
PERSONAL INFORMATION

Family name, First name: Sampietro, Marco
Research unique identifier: ORCID 0000-0003-4825-9612, ResearchID A-3732-2016
Nationality: Italian
Date of birth: 17-07-1957, Como, Italy
Marital status: Married with two children
E-mail&URL of website: sampietro.faculty.polimi.it



EDUCATION

1982: University Degree (Laurea – Bachelor+Master) in Nuclear Engineering (28.10.1982) at Politecnico di Milano. Thesis: “*Experimental determination of the refraction index and of the absorption coefficient of III-V compounds*”, Dept. of Nuclear Engineering, Politecnico di Milano (Italy) and CSELT (Centro Studi E Laboratori Telecomunicazioni), Torino (Italy).

CURRENT POSITION

2002-now Full Professor of Electronics (Permanent position) at Politecnico di Milano, Dept. of Electronics and Information Technology, Milano (Italy).

PREVIOUS POSITIONS

1992-2002 Associate Professor (Permanent position) at Politecnico di Milano (Italy), Dept. of Electronics and Information Technology.
1984-1992 Researcher (Permanent position) at the Italian National Research Council (CNR), Dept. of Quantum Electronics, Milano (Italy) on the development of semiconductor radiation detectors for X-ray application and High Energy physics experiments.

ISTITUTIONAL DISTINCTIONS

2011 **Co-founder of POLIFAB** (www.polifab.polimi.it), the micro and nano technology center of the Politecnico di Milano created to provide the highest technological standards for a wide range of applications and processes involving the five Key Enabling Technologies: photonics, micro and nanoelectronics, biotechnologies, advanced materials and nanotechnology.

SUPERVISION OF GRADUATES & POSTDOCTORAL FELLOWS

PhD supervisor: about 1 PhD per year in the last 25 years; From the first PhD student back in 1996, Luca Fasoli (now VP, Memory Product Solutions, Silicon Technology and Manufacturing Group at Western Digital, San Jose, California) to Laura Fumagalli (now Assistant Professor at the National Graphene Institute, University of Manchester (UK)) they all found success in science, industry (e.g. P. Ciccarella is Design manager at TDK-Invensense, SanJose (USA)) or academia (e.g. M. Carminati is Assistant Professor on Electronics at Politecnico di Milano). Some of the PhD have received ERC grants (Laura Fumagalli -2019, on nanoAFM; Mario Caironi -2014 and 2019, on high frequency organic semiconductors and on edible electronics, now at IIT).
Master thesis supervisor : about 3 MS per year in the last 25 years;

TEACHING ACTIVITIES (from year 2000)

2003-now “**Elettronica Analogica**” (10 ECTS) for Bachelor/Master students in Electronics, Bioengineering and Automation at Politecnico di Milano (160 students/year)
2019 “**High Resolution Electronic Measurements in Nano-Bio Science**” (5 ECTS) for PhD students (63 students from all over the world) at Politecnico di Milano (sampietro.faculty.polimi.it/Nano).
2008-2016 “**Electrical Characterisation of Nanoscale Samples & Biochemical Interfaces : methods and electronic instrumentation**” (5 ECTS) for PhD students (Course held every two years, average attendance of 30 students from all over the world) at Politecnico di Milano.
2003-2015 “**Organic Electronics: principles, devices and applications**” (5 ECTS) for PhD students (every two years, average attendance of 40 students from all over the world) at Politecnico di Milano.
2000-2009 “**Fondamenti di Elettronica**” (10 ECTS) in the Laurea-On-Line of Politecnico di Milano. This has been the first on-line University degree in Italy, to which I contributed since the foundation.

Educational material:

Book “Circuiti Elettronici” A.L.Lacaita, M.Sampietro, Città Studi Edizione (1997, 2nd ed.).
eBook “Elettronica Analogica” at sampietro.faculty.polimi.it/didattica/ElAnscaricabile

INSTITUTIONAL RESPONSIBILITIES

- 2012-2018 **Dean** of the Bachelor and Master Course Programs in “Electronics Engineering” at the School of Industrial and Information Engineering, Politecnico di Milano
- 2004-2006 **Vice-Dean** of the Faculty of Information Technology at Politecnico di Milano.
- 2002-now **Head** of “Innovative Integrated Instrumentation for the Nanoscience – I3N”, now at POLIFAB in Politecnico, Via G. Colombo 81, Milano (Italy), with more than 20 members (3 staff professors, 1 guest senior researcher, 3 post-docs/temporary researchers, 7 PhD students, 10 Master students every year)
- 1997-now **ERASMUS Coordinator** for outgoing students of “Electronics Engineering” Bachelor and Master students in Politecnico di Milano
-

