

CURRICULUM VITAE

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Academic Position: Full Professor in Bioengineering (S.S.D. ING-INF/06)

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Education

24 June 1998

Degree in Electronic Engineering (Course Bioengineering) at University of Pisa with 103/110.

21/12/1998

Achievement of professional qualification of engineer

October 1998 - October 2001

PhD in Bioengineering obtained at Politecnico of Milan on 5th February 2002, with PhD thesis "Microfabrication techniques for the realisation of organised engineered tissue", was carried out at Interdepartmental Research Center "E. Piaggio" in Pisa, with the collaboration of Institute of Clinical Physiology at Pisa, of institute of Neurophysiology at Pisa and of Microscale Tissue Engineering Laboratory of University of California San Diego, USA.

Professional experiences

from 22/07/1998 to 22/10/1998.

Collaboration contract for three months at Research Center "E. Piaggio" – University of Pisa to develop a bioreactor for the growth of endothelial cells in a hemodynamic simulated environment.

from 22/12/1999 to 22/03/2000

Collaboration contract for three months at Research Center "E. Piaggio" – University of Pisa for the development of conductive polymers sensors.

from 20/10/2000 to 25/04/2001

Collaboration contract for six months at Microscale Tissue Engineering Laboratory of UCSD- San Diego-CA, USA to develop new microfabrication techniques obtained by soft-lithography.

from 12/11/2001 to 03/03/2002

Collaboration contract for four months at Research Center "E. Piaggio" – University of Pisa to optimise a measure chamber for TIRF optical sensors

from 02/04/2002 to 30/06/2002

Collaboration contract for two months at Research Center "E. Piaggio" – University of Pisa to set-up a Soft-Lithography laboratory.

from 01/07/2002 to 30/06/2003

Post-Doc grant on “Microfabrication of biomimetic actuators” on European Project “Bioloach” at Research Center “E. Piaggio” – University of Pisa

from 01/07/2003 to 30/04/2006

Post-Doc grant on FIRB project “Development of materials and technologies focused for controlled drug release systems for endovascular devices” at Institute of Composite and Biomedical Materials – CNR in Pisa

from 09/11/2005 to 17/12/2005

Collaboration contract for teaching Chemical Bioengineering at Bachelor degree of Biomedical Engineering for academic year 2005-2006.

from 02/11/2005 to 01/02/2006

Collaboration contract at Department of Chemical Engineering, Industrial Chemistry and Material Science of University of Pisa on “Synthesis and characterisation of monomers to realise elastomers used as solid propellents”.

from 01/04/2006 to 30/04/2006

Collaboration contract for four months at Research Center “E. Piaggio” – University of Pisa on “Optimisation of a laminar flow bioreactor”.

from 18/03/2006 to 03/04/2006

Collaboration contract for two months on European Project UE CT. ASIA-LINK for “Training on the use of Biopac and transducers and Biomaterials” at University of Pisa

from May 2006 to 28/12/2014

Permanent Assistant Professor in Industrial Bioengineering (ING-IND/34) at University of Pisa.

from April 2012 to present

Visiting professor at IPL-Centro Para o desenvolvimento rapido e sustentado de producto –Instituto Politecnico de Leiria, Portugal

from 29/12/2014 to 1/12/2019

Permanent Associate Professor in Bioengineering (ING-INF/06) at University of Pisa.

from 01/03/2015 to present

Adjunct Associate professor in Biomedical Engineering and Medical Physics Discipline, School of Chemistry, Physics and Mechanical Engineering in the Science and Engineering Faculty at the Queensland University of Technology, Australia

from 30/03/2017 to 30/03/2023

Italian National Scientific qualification for the role of Full professor in Bioengineering

from 01/06/2018 to 31/08/2018

Visiting Professor at Sabanci University Campus in Tuzla, Turkey

from 02/12/2019 to present

Permanent Full Professor in Bioengineering (ING-INF/06) at University of Pisa.

Teaching Activity

From 2006 to 2008

I taught the following classes:

- Laboratory for Biomedical Engineering (3CFU), (Bachelor Degree in Biomedical Engineering);
- New Technologies in Surgery, Minimally Invasive therapies (2 CFU), (Master Degree in Biomedical Engineering). The topics covered in Bioengineering Laboratory ranged from: the preparation of solutions and buffer solutions; pH, permeability, wettability measurements; mechanical characterization of materials. The teaching of minimally-invasive therapies was based on personal research topics. In particular, it was focused on development of two-dimensional and three-dimensional microfabrication techniques for applications in the biomedical area and use of CAD / CAM systems and of nanotechnology.

I taught as teaching assistant the following classes:

- Chemical Bioengineering (6CFU), (Bachelor Degree in Biomedical Engineering). My lessons were focused on physiology of kidney and lung, on modeling of dialyzers and oxygenators, on physiology of pancreas, on development of insulin pumps, their control algorithms and related biosensors, and on development of assisted circulation systems and artificial heart.
- Biomechanics (6CFU),(Bachelor Degree in Biomedical Engineering). In this course, my lessons were focused on bone biomechanics.
- New technologies in surgery (6CFU), (Master Degree in Biomedical Engineering). In this class my lessons were focused on design and modeling of orthopedic and dental implants and heart valves.
- Biomolecular and Tissue engineering (6CFU), (Master Degree in Biomedical Engineering). In this class my lessons were focused on 2D and 3D microfabrication systems, on methods for characterization and analysis of cells, tissues and surfaces, and on design and modeling of bioreactors.

