CURRICULUM VITÆ

Sergio MARTINOIA, Ph.D.

1989: University of Genova, Laurea degree in Electronic Engineering, summa cum laude.
1991: Visiting student, Stanford University, CA (USA), Center for Integrated Systems – CIS (May-August)
1993: Polytechnic of Milano and University of Genova, PhD in Bioengineering
1993-2000: Assistant Professor, Dept. of Biophysical and Electronic Engineering, University of Genova
1997: Visiting scientist, Stanford University, CA (USA), Center for Integrated Systems – CIS (October-November)
2000-2016: Associate Professor of Bioelectronics, University of Genova
2002-2007: Chairman, PhD program in Bioengineering, Material engineering and Robotics, University of Genova
2007-2010: Chairman, Laurea degree in Biomedical Engineering and Bioengineering
2008-2013: Consultant Senior Scientist in the Dept. of Neurosciences and Brain Technologies at the Italian Institute of Technology
2013-2015: Chairman, PhD program in Bioengineering and Robotics
2015-2016: Member of the National Board (GEV09) for the Evaluation of Research Quality (VQR 2011-14)
2015-2017: Member of the Board for Internationalization, University of Genova
2016- present: Full professor of Bioengineering, University of Genova
2017-2020: Member of the Research Commission, University of Genova
2018-2020: Deputy director of DIBRIS
2020- present: Department Director (DIBRIS)

Sergio Martinoia (SM) is professor of Bioengineering in the Department of Informatics, Bioengineering, Robotics and Systems Engineering (DIBRIS) at the University of Genova, where he teaches courses on Bioelectronics, Neuroengineering and Neurotechnologies, offered to students of the biomedical engineering curricula. He has participated to several national and international project in the field of bioengineering and neuroengineering starting from the European FP5 including coordination of projects in FP5 and FP7. More recently, his Lab has been the academic partner of three funded projects in the framework of the Eurotransbio for the development of new microsystem platforms for in-vitro neurotoxicity (2010-2017). He has been also National coordinator of two national projects (PRIN 2003 and 2006). More recently, he participated to National and European projects and he is now involved in three big projects within the Italian Recovery and Resilience Plan (RRP) related to Neuroscience, Neurotechnology and Robotics. From 2008 to 2014 he was one of the organizers of the international Micro Electrode Array meeting held every two years in Reutlingen (Germany). He has been the co-founder in 2002 and first chairman of the International Summer School of Neuroengineering held periodically in Genova (in 2022 the 8th edition) www.neuroengineering.eu. He is associate editor of Scientific Report (Nature PG), PlosOne for the specialty Neuroengineering, Frontiers in Neuroscience for the specialty Neurotechnology, Frontiers in Bioengineering and Bionanotechnology, Computational intelligence in Neuroscience and review editor of Frontiers in Neurorobotics. He is serving as reviewer of many international journals (e.g., J. Neural Eng., J. of Neuroscience, Sensors and Actuators, Plos Comp. Biol.) and for national and international projects (e.g., FET, EIC, ERC).

RESEARCH ACTIVITIES

The research activity of SM is focused in the fields of Neuroengineering and Bioelectronics. These are multi-disciplinary fields with relevance in the context of biomedical engineering research, biotechnologies and neuroscience for future clinical applications and bio-techniques.

KEYWORDS

Bioelectronics, Neurotechnologies, neuro-electronic interface, micro-nano systems and biosensors, computational neuroscience, electrophysiology, microtransducer array for electrochemical measurements, biological neuronal networks, hybrid-systems, brain-on-a-chip.