MAJOR SCIENTIFIC COLLABORATIONS

We provide innovative solid state sensors and high sensitivity electronic platforms to a broad range of partners operating in many different scientific fields:

ACADEMIC:

- (1) *Photonic mesh for optical processing*: **David Miller**, Ginzton Laboratory, **Stanford University** (USA).
- (2) *Miniaturized gas sensors*: **Anuradha Murthy Agarwal**, Department of Materials Science & Engineering, **MIT**, Cambridge (USA)
- (3) *Fabrication of Silicon-Photonics circuits and devices*: **Marc Sorel**, James Watt School of Engineering, **University of Glasgow** (UK)
- (4) *Electrochemical chips for biosensing applications*: **Jenny Katarina Emnéus**, Dept. Biotechnology and Biomedicine (**DTU Bioengineering**), Kgs. Lyngby, Denmark
- (5) *Neural tissue engineering*: **Alberto Martinez Serrano**, Biology of Neural Stem Cells group, **Universidad Autónoma de Madrid**, Spain,
- (6) *Nanoscale Bio-electrical Characterization of materials*: **Gabriel Gomila Lluch**, Institute for Bioengineering of Catalonia (IBEC), **University of Barcelona**, Spain
- (7) *Optogenetic applications*: **Merab Kokaia**, Experimental Epilepsy group, **Lund University**, Sweden.
- (8) *Bioimpedance tomography*, **Ørjan Grøttem Martinsen**, Oslo Bioimpedance group, **Oslo University** and University Hospital, Norway.
- (9) *2D materials for sensors applications*: **Gilbert Daniel Nessim**, Institute for Nanotechnology and Advanced materials (BINA), **Bar Ilan University**, Israel
- (10) *Plasmonic devices for optical processing*: **Alexandre Bouhelier**, Laboratoire Interdisciplinaire Carnot de Bourgogne, **CNRS Dijon**, France

INDUSTRIAL: (1) **STm microelectronics** (IT): Design and fabrication of electronic ASIC. (2) **IMEC** (Be): design and fabrication of photonic devices.

PUBLICATIONS (on Nov.2019)

Full papers: 223. **Citation analysis:** Google scholar Nov. 2019: Citations: 8135. H-index: 45. Web of science Nov. 2019: Reported papers: 223: Citations: 4998. H-index: 35.

10 representative publications from the last 10 years 2010-2020 (citations/google scholar)

1. A.Annoni, E.Guglielmi, M.Carminati, G.Ferrari, M.Sampietro, D.A.B.Miller, A.Melloni, F.Morichetti “Unscrambling light—automatically undoing strong mixing between modes” **Light: Science & Applications, Nature Publishing Group 6 (12), e17110 (2017)** /39 citations
2. P Ciccarella, M Carminati, M Sampietro, G Ferrari “Multichannel 65 zF rms resolution CMOS monolithic capacitive sensor for counting single micrometer-sized airborne particles on chip” **IEEE Journal of Solid-State Circuits 51 (11), 2545-2553 (2016)** /27 citations
3. Morichetti, Francesco; Grillanda, Stefano; Carminati, Marco; Ferrari, Giorgio; Sampietro, Marco; Strain, Michael J; Sorel, Marc; Melloni, Andrea; “Non-invasive on-chip light observation by contactless waveguide conductivity monitoring” **IEEE Journal of Selected Topics in Quantum Electronics 20 (4), 292-301 (2014)** /88 citations
4. S.Grillanda, M.Carminati, F.Morichetti, P.Ciccarella, A.Annoni, G.Ferrari, M.Strain, M.Sorel, M.Sampietro, A.Melloni “Non-invasive monitoring and control in silicon photonics using CMOS integrated electronics” **Optica 1 (3),129-136 (2014)** /76 citations
5. Pace, Giuseppina; Grimoldi, Andrea; Natali, Dario; Sampietro, Marco; Coughlin, Jessica E; Bazan, Guillermo C; Caironi, Mario “All-Organic and Fully - Printed Semitransparent Photodetectors Based on Narrow Bandgap Conjugated Molecules” **Advanced Materials 26 (39), 6773-6777 (2014)** /70 citations