From 2009 to 2010

I taught the following classes:

- Laboratory for Biomedical Engineering (3CFU), (Bachelor Degree in Biomedical Engineering);
- New Technologies in Surgery, Minimally Invasive Therapies (2 CFU), (Master Degree in Biomedical Engineering)
- Chemical Bioengineering, (6CFU), (Bachelor Degree in Biomedical Engineering).

I taught as teaching assistant the following classes

- Biomechanics (6CFU), (Bachelor Degree in Biomedical Engineering);
- New technologies in surgery (6CFU), (Master Degree in Biomedical Engineering).

From 2010 to 2011

I taught the following classes:

- Prosthesis (6CFU), (Bachelor Degree in Biomedical Engineering). In this class my lessons were focused on design and modeling of orthopedic, dental, ocular, vascular implants, of hearing aids and cochlear devices, and heart valves
- Micro and nano systems, (6CFU),(Master Degree in Biomedical Engineering). In this class my lessons were focused on 2D and 3D microfabrication systems and their modeling for a total of 2CFU.
- Laboratory for Biomedical Engineering (3CFU), (Bachelor Degree in Biomedical Engineering)

From 2011 to 2012

I taught the following classes:

- Prosthesis (6CFU), (Bachelor Degree in Biomedical Engineering).
- Micro and nano systems, (9CFU), (Master Degree in Biomedical Engineering). In this class my lessons were focused on 2D and 3D microfabrication systems and their modeling for a total of 3CFU.

From 2012 to 2014

I taught the following classes:

- Prosthesis (6CFU), (Bachelor Degree in Biomedical Engineering).
- Chemical Bioengineering, (6CFU), (Bachelor Degree in Biomedical Engineering).
- Micro and nano systems, (9CFU), (Master Degree in Biomedical Engineering). In this class my lessons were focused on 2D and 3D microfabrication systems and their modeling, on nanotechnologies devices and FEM modeling for a total of 6CFU.

From 2014 to 2015

I taught the following classes:

- Prosthesis (6CFU), (Bachelor Degree in Biomedical Engineering).
- Chemical Bioengineering, (6CFU), (Bachelor Degree in Biomedical Engineering).

From 2015 to 2016

I taught the following classes:

- Prosthesis (6CFU), (Bachelor Degree in Biomedical Engineering).
- Chemical Bioengineering, (6CFU), (Bachelor Degree in Biomedical Engineering).
- Micro and Nanosystems (6 CFU) (Master Degree in Biomedical Engineering)

From 2016 to 2017

I taught the following classes:

- Prosthesis (6CFU), (Bachelor Degree in Biomedical Engineering).
- Chemical Bioengineering, (6CFU), (Bachelor Degree in Biomedical Engineering).
- Micro and Nanosystems (6 CFU) (Master Degree in Biomedical Engineering)
- Laboratory of Biomedical Technologies (6 CFU) (Master Degree in Biomedical Engineering)
- Neural Prostheses (6 CFU) (Master Degree in Bionics Engineering)

From 2017 to 2018

I taught the following classes:

- Prosthesis (6CFU), (Bachelor Degree in Biomedical Engineering).
- Chemical Bioengineering, (6CFU), (Bachelor Degree in Biomedical Engineering).
- Micro and Nanosystems (6 CFU) (Master Degree in Biomedical Engineering)
- Laboratory of Biomedical Technologies (6 CFU) (Master Degree in Biomedical Engineering)
- Neural Prostheses (6 CFU) (Master Degree in Bionics Engineering)
- Bioengineering Principles for the development of phantom for medical application (1 CFU) (Master degree in Medicine)

From 2018 to 2020

I taught the following classes:

- Prosthesis (6CFU), (Bachelor Degree in Biomedical Engineering).
- Chemical Bioengineering, (6CFU), (Bachelor Degree in Biomedical Engineering).
- Micro and Nanosystems (6 CFU) (Master Degree in Biomedical Engineering)

- Laboratory of Biomedical Technologies (6 CFU) (Master Degree in Biomedical Engineering)
- Neural Prostheses (6 CFU) (Master Degree in Bionics Engineering)
- Lab Training (3 CFU) (Master Degree in Bionics Engineering)
- Bioengineering Principles for the development of phantom for medical application (1 CFU) (Master degree in Medicine)
- Bioengineering Principles for the development of 3D in vitro models in physiological and pathological conditions (6 CFU) (Master degree in Pharmacy)

From 2020 to 2021

I taught the following classes:

