



## Francesca Maria Carla Carpignano

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### Current Position and Specific Area of Interest:

Since November 2010, I'm enrolled in the Ph.D. program in Bioengineering and Bioinformatics and I'm working in the field of lab-on-chip and nanomedicine in the Dipartimento di Ingegneria Industriale e dell'Informazione of the University of Pavia, Italy. My current research interests include biosensors, microfluidics, photonic crystals, silicon micromachined devices and cell culture.

### Work Experience:

- Novembre 2012 – Ottobre 2013 **Research assistantship** in the Electrooptics laboratory for working on the project “Three-dimensional silicon microstructures for tumor cell entrapment: characterization of the refractive index profile by optical reflectivity and tomographic measurements.”
- April 2012 – September 2012 **Eramus Placement Scholarship** for working in the Optoelectronics Research Centre of the University of Southampton (UK).
- May 2011 - April 2012 **Research assistantship** in the Electrooptics laboratory for working on the project “Silicon micromachined photonic crystals for the monitoring cellular activities.”
- December 2010 - April 2011 **Scholarship for carrying out research on the project** “Characterization of micro-opto-fluidic photonic crystal structures.”
- May 2010 - October 2010 **Collaboration contract** entitled “Measurements on micro-opto-fluidic photonic-crystal structures.”

## Participation in funded Projects:

- “Toward the development of a cell-based optical biosensor: investigation of silicon micromachined photonic crystals as micro-opto devices for monitoring cellular activities,” funded by FAMT (Fondazione Alma Mater Ticinensis, Pavia, Italy), 2010-2012.  
<http://www.almamater ticinensis.eu/?pagina=p&id=35>
- “Development of an optical biosensor for the detection of amyloid fibrils-ligands interactions on a silicon micromachined structure,” funded by CARIPO Foundation (a BANK Foundation), 2007-2010.
- “Photonic Crystal Optofluidic Microsystems for Biosensing,” funded by Italian Ministry of University and Research (MIUR), 2007-2009.

I was co-supervisor with Prof. Merlo of the Master’s thesis entitled "Development of biosensors based on micro-opto-fluidic photonic-crystal structures" of the student Vito Vacirca for the degree in Biomedical Engineering earned with the final grade 110/110 cum laude, in December 2010.

Now, I am involved in the project “Three-dimensional silicon microstructures for tumour cell entrapment: characterization of the refractive index profile by optical reflectivity and tomographic measurements,” funded by CARIPO Foundation, 2012-2014.

## Education and training:

- December 2012 **Teaching Assistant** in Biomedical Optoelectronics.
- November 2010 – on going **Ph.D. program in Bioengineering and Bioinformatics (without fellowship of Ministry of University and Research).**
- November 2011 Recipient of **Erasmus Placement scholarship** for working at the Optoelectronics Research Centre of the University of Southampton (UK) for six months.
- April 2011 – July 2011 **Master’s degree in Business Development "Start Up"**, organized by Union of the Entrepreneurs of the Pavia Province.
- October 2010 **Registered Professional Engineer**, board of Engineers of Pavia.
- October 2007 – April 2010 **Master’s degree in Biomedical Engineering**, with a major in information technology and computer science, with the final grade 110/110 cum laude.  
Thesis entitled “*Characterization of micro-opto-fluidic devices for photonic crystal biosensors*”.  
Supervisor: Prof. Sabina Merlo

- September 2004 – September 2007 **Bachelor’s degree in Biomedical Engineering** with the final grade 106/110. Thesis entitled “*A speech recognition system for the treatment of diabetic patients*”. Supervisor: Prof. Mario Stefanelli Co-supervisor: Dott. Toni Giorgino
- September 1999 – June 2004 **Scientific high school**, with emphasis on information technology and computer science, with the final grade 95/100.

### Personal skills and competences:

- Mother Tongue: **Italian**
- English**: European Level

Reading skills		Verbal skills		Writing skills
Listening	Reading	Oral interaction	Oral production	
B1	B2	B1	A2	B1

I attained **Certification P.E.T. Cambridge**.

