Sergio Martinoia

Full professor

✉ sergio.martinoia@unige.it
📞 +39 0103532251

Education and training

1989
Laurea in Electronic Engineering
110/110 e lode
University of Genova - Genova - IT

1993
PhD in Bioenegineering
Integrated microbiosensors
Polytechnic University of Milano University of Genova - Milano Genova - IT

Academic experience

2016
Full Professor
University of Genova - Genova

Language skills

English
Proficient

French
Independent

Teaching activity

1993-1998 esercitatore di Dispositivi Elettronici, CdS in Ingegneria Elettronica, Università di Genova;
1994-1995 esercitatore di Campi Elettromagnetici, CdS in Ingegneria Elettronica, Università di Genova;
1996-2002 esercitatore di Bioelettronica, CdS in Ingegneria Biomedica, Università di Genova;
1996-1997 incarico di docenza per il corso di Tecnologie Biomediche (II modulo), CdS in Ingegneria Biomedica, Università di Genova;
1997-1999 incarico di docenza del corso di Tecnologie Biomediche (1/2), CdS in Ingegneria Biomedica, Università di Genova;
1999-2000 incarico di docenza del corso di Tecnologie Biomediche 1, CdS in Ingegneria Biomedica, Università di Genova;
1999-2000 incarico docenza del corso di Elettronica Biomedica 1, CdS in Ingegneria Biomedica, Università di Genova;
2000-2008 docenza del corso di Fondamenti di Strumentazione Biomedica 1 (5 CF), CL3 in Ingegneria Biomedica, Università di Genova;

2001-2012 docenza del corso di Metodi e Tecniche per la Neuroingegneria (5 CF), CLS in Bioingeneria, Università di Genova;
2002- docenza del corso di Bioelettronica (12 CF), CL3 in Ingegneria Biomedica, Università di Genova;
2003-2005 docenza del corso di Fondamenti di Neuroingegneria (5 CF), LS in Ingegneria Biomedica, Università di Pavia;
2013- docenza del corso di Neuroengineering and Neurotechnologies (6 CF).

Postgraduate research and teaching activity

Supervision of PhD students, residents and post-doctoral fellows

Since 2002, SM is leading the Neuroengineering and BionanoTechnology Group 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 16 PhD students within the PhD program of Bioelectronics and Bioengineering, the PhD program on Humanoid Technologies and the PhD program in Bioengineeering 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).

Research interests

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 and 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). 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.

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 pioneer in developing hybrid systems encompassing biological neuronal networks coupled (through micro-transducer arrays) to artificial devices. On this topic he coordinated an UE project funded in the Future and Emerging Technologies scheme (from 2002-2005) paving the way to a new series of investigation 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.

Grants

2007 – 2009

A new neuroengineering tool for studying dynamics plasticity and information processing in natural neuronal networks photoMEAs coupled with micro patterned substrates

MIUR - IT

Pricipal investigator

2002 – 2006

Imaging device for Electrophysiological Activity Monitoring of Neuronal Cell Cultures IDEA (NEST-1 ADVENTURE)

UE-FP6 - IT

Pricipal investigator

2013 - 2015

In vitro alternative assay for neurotoxicity evaluation and prediction NEUROTOX

Eurotransbio - IT

Participant

Editorial activity

From 2008 to 2014 organizers of the international Micro Electrode Array meeting held every two years in Reutlingen (Germany).
First chairman in 2002 and of the International Summer School of Neuroengineering held periodically in Genova (in 2018 the 7th edition) www.neuroengineering.eu.
Editorila board of Scientific Report (Nature PG)
Editorial board of PlosOne for the specialty Neuroengineering,
Editorial board of Frontiers in Neuroscience for the specialty Neurotechnology
Editorial board of Frontiers in Bioengineering and Bionanotechnology
Editorial board of Computational intelligence in Neuroscience
Review editor of Frontiers in Neurorobotics