- Prosthesis (6CFU), (Bachelor Degree in Biomedical Engineering).
- Artificial Organs, (6CFU), (Bachelor Degree in Biomedical Engineering).
- Micro and Nanosystems (6 CFU) (Master Degree in Biomedical Engineering)
- Laboratory of Biomedical Technologies (6 CFU) (Master Degree in Biomedical Engineering)
- Neural Prostheses (6 CFU) (Master Degree in Bionics Engineering)
- Lab Training (3 CFU) (Master Degree in Bionics Engineering)
- Bioengineering Principles for the development of phantom for medical application (1 CFU) (Master degree in Medicine)
- Bioengineering Principles for the development of 3D in vitro models in physiological and pathological conditions (6 CFU) (Master degree in Pharmacy)

From 2021 to present

I am teaching the following classes:

- Prosthesis (6CFU), (Bachelor Degree in Biomedical Engineering).
- Artificial Organs, (6CFU), (Bachelor Degree in Biomedical Engineering).
- Micro and Nanosystems (6 CFU) (Master Degree in Biomedical Engineering)
- Laboratory of Biomedical Technologies (6 CFU) (Master Degree in Biomedical Engineering)
- Neural Prostheses (6 CFU) (Master Degree in Bionics Engineering)
- Lab Training (3 CFU) (Master Degree in Bionics Engineering)
- Bioengineering Principles for the development of phantom for medical application (1 CFU) (Master degree in Medicine)
- Bioengineering Principles for the development of 3D in vitro models in physiological and pathological conditions (6 CFU) (Master degree in Pharmacy)
- Law of Biotechnological Innovation in the European Perspective (6 CFU) (Master degree in Law)

In the European Project UE CT. ASIA-LINK "Development of Core Competencies in the Areas of Biomedical and Clinical Engineering in the Philippines and Indonesia" from March to April 2006, I taught an intensive class of 40 hours per week at De La Salle University in Manila and a similar class at the University of Indonesia in Jakarta.

In this class my lessons were focused on the design and realization of artificial organs, on biomaterials and on bioengineering principles that underlie the interpretation of physiological processes that occur in major natural systems (kidney, lung, heart, pancreas). In particular, the following topics were analysed: dialyzers, oxygenators, artificial pancreas, design and realisation of orthopedic, vascular and valvular prostheses, 2D and 3D microfabrication techniques. I have also performed laboratory class on the use of a device for collection and analysis of the main physiological signals such as ECG, EEG, EMG, Spirometry. The course was aimed at professors of these two universities that were interested to rise a degree in Biomedical Engineering.

In the framework of the Jean-Monnet ELATE European Health Law and Technology project funded by the Erasmus+ Action - Jean Monnet Module - No 621002-EPP-1-2020-1-IT-EPPJMO-MODULE

I am responsible for the Crush Courses for Technology Transfer, from September 2020 to September 2022.

I have been supervisor of several bachelor and master degree thesis in the field of bioengineering, particularly focused on tissue engineering, bioreactors, biomaterials, biosensors, actuators, development of new methods of micro and nano manufacturing and development of software for the simulation of biochemical pathways of cellular metabolism.

I was supervisor of five PhD students in Chemical and Material Engineering, and at present I am supervisor of six Phd students in Information Engineering (section Bioengineering).

Scientific Activity

My research interests are:

1) Development of Micro and Nanofabrication techniques for the biomedical field.

As part of this activity, I have developed and patented several microfabrication methods. PAM, PAM2, PAM², Micromolding of polymeric structures, Soft-MI, ink-jet 3D printer.

- The PAM system is a microfabrication system based on a Pressure Assisted Microsyringe (PAM). The system consists of a microsyringe, whose glass needle has a 5-20 micron diameter tip, from which a polymer is extruded through the application of pressure. The PAM is interfaced to a computer, which controls at all times both the positioning of the syringe and the pressure applied. This system has been used for the fabrication of polymeric frames with a lateral resolution between 5-20 microns and is currently the microfabrication method in the field of tissue engineering with the highest resolution reported in the literature. In particular, the PAM method has been adopted for the fabrication of structures with different two- and three-dimensional topologies. The PAM technique has also been used in various applications, such as the fabrication of sensitive tissues and flexible electronic circuits.

- The PAM2 system consists of a commercial syringe whose piston is driven by a high-resolution stepper motor with micrometric steel needles, from which a high-viscosity polymer solution or a suspension or gel-like solutions can be extruded with (or without) cells inside. The PAM2 is interfaced to a computer, which controls both the positioning of the syringe and the motion of the syringe piston at all times. This system has been used for the fabrication of polymeric frames with lateral resolution between 100-200 microns and is currently a microfabrication method in the field of tissue engineering that is very easy to use by an inexperienced user and has a high flexibility in the type of materials to be used. In particular, the PAM2 method has been adopted for the fabrication of structures with different two- and three-dimensional topologies.

- The PAM² system is a modular Micro and Nanofabrication system that integrates, on a 3-axis mechanical micropositioner, three material processing systems, namely a steel syringe for the extrusion of polymers dissolved in highly volatile solvents, a commercial syringe that allows the extrusion of geliform and/or composite polymers by means of a fourth motor, and a laser system for the nano-processing of the polymeric construct using the laser ablation technique. The system is interfaced to a computer, which controls at all times both the positioning of the polymer processing systems and the processing of the materials. This method has been adopted for the fabrication of multi-material structures with different resolutions at the micrometer and nanometer level with different two- and three-dimensional topologies.

