***Curriculum vitae and Track Record*: Manuela Teresa Raimondi**
Primary ERC sector: PE8_13 Industrial bioengineering

PERSONAL DETAILS

Family name, First name: Raimondi, Manuela Teresa

Researcher unique identifier(s): ORCID 0000-0003-2585-7206, ResearcherID: F-6606-2013

URL for web site: https://www.cmic.polimi.it/en/persone/docenti-e-ricercatori/raimondi-manuela-teresa/

- **Education and key qualifications**

Feb 2000 PhD in Bioengineering / School of Industrial and Information Engineering / Polytechnic University of Milano, Italy

Jul 1993 Master of Science in Mechanical Engineering / School of Industrial and Information Engineering / Polytechnic University of Milano, Italy

- **Current position**

Jun 2018 - now Full Professor of Bioengineering at the School of Industrial and Information Engineering / Dept. of Chemistry, Materials and Chemical Engineering "Giulio Natta" / Polytechnic University of Milano, Italy

- **Previous position**

Aug 2020-Jul 2021 Visiting Professor of Bioengineering at the Perelman School of Medicine and School of Engineering and Applied Sciences / Dept. of Paediatrics and Dept. of Bioengineering / Children's Hospital of Philadelphia / University of Pennsylvania, Philadelphia, USA

RESEARCH ACHIEVEMENTS AND PEER RECOGNITION

Research achievements

1. Marturano-Kruik A, Nava MM, Yeager K, Chramiec A, Hao L, Robinson S, Guo E, Raimondi MT, Vunjak-Novakovic G. Human bone perivascular niche-on-a-chip for studying metastatic colonization. Proc Natl Acad Sci U S A. 2018 Feb 6;115(6):1256-1261. doi: 10.1073/pnas.1714282115.

My research group contributes advanced tools and models to the field of biological research since decades (Raimondi 2002). In 2010, I invented and patented an organ-on-a-chip millifluidic platform incorporated in a microscopy slide (Laganà 2012). Initially, we used the platform to test anticancer agents *in vitro* (Credi 2016). This paper on PNAS (with impact factor 9) shows how we used the platform to test chemotherapy drugs in a model of bone metastasis.

2. Raimondi MT, Albani D, Giordano C. An Organ-On-A-Chip Engineered Platform to Study the Microbiota-Gut-Brain Axis in Neurodegeneration. Trends Mol Med. 2019 Sep;25(9):737-740. doi: 10.1016/j.molmed.2019.07.006.

We later developed a modified millifluidic platform to model neurodegeneration and to test neuroprotective pharmacological therapies (Tunesi 2016, Chierchia 2017, Izzo 2019, Donnaloia 2023a, Donnaloia 2023b). This paper on Trends in Molecular Medicine (with impact factor 14) describes the highly innovative concept of modelling the axis between very far body districts (the gut and the brain) using an organ-on-a-chip platform.

3. Raimondi MT, Donnaloja F, Barzaghini B, Bocconi A, Conci C, Parodi V, Jacchetti E, Carelli S. Bioengineering tools to speed up the discovery and preclinical testing of vaccines for SARS-CoV-2 and therapeutic agents for COVID-19. Theranostics. 2020 May 27;10(16):7034-7052. doi: 10.7150/thno.47406.

During the covid pandemic, we used a millifluidic platform to set-up a lymph node-on-a-chip model to study adaptive immunity and to test cancer immunotherapies and vaccines. In this paper on Theranostics (with impact factor 13), I reviewed the frontier platforms for drug discovery in virology and vaccinology.

4. Perottoni S, Neto NGB, Di Nitto C, Dmitriev RI, Raimondi MT, Monaghan MG. Intracellular label-free detection of mesenchymal stem cell metabolism within a perivascular niche-on-a-chip. Lab Chip. 2021 Apr 7;21(7):1395-1408. doi: 10.1039/d0lc01034k.

My group developed pioneering computational models to predict the local mechano-chemical parameters of cells over long-term interstitial perfusion culture *in vitro* (Raimondi 2015, Raimondi 2011a, Raimondi 2011b, Sacco 2011, Nava 2013, Raimondi 2013a, Sacco 2017). We also developed experimental optical microscopy methods to monitor oxygenation intravitally in millifluidic chambers (Raimondi 2015). In this paper on Lab on a Chip, we describe an innovative label-free imaging method to monitor cell metabolism in cells intravitally.

5. Ritter P, Oliveto S, Cordiglieri C, Fasciani A, Di Buduo CA, Della Volpe L, Bocconi A, Conci C, Miguel CP, Di Micco R, Balduini A, Raimondi MT, Biffo S. A millifluidic bioreactor allows the long-term culture of primary lymphocytes or CD34+ hematopoietic cells while allowing the detection of tumorigenic expansion. Front Bioeng Biotechnol. 2024 Oct 2;12:1388312. doi: 10.3389/fbioe.2024.1388312.