- Organisational skills and competences** Ability to work in stressful situations, especially related to project’s deadlines typical of my training and research projects, funded by several institutions, related to my doctoral work.
- Technical skills and competences with computers** Language Java, XML, JSP, HTML, CSS, MySql, ECMAScript, VoiceXML, Matlab, Perl, MS Office, UML. Protegè, Guide, Oracle Engine Workflow (Income), Orange, ClustalW, Genie, Tree Age, PyFormex, Feap, NetBeans, Labview, Photoshop. Excellent ability to navigate in Internet OsX, MS Windows, Linux
- Artistic skills and competences** Step and Fighting bags Tennis, Skiing, Photography I give private lessons in physics, mathematics and chemistry. Volunteer in the OFTAL organization (Opera Federativa Trasporto Ammalati a Lourdes), Tortona section, since the age of sixteen.
- Driving licence** Automobile licence (licence B).
- Additional Information** Available to transfers and business trips.

- Sign in organizations

IEEE, AEIT, ASTRI, AICT, Ordine degli Ingegneri della Provincia di Pavia (Italy).

## **Publications:** **ISI Journals (J)**

- [J.1] G. Barillaro, S. Merlo, S. Surdo, L.M. Strambini, **F. Carpignano**, "OPTICAL QUALITY ASSESSMENT OF HIGH-ORDER ONE-DIMENSIONAL SILICON PHOTONIC CRYSTALS WITH A REFLECTIVITY NOTCH AT  $\lambda \sim 1.55 \mu\text{m}$ ", *IEEE Photonics Journal*, Vol. 2, N. 6, pp. 981-990, Piscataway, NJ, USA (2010), DOI: 10.1109/JPHOT.2010.2089440.  
IF 2010: 2.344
- [J.2] **F. Carpignano**, G. Silva, M. Benedetti, S. Surdo, L.M. Strambini, V. Leva, V. Giansanti, S. Soza, "A CELL-BASED OPTICAL BIOSENSOR (SILICON PHOTONIC CRYSTAL): A NEW TOOL FOR MONITORING CELLULAR ACTIVITIES", *Cytometry Part A*, Vol. 79, pp. 1066, (2011).  
IF 2011: 3.729
- [J.3] G. Barillaro, S. Merlo, S. Surdo, L.M. Strambini, **F. Carpignano**, "INTEGRATED OPTO-FLUIDIC MICROSYSTEM BASED ON VERTICAL HIGH-ORDER ONE-DIMENSIONAL SILICON PHOTONIC CRYSTALS", *Microfluidics and Nanofluidics*, Vol. 12, N. 1-4, pp. 545-552, Springer (2012), DOI:10.1007/s10404-011-0896-0.  
IF 2011: 3.371
- [J.4] S. Merlo, G. Barillaro, **F. Carpignano**, V. Leva, A. Montecucco, S. Surdo, L.M. Strambini, G. Mazzini, "INVESTIGATION OF CELL CULTURING ON HIGH ASPECT-RATIO, THREE-DIMENSIONAL SILICON MICROSTRUCTURES", *IEEE Journal of Selected Topics in Quantum Electronics*, Special Issue on Biophotonics I, Vol. 18, N. 3, pp. 1215-1222, Piscataway, NJ, USA (2012), DOI: 10.1109/JSTQE.2011.2170662.  
IF 2011: 3.780
- [J.5] S. Merlo, G. Barillaro, **F. Carpignano**, G. Silva, S. Surdo, L.M. Strambini, S. Giorgetti, D. Nichino, A. Relini, G. Mazzini, V. Bellotti, "FIBRILLOGENESIS OF HUMAN  $\beta$ 2-MICROGLOBULIN IN THREE-DIMENSIONAL SILICON MICROSTRUCTURES", *Journal of Biophotonics*, Vol. 5, N. 10, pp. 785-792, Wiley (2012), DOI: 10.1002/jbio.201100132.  
IF 2011: 4.343
- [J.6] S. Surdo, S. Merlo, **F. Carpignano**, L. M. Strambini, C. Trono, A. Giannetti, F. Baldini and G. Barillaro, "OPTOFLUIDIC MICROSYSTEMS WITH INTEGRATED VERTICAL ONE-DIMENSIONAL PHOTONIC CRYSTALS FOR CHEMICAL ANALYSIS", *Lab on a Chip*, Vol. 12, pp. 4403-4415, RSC (2012), DOI: 10.1039/C2LC40613F.  
IF 2011: 5.670
- [J.7] **F. Carpignano**, G. Silva, S. Surdo, V. Leva, A. Montecucco, F. Aredia, A. I. Scovassi, S. Merlo, G. Barillaro, G. Mazzini, "A NEW CELL-SELECTIVE THREE-DIMENSIONAL MICROINCUBATOR BASED ON SILICON PHOTONIC CRYSTALS", *PLoS ONE*, Vol. 7, N. 11, pp. e48556, PLOS (2012). DOI: 10.1371/journal.pone.0048556.  
IF 2011: 4.092