- Micromolding of polymeric structures is a technique patented in the USA during my time at the Microscale Tissue Engineering Lab at UCSD, San Diego, as part of my PhD. This method involves making polymer structures by casting, spin-coating or fluid-dynamic methods in polydimethylsiloxane moulds, which have a micrometric topology. These moulds are obtained by casting the silicone polymer on a silicon master suitably photolithographed with the desired topology.

- Soft-MI is a highly innovative method that combines the development of polydimethylsiloxane moulds obtained by Soft-lithography with the technique of Molecular Imprinting. In practice, once the microfabricated silicone mould has been functionalised in such a way as to selectively bind proteins, growth factors or cells to its polymeric surface, the polymeric solution is cast. Once the microchannels in the mould have been filled and the solvent has evaporated, a microfabricated structure is obtained that has a nanotopological imprint of the desired biomolecule or cells. At present, this method of microfabrication in the field of tissue engineering is the only one that makes it possible to obtain a well-defined microfabricated topology with a well-organised nanometric structure on its surface.

- The ink-jet 3D printer, Penelope, using the electronics and drivers of commercial thermal ink-jet printers, allows two- and three-dimensional structures to be printed with an accuracy of around 80 microns. This technique has been used both to print cells in geliform media and to print nanoparticles, nanosensors and biomolecules in well-defined patterns.

2) Development of bioreactors for engineered tissue culture.

As a major achievement in the field of Tissue Engineering and Regenerative Medicine, I have patented several microfabricated and non-microfabricated dynamic cell culture systems, through which physical stimuli can be applied to tissues and cells in culture. These systems have aroused great interest on the part of research bodies and companies in the sector (the idea won the Europractice VC Funding Forum competition funded by the European Community), and the commercialisation rights for two of these have been sold to an English company, Kirkstall Ltd, and an Italian company, Linari Engineering s.r.l.

The most recent developments in this research are aimed at the creation of two- and three-dimensional gradient bioreactors to recreate the same conditions found during embryonic development in order to study the factors that influence this process.

3) *In-vitro* and *in-vivo* physico-chemical, mechanical and cellular characterisation of micro- and nanofabricated polymer microstructures.

The microstructures created using the various methods developed during my research are characterised by me in terms of their wettability, porosity, surface charge density, mechanical, electrical and electromechanical properties, so as to determine not only their biomechanical behaviour but also to define the best biological site where they can be implanted. To this end, I am also involved in the evaluation of their cytotoxicity study and the analysis of changes in cellular activities *in-vitro* and *in-vivo* following their use.

4) In silico modelling of cell metabolism

The difficulty of integrating in a single model the biochemical reactions that occur during cellular processes is the main reason for poor results in software for simulating and predicting the behaviour of cells subjected to different physical and chemical stimuli. In this context, I tried to develop a new modelling approach by accurately describing the biochemical reactions with differential equations, resulting in a modular model of cellular metabolism. The equations have been implemented in a software consisting of distinct modules, each describing a different metabolic pathway; they constitute a useful library for the development of new modules and models that can help researchers to predict and explain experimental data on cellular behaviour.

5) Analysis of neuronal functional recovery by means of electromyographic and electroneurographic signal analysis following the implantation of hollow tubular polymeric structures or new neuronal surgery methods.

In this field of research I am evaluating the functional recovery of the peripheral nervous system following the implantation of hollow tubular polymeric microstructures made of biopolymers, suitably functionalised with neurotrophic and cell adhesion factors in the case of peripheral system

lesions in in-vivo animal models. This research is carried out in collaboration with the Institute of Clinical Physiology and in particular with Dr Silvia Burchielli. The same EMG and ENG signal analysis method was also applied in the case of new surgical techniques where the injured nerve is rotated 180° in order to create a gradient of neurotrophic factors that accelerate functional recovery. This research was carried out in collaboration with the research group of Prof. Giuliano Cerulli of the University of Perugia and Prof. Domenico Sergio Poggi of the University of Pisa.

6) Development and optimisation of natural and/or composite biomaterials for applications in the biomedical engineering field.

In this field, I am working on the development of polymeric systems, mainly of a gel-like nature, which can be added with other materials such as carbon nanotubes, carbon black, hydroxyapatite, lithium oxide, in order to modify their mechanical, electrical, electro-mechanical and chemical properties and their processing to produce both functional tissue substitutes and biomedical devices.

7) Development of touch sensors

“Skin-like” tactile sensors usually consist of arrays of touch-sensitive areas. During the last few years, a considerable effort has been made to develop tactile arrays capable of obtaining information on normal forces applied over a wider area than that covered by a single sensor. In this field, I have developed and patented a tactile sensor based on the use of macro and/or micro tracks manufactured according to a well-defined topology, immersed in a non-conductive silicone that has mechanical characteristics similar to those of skin. Thanks to their piezoresistive nature, the sensors thus created vary their impedance when they are pressed by external stimuli, and a fine mapping can be obtained not only of the contact area but also of the force exerted on them. This sensor is then interfaced through a suitable acquisition system to a PC in order to process the acquired signal and provide an evaluation of the induced effort.

