; 6(1): 101-7.

Patents

Marco Rasponi activities led to the publication of 4 international patent applications and 1 national patent application.

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 and a device obtained from it. 2011 (WO2011IB00677 201103290).

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

Milan, 01 December 2019