## **Book Chapter (B)**

- [B.1] S. Surdo, L.M. Strambini, G. Barillaro, S. Merlo, **F. Carpignano**, "HIGH-ORDER ONE-DIMENSIONAL SILICON PHOTONIC CRYSTALS WITH A REFLECTIVITY NOTCH

AT  $\lambda \sim 1.55 \mu\text{m}$ ”, **Sensors and Microsystems**, Series: Lecture Notes in Electrical Engineering, Vol. 109, pp. 231-234, A. D’Amico, C. Di Natale, L. Mosiello, G. Zappa Eds., Springer, 2012, ISBN: 978-1-4614-0934-2, DOI: 10.1007/978-1-4614-0935-9\_39.

### **Proceedings of International Conference (P)**

- [P.1] S. Surdo, L.M.Strambini, G. Barillaro, **F. Carpignano**, S. Merlo, “SILICON MICROMACHINED PHOTONIC CRYSTAL INTEGRATED IN AN OPTO-FLUIDIC MICROSYSTEM”, We4.5, **IEEE International Workshop on BioPhotonics 2011**, Parma (Italy), 8-10 June 2011.  
<http://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=5954862>  
DOI: 10.1109/IWBP.2011.5954862; E-ISBN: 978-1-4244-9835-2; Print ISBN: 978-1-4244-9836-9
- [P.2] S. Merlo, **F. Carpignano**, G. Silva, G. Barillaro, S. Surdo, G.Mazzini, M. Stoppini, S. Raimondi, “FLUORESCENCE DETECTION OF FIBRILLAR PROTEINS ON SILICON MICROSTRUCTURES”, Th2.3, **IEEE International Workshop on BioPhotonics 2011**, Parma (Italy), 8-10 June 2011.  
<http://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=5954809>  
DOI: 10.1109/IWBP.2011.5954809; E-ISBN: 978-1-4244-9835-2; Print ISBN: 978-1-4244-9836-9
- [P.3] G. Barillaro, S. Merlo, S. Surdo, **F. Carpignano**, L.M. Strambini, A. Montecucco, V. Leva, G. Mazzini, “CELL CULTURING INTO HIGH ASPECT-RATIO ONE-DIMENSIONAL SILICON PHOTONIC CRYSTALS: TOWARD CELL-BASED BIOSENSORS”, **8<sup>th</sup> International Conference Porous Semiconductors – Science and Technology PSST-2012**, Malaga (Spain), 25-30 March 2012.
- [P.4] J.A. Grant-Jacob, **F. Carpignano**, W.S. Brocklesby, T. Melvin, “FREE-STANDING NANOSTRUCTURED GOLD FILMS WITH MILLED NANOPORES FOR DNA ANALYSIS”, P.26, **IOP Physics meets Biology**, Oxford (UK), 3-5 September 2012.
- [P.5] **F. Carpignano**, J.A. Grant-Jacob, W.S. Brocklesby, T. Melvin, “RAMAN MICROSCOPY OF DNA ON GOLD NANOSTRUCTURES”, P.24, **IOP Physics meets Biology**, Oxford (UK), 3-5 September 2012.