In this paper on Frontiers in Bioengineering and Biotechnologies, we demonstrate that a millifluidic bioreactor can maintain sterility of a perfused cell culture for up to three months. This result represents an unprecented advancement in the field of organs-on-a-chip, because it allows to model slowly developing mechanisms of great interest in the development of advanced theraphy medicinal products (ATMPs). For example, unwanted leukemic transformation of gene-edited hematopoietic stem cells, an ATMP in use on patients with hemophilia.

6. Genchi GG, Conci C, Şen Ö, Nardini A, Bartolucci M, Marino A, Martinez Vazquez R, Cerullo G, Osellame R, Petretto A, Raimondi MT, Ciofani G. Two-photon polymerization of miniaturized 3D scaffolds optimized for studies on glioblastoma multiforme in spaceflight-like microgravity conditions. Biofabrication. 2025 Mar 12;17(2). doi: 10.1088/1758-5090/adbb21.

In 2012, I invented and patented a microscopic 3D cell culture substrate recapitulating the anatomical stem cell niche present in tissue and organs. I used this platform to create advanced models *in vitro* of the mesenchymal (Raimondi 2013b, Raimondi 2014, Nava 2017, Remuzzi 2020, Donnaloia 2023c, Barzaghini 2023, Testa 2023), the neural (Rey 2020, Carelli 2021, Messa, 2021, Musi 2023), the embryonic (Nava 2016), and the cancer (Oliveto 2024) stem cell niches. I was also funded by the European Space Agency to adapt this technology for use on board the International Space Station. This paper on Biofabrication (with impact factor 8) describes our results using the platform for cell culture in simulated microgravity.

7. Martinelli C, Bocconi A, Milone S, Baldissera T, Cherubin L, Buccioli G, Perottoni S, Conci C, Cerullo G, Osellame R, Chirico G, Jacchetti E, Raimondi MT. A 3D millifluidic model of a dermal perivascular microenvironment on a chip. Lab Chip. 2025 Jan 28;25(3):423-439. doi: 10.1039/d4lc00898g.

I then had the idea of integrating a millifluidic lab-on-a-chip bioreactor with a 3D micro scaffold (Ene-Iordache 2021). This paper on Lab on a Chip shows our first successful regeneration *in vitro* of tissue with blood vessels using these two combined platforms.

8. Conci, C., Jacchetti, E., Sironi, L., Gentili, L., Cerullo, G., Osellame, R., Chirico, G. and Raimondi, M.T. A Miniaturized imaging window to quantify intravital tissue regeneration within a 3D microscaffold in longitudinal studies. Adv Opt Mat. 2022, p.2101103. doi: 10.1002/adom.202101103.

In 2014, I threw myself in the field of cell modelling *in vivo*, because I was curious to add the contribution of a functional vascularisation to my models. I invented and patented a miniaturized subcutaneous imaging window for time-lapse analyses of foreign body reactions in mice (Conci 2020, Conci 2024). This revolutionary device incorporates a 3D micro lattice that provides a reference geometry to correct optical aberrations deriving from two-photon imaging (Parodi 2020a, Parodi 2020b). In this paper on Advanced Optical Materials (with impact factor 9), we show that this platform can be used to replace histology, drastically reducing and refining animal testing, coherently with the 3Rs principles.

9. Marini, M., Nardini, A., Martínez Vázquez, R., Conci, C., Bouzin, M., Collini, M., Osellame, R., Cerullo, G., Kariman, B. S., Farsari, M., Kabouraki, E., Raimondi, M. T., Chirico, G., Microlenses fabricated by two-photon laser polymerization for cell imaging with non-linear excitation microscopy. Adv Funct Mat. 2023, 2213926. doi: 10.1002/adfm.202213926.

In this paper published on Advanced Functional Materials (with impact factor 19), we demonstrate the highly innovative concept of an "objective on-a-chip", i.e. an imaging window with an incorporated array of microlenses, allowing to perform cell imaging at high resolution, intravitally and deep into tissue.

10. In December 2019 I incorporated a start-up company, MOAB Srl (https://moab-research.com/), of which I am currently the President and Chief Scientific Officer. The company commercializes technological platforms including millifluidic bioreactors, usable to build *in vitro* models allowing to observe 3D cells and tissues in real-time, for the discovery and testing of advanced therapy medicinal products (ATMP).