CONTENT AND IMPACT OF THE MAJOR SCIENTIFIC CONTRIBUTIONS

SM is a recognized leading expert in the area of Bioelectronics and Neuroengineering and more specifically in the field of Micro Electrode Array (MEA) based systems and micro-sensors for bio- and neuro-electronic interfaces. Since his PhD studies (early '90), he was involved in developing innovative tools and technologies for neural interfaces for in-vitro applications. At that time, no commercially available systems for multi-site network electrophysiology were available and he substantially contributed to the diffusion of those systems, developing new devices (during repeated periods at Stanford University - Center for Integrated Systems, Prof. Gregory Kovacs) and collaborating with recognized leading centers (e.g. Institute of Microtechnology, University of Neuchatel, Prof. Nico de Rooij). He presented pioneering works in this field (e.g., Martinoia et al., J. Neurosci. Methods, 1993), broadening his interest to chemical sensors, biosensors and cell-based biosensors (e.g., Bove M., et al., Sens. and Act. B, 1995) and thus contributing to the introduction of novel techniques in the chemical-biosensor field for neuropharmacology (e.g., Chiappalone et al., Biosensors & Bioelectronics, 2001; Martinoia et al., Biosensors and Bioelectronics, 2005). Broadening his interests and by exploiting the capabilities of MEA based microsystems, SM was very active in the field of network electrophysiology contributing with relevant studies to the characterization of the dynamics of neuronal populations with highly cited works (i.e., Chiappalone et al., Brain Research, 2006; Pasquale et al, Neuroscience, 2008).

As regard to the technological development and innovation, he participated (and coordinated in the final part of the research) a project dealing with new high-density MEAs (i.e., Berdondini et al., Lab on a Chip, 2009). He established in 2012 a collaboration with the University of Cagliari, for designing organic-based transistors for electrophysiological measurements (i.e., Spanu et al., Scientific Report, 2015; European Patent). In the same period, he developed in his Lab a new experimental model constituted by 3-dimensional network chronically coupled to 3D scaffolds and MEA based devices (i.e., Frega et al., Scientific Report, 2014; Tedesco et al., Biomaterials, 2018; Andolfi et al. Biochip J 2022). In the last few years (from 2015), he also established a collaboration with the IBM research lab at Almaden (S.José, CA, USA), for developing technologies for 3D MEAs to be coupled to engineered 3D cultures (Spanu et al., J. Neural Eng. 2020).

Since many years, SM is one of the leading expert in the field of modeling of neuro-electronic interface and solid-state device for chemical and bio-sensing, contributing with highly cited works in the field (e.g., Grattarola M., Martinoia S., IEEE Trans. on Biomed. Eng., 1993) and with works on neuro-carbon nanotube interface (i.e., Massobrio et al., Nanoletters, 2008) and 3D nano-electrodes (i.e., Massobrio et al., IEEE Trans on Biomed. Circ. and Syst., 2018).

Finally, SM was one of the pioneers in developing hybrid systems encompassing biological neuronal networks coupled (through neuro-electronic interfaces) to artificial devices. On this topic he coordinated a UE project funded in the Future and Emerging Technologies scheme (from 2002-2005) paving the way to a new series of investigations both in the field of advanced neuro-electronics and hybrid bio-artificial systems and for neurally inspired ICT applications (Martinoia et al., Neurocomputing, 2004; Tessadori et al., Front. In Neural Circuits, 2012). During the last ten years, he also developed and validated, in cooperation with a company, an in-vitro platform for a neurotoxicity method alternative and complementary to animal experiments (i.e., Novellino et al., Front. In Neuroengineering, 2011; Vassallo et al., Neurotoxicology, 2017).

SM has a specific vocation for inter- and multi-disciplinary studies. All his research interests are at the crossing of scientific disciplines such as electronic engineering and neuroscience, biophysics and bioengineering.

SM is member of the IEEE BME (BioMedical Engineering), Society for Neuroscience (SFN)

PUBLICATIONS TRACK RECORD:

More than 120 journal papers (Scopus) published in International Journals (50 in the last 10 years)
25 invited talks/seminars in the last ten years
The H-index is 41 (Scopus), 4891 citations
The H-index is 49 (Google scholar), 7697 citations

RELEVANT RECENT PUBLICATIONS:

1. Andolfi, A., Jang, H., Martinoia, S., Nam, Y. Thermoplasmonic Scaffold Design for the Modulation of Neural Activity in Three-Dimensional Neuronal Cultures, ***Biochip Journal***, 16 (4), pp. 451-462, 2022.
2. Muzzi, L., Di Lisa, D., Arnaldi, P., Aprile, D., Pastorino, L., Martinoia, S., Frega, M. Rapid generation of functional engineered 3D human neuronal assemblies: Network dynamics evaluated by micro-electrodes arrays, ***J of Neural Engineering***, 18 (6), 2021
3. Spanu, A., Colistra, N., Farisello, P., Friz, A., Arellano, N., Rettner, C.T., Bonfiglio, A., Bozano, L., Martinoia, S. A three-dimensional micro-electrode array for in-vitro neuronal interfacing, ***J of Neural Engineering***, 17 (3), 2020.
4. Spanu, A., Colistra, N., Farisello, P., Friz, A., Arellano N., Rettner, C.T., Bonfiglio, A., Bozano, L., Martinoia, S., A Three-Dimensional Micro-Electrode Array for in-vitro neuronal interfacing, ***J. Neural Eng.***, in press (2020).
5. Pastore, V.P., Massobrio, P., Godjoski, A., Martinoia, S, Identification of excitatory-inhibitory links and network topology in large-scale neuronal assemblies from multi-electrode recordings, ***PLoS Computational Biology***, 14 (8), art. no. e1006381, (2018).
6. Tedesco M.T., Di Lisa D., Massobrio P., Colistra N., Pesce M., Catelani T., Dellacasa E., Raiteri R., Martinoia S., Pastorino L., Soft chitosan microbeads scaffold for 3D functional neuronal networks, ***Biomaterials***, 156, pp. 159-171, (2018).
7. Rojas C., Tedesco M.T., Massobrio P., Marino A., Ciofani G., Martinoia S., and Raiteri R., Acoustic stimulation can induce a selectiveneural network response mediated by piezoelectric nanoparticles, ***J Neural Engeneering***, 15 (2018).
8. Poli D., Pastore V.P., Martinoia S., and Massobrio P., From functional to structural connectivity using partial correlation in neuronal assemblies, ***J Neural Engineering***, 13, doi:10.1088/1741-2560/13/2/026023, (2016).
9. Massobrio P., Pasquale V., and Martinoia S., Self-organized criticality in cortical assemblies occurs in concurrent scale-free and small-world networks, ***Scientific Report***, 5, 10578, doi:10.1038/srep10578 (2015).
10. Spanu A., Lai S., Cosseddu P., Tedesco M., Martinoia S., Bonfiglio A., An organic transistor-based system for reference-less electrophysiological monitoring of excitable cells, ***Scientific Reports*** 5, 8807, doi:10.1038/srep08807, (2015).

LEADERSHIP IN INDUSTRIAL INNOVATIONS

SM was co-founders of two start-up companies.

2001: ETT spa (www.ettsolutions.com) that has an innovative service for neurotoxicological screening with new in-vitro bioelectronic tools.

2011: 3Brain AG (www.3brain.com) as result of the exploitation of the UE IDEA project (ended in 2008). The company has established (since 2018) a joint Lab with the University of Genova, Dept. of Informatics, Bioengineering, Robotics, and Systems Engineering.

RESEARCH MANAGEMENT AND PHD STUDENTS MENTORING

From 2002 to 2021, SM was leading the Neuroengineering and BionanoTechnology Lab, and Neuroengineering and Neurotechnology Lab (N2Lab) first at the Department of Biophysical and Electronic Engineering (DIBE) and, from 2012, at the Department of Informatics, Bioengineering, Robotics and Systems Engineering (DIBRIS). Since 2001, SM has been mentor of 18 PhD students within the PhD program of Bioelectronics and Bioengineering, the PhD program on Humanoid Technologies and the PhD program in Bioengineering and Robotics in cooperation with the Italian Institute of Technology. Four PhD thesis works have been awarded, as best thesis, by the national committee on Bioengineering and one thesis received a special award from a committee of companies of the Genova industrial area. In the last two years two thesis has been published by Springer (recognizing outstanding PhD research).

Genova, 18 Aprile 2023 Sergio Martinoia

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