These scientific activities are demonstrated by more than 140 papers on International journals with high IF, 16 book chapters and 24 national and international patents (h-index=33).

I am reviewer for several international journals, such as Acta Biomaterialia, Biosensors & Bioelectronics, Biomaterials, Biomedical Microdevices, Biotechnology Progress, Journal of Controlled Release, Materials Science & Engineering C, Open Chemical Engineering Journal, Sensors and Actuators, Tissue Engineering, ACS Nano, Journal of Neural Engineering, IEEE EMBS, Polymer Composites, etc. I was invited speaker and chairman in several international scientific meetings.

I was member of Editorial Board of International Journal of Osteology and Biomaterials (<http://www.osteobiom.com/editorialboard.html>), of Open Nanoscience Journal (<http://www.benthamscience.com/open/tonanoj/EBM.htm>) and of Open Chemical Journal (<http://www.benthamscience.com/open/tocengj/EBM.htm>) of Bentham Sciences Publishers Ltd.

I am member of Editorial Board of Biomedical Science and Engineering (<http://technology.pagepress.org/index.php/bse/pages/view/board>), Recent patents in Engineering (<http://benthamscience.com/journals/recent-patents-on-engineering/editorial-board/>), International Journal of Bioprinting (<http://ijb.whioce.com/index.php/int-j-bioprinting/about/editorialTeam>), Journal of 3D printing in Medicine (<http://www.future-science-group.com/journal-of-3d-printing-in-medicine/>), AIMS Bioengineering (<http://www.aimspress.com/news/80.html>), Annals of Medicinal Chemistry and Research (<https://www.jscimedcentral.com/MedicinalChemistry/editors.php>), Open Chemical Engineering Journal (<https://benthamopen.com/TOCENGJ/editorial-board/>), Trends in Medicine and Health (https://www.oatext.com/Trends-in-Medicine-TiM.php#Editorial_Board), Regenerative Medicine Frontiers (<https://rmf.hapres.com/EditorialBoard.aspx>), Journal of Polymer Science and Engineering (<http://systems.enpress->

publisher.com/index.php/JPSE/about/editorialTeam), Orthoplastic Surgery & Orthopedic Care International Journal (<https://crimsonpublishers.com/ooij/editorial-board.php>).

I am a founding member, member of the Directors board and currently treasurer of the International Society for Biofabrication, member of IEEE, of the National Bioengineering Group, of the Italian Digital Biomanufacturing Network (IDBN), of the Interuniversity Consortium for Additive Manufacturing (CIRAM), of the Interdepartmental Research Centre on Health Technology Assessment (CIRHTA) of the University of Pisa and of the Interdepartmental Centre for Law and Technologies of the Frontier (DETECT) of the University of Pisa.

I was auditor of projects for the Romanian Executive Agency for Higher Education, Research, Development and Innovation Funding, for the Estonian Science Foundation and for the Autonomous Province of Trento, University and Scientific Research Service. I was evaluator of Consolidator Grant, ERC Program, European Commission and of the Italian Ministry of Education, University and Research (MIUR) for FAS projects.

I was Scientific advisor for Dipromed Srl in San Mauro Torinese (To), Italy for following European Manunet Era Net Call and FP7 projects:

- Nanowell Manunet (2008);
- Biodress Manunet (2010);
- Nasla Capacities FP7 (2009);
- Nabla Converging Technology (2008)

I was evaluator of innovation project in industrial area for Fondimpresa, Italy.

In 2019, I co-organized the National Congress of the Italian Digital Biomanufacturing Network IDBN2019 "3D Printing and Bioprinting" (Pisa Centro Congressi le Benedettine 28th-30th OCTOBER 2019).

I was the organizer of the Winter School of Bioprinting "From 3D printing set-up to laboratory analysis" at the University of Pavia from 11th to 13th February 2020 (<http://bioprintingwinterschool.unipv.it/bioprinting-winter-school-2020-from-printing-set-up-to-laboratory-analysis/>), of the XL Annual School of Bioengineering entitled "Biofabrication: an integrated bioengineering approach for the automated fabrication of biological structures for clinical and research applications" from 13 to 16 September 2021 and of the international congress of the Advanced Functional Polymers for Medicine society from 13th to 16th July 2021.