Peer recognition

Competitive grants won as PI or local PI. Total amount managed ~ €7M comprising five ERC grants

- BEACONSANDEGG, European Research Council, call ERC-AdG-2021, €2,498,690, Sept 2022-Aug 2027. Research grant to explore a frontier technology for drug discovery in oncology
- flIMAGIN3D, European Commission, call HORIZON EU-MSCA-2021-DN-01, €2,743,459, Jan 2023-Dec 2026. Doctoral network to integrate advanced imaging methods in bioengineering platforms
- NICHILD, European Research Council, call ERC-2022-PoC1, €150,000, Apr 2023-Sept 2024. Grant to advance the TRL of a platform to produce stem cell secretome
- IN2SIGHT, European Commission; call H2020-FETOPEN-2018-2020, €3,438,960, Mar 2021-Aug 2025. Research grant to explore a frontier technology for biomaterial discovery and testing
- MOAB, NC3Rs, London, UK; call CRACK-IT Challenge 33: Clean cut, €1,223,748, Feb 2021-Jan 2024. Research grant on a new technology to test advanced therapy medicinal products
- NICHOID-ET, European Space Agency; call: Idea I-2020-01240, €174,750, Feb 2021-July 2022. Grant to adapt a cell culture technology for use onboard the International Space Station
- MOAB, European Research Council, call ERC-PoC-2018, €150,000, Dec 2018-Jul 2020. Grant to advance the TRL of a millifluidic bioreactor
- NICHOIDS, European Research Council, call ERC-PoC-2016, €150,000, Jun 2017-Nov 2018. Grant to advance the TRL of a substrate for stem cell expansion
- NICHOID, European Research Council, call ERC-CoG-2014, €1,903,000, May 2015-Jul 2020. Research grant to explore a frontier technology for the manipulation of stem cells in vitro

Institutional appointments at Polytechnic University in Milan

2023 – now	Scientific Advisory Board member, Dept. of Chemistry "G. Natta"
2023 – now	Delegate for Talent Development, Dept. of Chemistry "G. Natta"
2015 – now	Institutional representative, research frame agreement with the M. Negri Institute for Pharmacological Research, Milan, Italy
2014 – now	Head of the Managing Board, inter-departmental core facility for Live Cell Imaging
2012 – 2020	Vice-Coordinator and Advisory Board member, Ph.D. program in Bioengineering
2006 – 2010	Scientific Advisory Board delegate, Galeazzi Orthopaedic Institute, Milan, Italy
2006 – 2007	Didactic Coordinator, Master of Science in Engineering in Surgery, School of Engineering
2003 – 2008	Founder and Director, external research facility located at the hospital Galeazzi Orthopaedic Institute, Milan, Italy

Memberships to scientific societies

2024 – now	Elected Member, Italian Academy of Engineering and Technologies (ITATEC) (https://www.euro-case.org/about-us/member-academies/member-academies-italy/)
2021 – now	Founding President, Association "ERC in Italy APS", Polytechnic of Milano Foundation, (https://ercinitaly.eu/)
2020 – now	Advisory Board Member, European Society for Translational Medicine (EUSTM)
2008 – now	Member: Tissue Engineering and Regenerative Medicine International Society (TERMIS), European Society of Biomechanics (ESB), European Society for Artificial Organs (ESAO)

Fellowships and awards

2017 – 2018 Winner of two start-up competitions, €60,000, Deloitte and other private foundations
2006 – 2018 Winner of three MIT-Italy exchange awards, €8,500, Rocca Foundation, Milano, Italy
2000 – 2004 Winner of a 5-year post-doc fellowship, €150,000, Italian Ministry of University and Research
1997 – 2000 Winner of a 3-year Ph.D. fellowship, €82,000, Italian Ministry of University and Research

Peer reviewing activity

2022 Deputy Chair and Member of panel PE8 – Products and processes engineering, call ERC-AdG-2022, European Research Council (ERC), Brussels, Belgium
2022 Invited Expert, Irish Research Council, Dublin, Ireland
2021 Grant Evaluator, Human Frontier Science Program, Strasbourg, France
2020 Member of panel PE8 – Products and processes engineering, call ERC-AdG-2020, European Research Council (ERC), Brussels
2019 – 2022 Member, Scientific Advisory Board (SAB), Paediatric Research Institute (IRP), Padua, Italy
2018 Grant evaluator, Swiss National Science Foundation, Berne, Switzerland
2018 Grant evaluator, Swiss cancer league, Berne, Switzerland
2016 – now Invited Expert, European Research Council (ERC). Calls: ERC-CoG-2016, ERC-AdG-2017, ERC-AdG-2018, ERC-StG-2021, ERC-2025-CoG
2010 Grant Evaluator, Portuguese Science & Technology Foundation, Lisboa, Portugal
2009 Grant Evaluator, Dutch Technology Foundation, Utrecht, The Netherlands
2005 – now Grant Evaluator, American National Science Foundation (NSF), USA
2000 Grant Evaluator, Mid-term Reviewer, European Commission, Brussels, Belgium