6. L. Sasso, A. Heiskanen, F. Diazzi, M. Dimaki, J. Castillo-León, M. Vergani, E. Landini, R. Raiteri, G. Ferrari, M. Carminati, M. Sampietro, W. E. Svendsen and J. Emnéus "Doped overoxidized polypyrrole microelectrodes as sensors for the detection of dopamine released from cell populations" *Analyst* **138**, 3651-3659 (2013). *Cover page*. /52 citations
7. G. Azzellino, A. Grimoldi, M. Binda, M. Caironi, D. Natali, M. Sampietro; "Fully inkjet printed organic photodetectors with high quantum yield", *Adv. ed Materials* **25** (47), 6829-6833 (2013) *na/111 citations*
8. M. Carminati, G. Ferrari, F. Guagliardo, M. Sampietro "ZeptoFarad capacitance detection with a miniaturized CMOS current front-end for nanoscale sensors" *Sensors and Actuators A: Physical* **172** (1), 117-123 (2011) /53 citations
9. L. Fumagalli, G. Ferrari, M. Sampietro, G. Gomila "Quantitative nanoscale dielectric microscopy of single-layer supported biomembranes" *Nano Letters* **9** (4), 1604-1608 (2009) /101 citations
10. G. Ferrari, F. Gozzini, A. Molari, M. Sampietro "Transimpedance amplifier for high sensitivity current measurements on nanodevices" *IEEE J. of Solid-State Circuits* **44**(5), 1609-1616 (2009) /115 citations

Patent applications

1. M. Giacometti, M. Carminati, S. Chiodini, **M. Sampietro**, G. Ferrari "Device and method for detecting nonelectrolyte particles in two flows of liquid solutions containing an electrolyte", PCT/IB2017/000468 del 25/4/2017, international publication number WO 2017/187252 A1.
2. S. Grillanda, F. Morichetti, A. Melloni, M. Carminati, G. Ferrari and **M. Sampietro** "Optical radiation detection system comprising an electric parameter measuring circuit", patent application WO 2014096449 A1. US Patent 9,722,124
3. M. Fanciulli, G. Ferrari, L. Fumagalli, E. Prati, **M. Sampietro** "Rivelatore di microonde", application number IT2005BG00021
4. **M. Sampietro**, G. Ferrari, D. Natali "Broad band and low noise integrator circuit", PCT/IB2004/004080 (7/12/2004), international publication number WO2005062061A1
5. **M. Sampietro**, G. Ferrari, D. Natali "Organic semiconductor photodetector" PCT/EP 03/00866, US Patent US20050179031A1

Research management and funding in the last 10 years 2010-2020

- **Partner** of **H2020-ICT-2019-2 project 2020-2022**: "Neuro-augmented 112Gbaud CMOS plasmonic transceiver platform for Intra- and Inter-DCI applications (NEBULA)". Contract n. 871658. Coordinated by AUTH, 12 partners. Total funding: **6M€** Funding for POLIMI: 375.000€ Website: <http://nebula-h2020.eu/index.php>.
- **Partner** of **H2020-ICT-2015 project 2016-2019**: "Silicon Photonics Transceiver and Routing technologies for High-End Multi-Socket Server Blades with Tb/s Throughput interconnect interfaces (ICT-STREAMS)". Contract No. 688172. Coordinated by AUTH, 9 partners. Total funding: **2.917M€** Funding for POLIMI: 310.500 € Website: <http://www.ict-streams.eu>.
- **Partner** of Marie Skłodowska Curie **ITN Horizon 2020 project 2016-2020** "European Training Network for Cell-based Regenerative Medicine (Training4CRM)". Contract n. 722779. Coordinated by DTU(Denmark), 9 partners. Total funding: **4M€** Funding for POLIMI: 258k€
- **Coordinator** of **Fondazione Cariplo/Regione Lombardia grant ID 42758879 project 2013-2015**: "Early Stage Cancer diagnosis via Highly sensitive Lab-On-chip multi target systems (ESCHILO)". 4 partners. Total funding: 832k€ Funding for POLIMI: 328k€
- **Coordinator** of **Fondazione Cariplo grant n.2011-0368 project 2012-2014**: "Inkjet printing of integrated organic optoelectronic devices: from molecular design to a digital X-ray imager (INDIXI)". 3 partners. Total funding: 586k€ Funding for POLIMI: 256k€
- **Partner** of the **FP7 EU NMP project 2008-2012**: "Exploring Cellular Dynamics at Nanoscale (EXCELL)". Contract No. NMP-SL-214706. Coordinated by DTU, 10 partners. Total funding: **3.78M€** Funding for POLIMI: 344.280€ Website: www.excell.eu.
- **Partner** of **FP7-NMP-2008-SMALL-1.1-1 project 2009-2012**: "Bioelectronic Olfactory Neuron Device (BOND)". Contract No. 228685-2. Coordinated by UB, 8 partners. Total funding: **2.6M€** Funding for POLIMI: 212.800 € Website: <http://www.bondproject.org>.