Scientific grant

I was involved in the following grants:

- 1) Fondazione Cassa Di Risparmio di Pisa 2002: Development of miniaturized bioreactors for testing drugs on cell cultures in a dynamic regime in models of nervous and vascular pathologies;
- 2) FIRB 2002 Development of technologies for the realisation of electronic components and devices on textile substrates;
- 3) PRIN 2002: Development and realisation of a micromechanical transducer system for the determination of messenger RNA in biomedical applications;
- 4) PRIN 2003: New neuro-electronic interfaces: functional coupling of networks of neurons in-vitro to planar polymeric structures for the development of a bidirectional connection system for monitoring and conditioning the electrophysiological activity of such neuronal systems;
- 5) European project IST 2001-34181 BIOLOCH 2002-2005 BIO-mimetic structures for

- LOComotion in the Human body;
- 6) European project FP7-NMP-2008-SMALL-2: In-liveTox: Intestinal, Liver and Endothelial Nanoparticle Toxicity Development and evaluation of a novel tool for high-throughput data generation.
 - 7) FP7, INNOVATION -201207: Reliver: design of biomimetic bioartificial liver.
 - 8) PRIN 2010: Engineering of organ models of physiological and pathological interest for the investigation of age-related disorders. (MIND)
 - 9) Research project of the University of Pisa PRA_2016_57 "Conveying cell-specific drugs and molecules in the retina: Targeted therapy approaches".
 - 10) H2020 European project - INFRASUPP - 2016 -1- GA 731053Euro-African Open Biomedical Engineering e-Platform for Innovation through Education
 - 11) University of Pisa Research Project PRA_2018_68 "CRISP/Cas9: Gene Editing to study gene function in physiological and pathological conditions".

I was scientific coordinator of the following grants:

- 1) MANUNET 2011-1136: MES-STAR- Morphologically Engineered scaffold for soft tissue application and regeneration
- 2) POR CRO FSE 2007-2013 ASSE IV- Capitale Umano : INNOMED:Dispositivi biomedicali innovativi integranti nanotecnologie e materiali bioattivi
- 3) MISTI Global Seed Funds project "Design And Realization of a 3-D Multi-scale In Vitro Model Of Breast Tumor Microenvironment" from January 2016 to July 2017
- 4) M-ERA.NET Call 2016 – BIOMEMBRANE project from May 2017 to April 2020 (extended to June 2021 due to COVID19 pandemic).
- 5) POR FSE 2014 – 2020 Asse A Occupazione - Priorità di investimento A.2 – Obiettivo A.2.1 – Azione A.2.1.7- SIMPLIFY. Design of phthalate-free cannule for dentistry application.
- 6) MANUNET III call 2017 – MNET17/NMAT-0060 KERAPACK: novel integrated approach for the reduction, recycling and reuse of poultry feathers by keratins based packaging manufacturing. European project from January 2018 to January 2020.
- 7) IMAGO- Italian Mexican working Group on biofabrication, progetto granted by Italian Minister of Foreign Affairs for the international collaboration projects Italy-Mexico, from January 2018 to December 2019.
- 8) Technological Demonstrator Project "Electrospider - Device for multiscale and multimaterial biofabrication by electrospinning and microextrusion" funded by the University of Pisa from 31 December 2019 to 30 November 2020.

I am currently involved in the following grants:

- 1) ERC-CoG-2015 scientific project - ERC Consolidator Grant: BOOST: Biomimetic trick to re-balance Osteoblast-Osteoclast loop in osteoporosis treatment: Topological and materials driven approach coordinated by Prof. Chiara Vitale Brovarone of the Politecnico di Torino
- 3) Jean-Monnet ELATE European Health Law and Technology project funded by Erasmus+ Action - Jean Monnet Module - No 621002-EPP-1-2020-1-IT-EPPJMO-MODULE, from September 2020 to September 2022)

I am currently a project unit leader in the following grants:

- 1) European project GIOTTO "Active aGeIng and Osteoporosis: The next challenge for smart nanobiomaterials and 3D technologies" project number: 814410 —H2020-NMBP-TR-IND-2018-202 (330 K€) from 1st January 2019 to 28th February 2023.
- 2) Project financed by the Region of Tuscany under the Bando Ricerca Salute 2018 with the project "TRITONE: smart bioactive personalised and implantable 3D printed scaffold for tendon regeneration".

- 3) Project co-financed by the POS FESR Toscana 2014-2020 "LEATHER-UP: LEATHER UPGRADE", Call 2 - Research and development projects for SMEs, from January 2021 to December 2022
- 4) MIT-UNIFI Project "An In Vitro Model of Pyelonephritis" from January 2019 to July 2022

Institutional Positions

From 1998 to present

Member of the Research Centre "E. Piaggio" – University of Pisa and currently responsible for safety at the Centre

From 2006 to 2012

Faculty member, University of Pisa - Engineering Faculty - Italy

From 2006 to present

Active member of defence for Biomedical Engineering of Bachelor and Master degree thesis

From 06/2006 to 2015

Member of the board of PhD in Chemical and Material Engineering, “Leonardo Da Vinci” PhD School of University of Pisa

From June 2006 to present

Expert member of the commission of the University of Pisa for the qualification to the profession of engineer

From 10/2009 to present

Member of the board of PhD in Automaton, Robotics and Bioengineering, “Leonardo Da Vinci” PhD School of University of Pisa

From 05/2009 to 18/09/2012

Elected Member of “Comitato di Presidenza” at faculty of Engineering of University of Pisa

From 11/2010 to 18/09/2012

Elected Member of “Giunta di Dipartimento” at Department of Chemical Engineering, Industrial Chemistry and Materials Science of University of Pisa