Organisation of scientific meetings

2023 Scientific Committee, The 33rd Annual Conference of the European Society for Biomaterials, September 4th to 8th, 2023, Davos, Switzerland
2022 Scientific Committee, 28th Congress of the European Society of Biomechanics, Maastricht, The Netherlands July 9 -12, 2023
2021 Scientific Committee, TERMIS 2021 World conference, Maastricht, The Netherlands
2018 Co-Chair, 6th National Congress of Bioengineering, Milano, Italy
2017 Co-Chair, 2nd International Conf. on Nanoengineering for Mechanobiology, Camogli, Italy
2014 – 2025 Organiser and Chair of several Symposia at the TERMIS-EU Conferences

Invited presentations at international conferences

2026 Invited speaker. American Association for the Advancement of Science (AAAS) annual meeting, Phoenix (AZ), USA, February 12-14, 2026
2025 Invited speaker, Avogadro colloquia, Italian Chemical Society, Rome, Italy
2024 Plenary Speaker, Autumn Meeting for Young Chemists in Biomedical Sciences (AMYC Biomed 24), Rome, Italy
2024 Keynote speaker, European Optical Society (EOSAM 2024), Naples, Italy
2023 Keynote speaker, European Society of Biomechanics (ESB2023), Maastricht, The Netherlands
2022 Invited speaker, World Congress of Biomechanics (WCB2022), Taipei, Taiwan
2021 Keynote speaker, TERMIS 2021 World conference, Maastricht, The Netherlands
2021 Invited speaker, International Society for Optics and Photonics (SPIE 2021), Webconference
2020 Invited speaker, European Society for Translational Medicine (EUSTM-2020), Webconference
2019 Keynote speaker, TERMIS-EU 2019, Rhodes, Greece
2015 Invited speaker, Ettore Majorana Foundation and Centre for Scientific Culture, Erice, Italy
2014 Keynote speaker, TERMIS-EU 2014, Genoa, Italy
2011 Keynote speaker, European Society of Biomechanics at TERMIS-EU 2011, Granada, Spain

ADDITIONAL INFORMATION

Patents

-Priority 04/09/2015, Synthetic niche matrices for stem cell culture, EP16763469 - WO2017037108 - US11027045, granted in Italy - Europe (Austria, France, Germany, UK, Italy, Lituania, The Netherlands, Spain, Switzerland) - United States, Licensed

-Priority 18/05/2016, A device for cell culture, WO2017199121 - US2019/0144810, granted in Italy - Europe (France, Germany, UK, Italy, Spain) - United States – China, Licensed

-Priority 21/12/2017, Implantable medical device, WO2019123227 - EP3727136, granted in Italy - Europe (Brevetto Unitario, Svizzera, Spagna, UK, Grecia) - United States

- Priority 08/03/2019, Geometric induction of pluripotency, WO2020183343, granted in Italy, pending in Europe - United States

- Priority 16/09/2019, Millifluidic device for advanced culture of biological agents, WO2021053458, granted in Italy, Japan, Europe, pending in Australia - Canada - China - Hong Kong - United States

- Priority 10/05/2022, Implantable platform for imaging in vivo, WO2023218340, granted in Italy, pending in Europe

- Priority 14/09/2022, Optically accessible system for studies on embryonated eggs, WO2024057159, granted in Italy

- Priority 31/07/2024, Bioreactor for positron-based microscopy, 102024000017944, pending in Italy

Teaching appointments at Polytechnic University of Milano

2023 – now	Lecturer, Laboratory of cell modelling, MS program in Biomedical Engineering, School of Industrial and Information Engineering (10 credits)
2019	Lecturer, Communication strategies that score in worldwide academia, Ph.D. school (5 credits)
2015 – 2022	Lecturer, Technologies for regenerative medicine, MS program in Biomedical Engineering, School of Industrial and Information Engineering (10 credits)
2015	Lecturer, Mechanobiology, Ph.D. program in Bioengineering (5 credits)
2008 – 2014	Lecturer, Biomimetics and tissue engineering, MS program in Biomedical Engineering, School of Industrial and Information Engineering (10 credits)
2009	Lecturer, Bioreactors for regenerative medicine, Ph.D. program in Bioengineering (5 credits)
2009	Lecturer, Design of biomechanics and biomachines, BS program in Biomedical Engineering, School of Industrial and Information Engineering (5 credits)

Career breaks, unconventional career paths and major life events

June 2001 -September 2001	4-months maternity leave, first child
April 2007-September 2007	6-months maternity leave, second child