Examples of leadership in industrial innovation

The I3N laboratory at POLIMI targets scientific leadership and industrial innovation by supporting PhD students in the exploitation of the research. As an example, in the last 5 years 3 start-up companies have germinated from my PhD students:

- (1) PhD **E. Guglielmi** (2016-2018), co-founder and CTO of **PhotonPath** Srl (Integrated Photonic components for reconfigurable networks) 2019, <https://www.photon-path.com>
- (2) PhD **A. Iacchetti** (2009-2011), founder and CEO of **RIBES Tech** Srl (Flexible photovoltaic films made of organic semiconductors) 2015. <http://www.ribestech.it/team>
- (3) PhD **M. Binda** (2008-2010), GM/VP Advanced Product Development at **Energy Everywhere Italy Srl**, (Affordable and sustainable energy available to everyone) 2016, <https://everywhere.com/>

MEMBERSHIPS OF SCIENTIFIC SOCIETIES

- 2011-now Member of SIE – Società Italiana di Elettronica, <https://www.associazione-sie.it/>
2016-now Member of IEEE Society, <https://www.ieee.org/>
1990-2003 Member of IEEE Electron Devices Society.

Ten years track-record

Since more than 15 years I am responsible for the activities in the field of high-sensitivity electronic instrumentation for the nanoscience at the Department of Electronics (DEIB) of Politecnico di Milano. **My group designs high performance electronic circuits for the measurement of currents [10], voltages, impedances [3,4], capacitance [2,8] and noise** to access the electronic properties of micro and nano sensors, of organic semiconductor devices and of photonic devices and circuits.

Electronic platforms and Instrumentation-on-Chip are the focus of our activity, to better address the need of high performance electronic measurements and portability that a vast number of researchers in any scientific field might require. **We co-develop with our scientific partners the most innovative electronic and sensor solutions to target scientific excellence and technological innovation.** As examples we have reached zepto Farad capacitance sensitivity [2,8] and sub fA current measurements on 1ms time scale. The designed electronic circuits and ASICs have contributed to important scientific achievements, like i) the experimental evidence that resistors may produce shot noise, in contrast to common belief [Physical Review Letters, Vol.92 Issue: 22, 2004] and ii) the experimental electrical characterisation of single nanosome through a special AFM (atomic force microscope) that performs impedance spectroscopy measurements with sub-attofarad resolution on nanometric areas [9]. *We are fostering further these electronic techniques to address the challenging requirements of the partners vision successfully.*

The expertise of my group is also strong in the electrical and physical characterisation of the single nano devices used as sensors. This has been proved for example i) in the design of organic photodetectors in the visible and infrared range using pristine metallorganic complexes and donor/acceptor blends [5,7], ii) in the EU project BOND to produce highly selective and sensitive detection systems based on natural olfactory receptors, thus mimicking mechanisms that are already present in nature and iii) in the EU-FP7 project EXCELL to develop bioanalytical tools for cell replacement therapy (CRT) relevant for neurodegenerative diseases like Parkinson [6]. Recently we invented a new class of light probes, called CLIPP, to monitor the light power in solid-state waveguides [3,4]. This detector allows to track and feedback control the working point of optical micro-integrated devices and has opened a new field of photonic applications [1] and many industrial fall-outs. *All together these electronic and optical high sensitivity techniques and the research on innovative sensors schemes and technologies have helped scientists in the most various field of science in targeting their goals.*

To support the activities emerging in the nano-bio field in our University, in 2011 I co-founded POLIFAB, the micro and nano technology center of the Politecnico di Milano. On a surface of about 400sqm, this open-access facility enables the development of micro-nano technologies and of sensor devices toward cooperative innovation in the nanoscience.