From 01/11/2012 to 31/10/2015

2012 – 2015 Elected Member of Security Committee; Assistant Coordinator, University of Pisa - Italy

From 01/11/2015 to 30/10/2016

2015 – 2018 Elected Member of Security Committee; Assistant Coordinator, University of Pisa - Italy

From 11/2013 to 10/2015

President of Didactics Commission of Council of Biomedical Engineering degree

From 11/2015 to 10/2018

VicePresident of Council of Biomedical Engineering and Bionics Engineering degree

From 01/2014 to present

Member of the Doctoral board of Ingegneria dell'Informazione, University of Pisa, Italy

From 11/2014 to 10/2018

Elected member of Commission for the evaluation of the Research for Industrial and Information Engineering

From 11/2016 to 10/2018

Managing security for University of Pisa appointed by the Chancellor

From 9/2017 to present

University member in agreement for research activities at the Fondazione Toscana Gabriele Monasterio for medical and public health research

From 11/2018 to 9/2021

President of the Aggregate Council of the Bachelor and Master Degree Courses in Biomedical Engineering and of the Master Degree Course in Bionics Engineering and member of the Joint Teaching Commission and of the Review Commission for these Degree Courses

From 2018 to present

Member of the Board of the School of Engineering; Member of the Interdepartmental Research Centre on Health Technology Assessment of the University of Pisa; Member of the Interdepartmental Centre "Frontier Law and Technologies" of the University of Pisa; Member of the Centre for the Integration of Scientific Instrumentation of the University of Pisa

From 2019 to present

Member of the Board of Directors of the National Bioengineering Group

From 11/2020 to present

Member of the Doctoral Board in Information Engineering

From 15/9/2021 to 14/09/2024

President of the Aggregate Council of the Bachelor and Master Degree Courses in Biomedical Engineering and of the Master Degree Course in Bionics Engineering and member of the Joint Teaching Commission and of the Review Commission for the above-mentioned Degree Courses

From 01/2022 to present

Vice-President of the Board of Directors of the National Bioengineering Group

I am also a member of various committees within and outside the University of Pisa for competitions for admission to the PhD programme in Information Engineering, for research grants, research scholarships, type A and type B researcher and full professor positions.

Awards

2001: 1st price in the "Research Capital 2001" for the "development of a system of microfabricated polymer microstructures for applications in the field of Biomedical Engineering"

2001: 3rd price in the "Research Capital 2001" for the "Design and implementation of a bioreactor and isobaric laminar flow for applications in the field of tissue engineering and pharmacology"

2002: EURO PRACTICE VC Funding Forum funded by the European Community for the development of a multicompartiment bioreactor (MCB)

Award "Augusto Bonola" 2007 by the Italian Society of Surgery of the Hand for the contribution in the advancement of hand surgery

Prize 2011 "Young Researcher" of University of Pisa

2017/7/1: Cover Image on Journal of Tissue Engineering and Regenerative Medicine, Volume 11, Issue 7, with paper "M Mattioli-Belmonte, C De Maria, C Vitale-Brovarone, F Baines, M Dicarlo, G Vozzi, Pressure-activated microsyringe (PAM) fabrication of bioactive glass-poly(lactic-co-glycolic acid) composite scaffolds for bone tissue regeneration"

Major Collaborations

- Prof. Thomas Boland, Ink-jet system, University of Texas at El Paso (USA)
- Prof. Paulo Bartolo, Microfabrication platforms, University of Manchester (UK) and Politecnico of Leiria (Portugal)
- Prof. Lorenzo Moroni, Electrospinning system, University of Twente (The Netherland)
- Prof. Joachim Kohn, Development of biomaterials, Rutgers University (USA)
- Prof. Paolo Madeddu, Angiogenesis process, Bristol University (UK)
- Prof. Iulian Antoniac, Bioceramics, University Politehnica of Bucharest (Romania)
- Prof. John Cooke, Cardiovascular medicine, Stanford University (USA)
- Dr. Ngan Huang, Cardiac muscle cells regeneration, Stanford University (USA)
- Prof. Helen Blau, Stem cell biology, Stanford University (USA)
- Prof. Jonathon Aylott, Design and Realisation of nanoparticles for sensing and controlled release, University of Nottingham, (UK)
- Prof. Dietmar Hutmacher, Biofabrication, Queensland University of Technology, Brisbane, Australia e Technische Universitat Munchen
- Prof. Alex K. Shalek, Institute for Medical Engineering & Science, MIT (USA)
- Prof. Wei Sun, Drexel Univeristy (USA) & Tsingua University (China)
- Prof. James J. Yoo, Wake Forrest (USA)
- Prof. Paolo Bonaldo, Università degli studi di Padova
- Prof. Gianluca Ciardelli, Politecnico di Torino
- Prof.ssa Chiara Vitale Brovarone, Politecnico di Torino
- Prof. Monica Mattioli- Belmonte, Università Politecnica delle Marche

I authorise the processing of the personal data contained in my curriculum vitae in accordance with art. 13 of Legislative Decree 196/2003 and art. 13 GDPR 679/16.

Pisa, 20th January 2022

Prof. Giovanni Vozzi

List of Publications

International Journals

- 1) Ahluwalia A, Basta G, Chiellini F, Ricci D, Vozzi G, *Endothelial Cell Adhesion on Bioerodable Polymers*, J. Materials Science: Materials in Medicine, 2001,12(7),613-619;
- 2) Vozzi G, Flaim CJ, Bianchi F, Ahluwalia A and Bhatia SN, *Microfabricated PLGA Scaffolds: A Comparative Study for Application to Tissue Engineering*, Materials Science & Engineering C, 2002, 20(1-2):43-47;
- 3) Vozzi G, Previti A, De Rossi D, Ahluwalia A, *Microsyringe-Based Deposition of Two-Dimensional and Three-Dimensional Polymer Scaffolds with a Well-Defined Geometry for Application to Tissue Engineering*, Tissue Eng. 2002 Dec;8(6):1089-1098;
- 4) Vozzi G, Flaim C, Ahluwalia A, Bhatia S, *Fabrication of PLGA scaffolds using soft lithography and microsyringe deposition*, Biomaterials. 2003 Jun;24(14):2533-2540;
- 5) Santarelli MF, Sani L, Ahluwalia A, Vozzi G, Landini L, De Rossi D, *A new Method For Quantitative Cellular Imaging on 3-D Scaffolds Using Fluorescence Microscopy*, IEEE Transactions on Nanobioscience, June 2003,2(2),110-117;
- 6) Bianchi F, Vozzi G, Pescia C, Domenici C, Ahluwalia A, *A comparative study of chemical derivatisation methods for spatially differentiated cell adhesion on 2-dimensional microfabricated polymeric matrices*, J. Biomater. Sci. Polymer Edn, 2003,14(10), pp. 1077-1096;
- 7) Ciardelli G, Chiono V, Cristallini C, Barbani N, Ahluwalia A, Vozzi G, Previti A, Tantussi G, Giusti P. *Innovative tissue engineering structures through advanced manufacturing technologies* J Mater Sci Mater Med. 2004 Apr;15(4):305-310.
- 8) Vozzi G, Previti A, Ciaravella G, Ahluwalia A., *Microfabricated fractal branching networks*, J Biomed Mater Res A. 2004 Nov 1;71(2):326-333.
- 9) Carlucci F, Dini F, Vozzi G, Vozzi F, Chiono V, Salvatori C, Arispici M, Domenici C, Ciardelli G, Giusti P, *L'effetto tunnel mediante tubi bioerodibili nelle nerve regeneration*. Annali della Facoltà di Medicina Veterinaria di Pisa, 2005, vol. LVIII, p. 227-240
- 10) Ciardelli G, Chiono V, Vozzi G, Pracella M, Ahluwalia A, Barbani N, Cristallini C, Giusti P, *Blends of poly-(ϵ -caprolactone) and polysaccharides in tissue engineering applications*, Biomacromolecules 2005, 10.1021/bm0500805, pp. 1-16.
- 11) Bonfiglio A, De Rossi D, Kirstein T, Locher IR, Mameli F, Paradiso R, Vozzi G, *Organic field effect transistors for textile applications*. IEEE Trans Inf Technol Biomed. 2005 Sep;9(3):319-24. Review.
- 12) Vozzi G, Carpi F and Mazzoldi A, *Realization of conducting polymer actuators using a controlled volume microsyringe system*, 2006 Smart Mater. Struct. 15:279- 287, 2006

- 13) Ciardelli G, Rechichi A, Sartori S, D'Acunto M, Caporale A, Peggion E, Vozzi G, Giusti P, *Bioactive Polyurethanes in Clinical Applications*, Polymers for Advanced Technologies 2006, 17 (9-10), 786-789
- 14) Bianchi F, Vassalle C, Simonetti M, Vozzi G, Domenici C, Ahluwalia A. *Endothelial cell function on 2D and 3D micro-fabricated polymer scaffolds: applications in cardiovascular tissue engineering*. J Biomater Sci Polym Ed. 2006;17(1-2):37-51.
- 15) Mariani M, Rosatini F, Vozzi G, Previti A, Ahluwalia A. *Characterization of tissue-engineered scaffolds microfabricated with PAM*. Tissue Eng. 2006 Mar;12(3):547-58.
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- 17) Bianchi F, Rosi M, Vozzi G, Emanuelli C, Madeddu P, Ahluwalia A. *Microfabrication of fractal polymeric structures for capillary morphogenesis: Applications in therapeutic angiogenesis and in the engineering of vascularized tissue*. J Biomed Mater Res B Appl Biomater. 2007 May;81B(2):462-8.
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- 34) Mazzoldi A, Tesconi M, Tognetti A, Rocchia W, Vozzi G, Pioggia G, Ahluwalia A, De Rossi D, *Electroactive Carbon Nanotube Actuators: Soft-Lithographic Fabrication and Electrochemical Modelling*, Materials Science and Engineering: C, 28(7) p.1057-1064, Aug 2008
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