### **Proceedings of National Conference and National Journal Papers (A)**

- [A.1] G. Barillaro, A. Diligenti, L.M. Strambini, S. Surdo, V. Annovazzi-Lodi, M.Benedetti, **F. Carpignano**, S. Merlo, “SILICON MICROMACHINED PERIODIC STRUCTURES: FROM PHOTONIC TO OPTOFLUIDIC APPLICATIONS”, **MEMS IN ITALY**, Otranto (Italy), 28 June - 1 July 2010.
- [A.2] S. Surdo, L.M. Strambini, G. Barillaro, S. Merlo, **F. Carpignano**, “HIGH-ORDER ONE-DIMENSIONAL SILICON PHOTONIC CRYSTALS WITH A REFLECTIVITY NOTCH AT  $\lambda \sim 1.55 \mu\text{m}$ ”, **16<sup>th</sup> Italian Conference on Sensors and Microsystems - AISEM**, Roma (Italy), 7-9 February, 2011.
- [A.3] S. Merlo, G. Barillaro, **F. Carpignano**, S. Surdo, V. Leva, A. Montecucco, G.Mazzini, “A CELL-BASED OPTICAL BIOSENSOR EXPLOITING SILICON MICROMACHINED PHOTONIC CRYSTALS: A NEW TOOL FOR MONITORING CELLULAR ACTIVITIES”, **Convegno congiunto IGM-DGM**, IGM-CNR di Pavia (Italy), 21-23 February 2011.
- [A.4] S. Merlo, **F. Carpignano**, G. Barillaro, S. Surdo, L.M.Strambini, “HIGH-ORDER ONE-DIMENSIONAL SILICON MICROMACHINED PHOTONIC CRYSTAL WITH A

REFLECTIVITY NOTCH AT  $\lambda \sim 1.55 \mu\text{m}$ ”, B4\_2 in Fotonica 2011, *13° Convegno Nazionale delle Tecnologie Fotoniche, FOTONICA 2011*, Genova (Italy), 9-11 May 2011. AEIT - ISBN 9788887237122

- [A.5] S. Merlo, G. Silva, **F. Carpignano**, G. Barillaro, S. Surdo, L.M. Strambini, “VERTICAL HIGH-ORDER 1D SILICON PHOTONIC CRYSTALS FOR INTEGRATED OPTO-FLUIDIC MICROSYSTEMS”, P\_08 in Fotonica 2011, *13° Convegno Nazionale delle Tecnologie Fotoniche, FOTONICA 2011*, Genova (Italy), 9-11 May 2011. AEIT - ISBN 9788887237122
- [A.6] **F. Carpignano**, S. Merlo, G. Silva, G. Barillaro, S. Surdo, L.M. Strambini, V. Leva, A. Montecucco, V. Giansanti, I. Scovassi, G. Mazzini, “UNA NUOVA CITOMETRIA (LIVE, LABEL-FREE) CON MICROSISTEMI A CRISTALLI FOTONICI IN SILICIO”, published in the journal *Lettere GIC*, Vol. 20, N. 3, pp. 13-18, 2011.
- [A.7] S. Surdo, **F. Carpignano**, A. Giannetti, L.M. Strambini, C. Trono, F. Baldini, S. Merlo, G. Barillaro, “PHOTONIC CRYSTAL OPTOFLUIDIC SILICON MICROSYSTEMS FOR (BIO)SENSING”, O51, *Convegno Nazionale Sensori, Innovazione, attualità, prospettive*, Roma (Italy), 15-17 February 2012.
- [A.8] G. Silva, **F. Carpignano**, S. Merlo, G. Barillaro, S. Surdo, G. Mazzini, “RECOGNITION OF HUMAN CELLS IN A GLASS-SILICON FABRY-PEROT MICROCAVITY BY SPECTRAL REFLECTIVITY MEASUREMENTS”, B4.3 in Fotonica 2012, *14° Convegno Nazionale delle Tecnologie Fotoniche, FOTONICA 2012*, Firenze (Italy), 15-17 May 2012. AEIT - ISBN 9788887237146
- [A.9] **F. Carpignano**, G. Silva, S. Merlo, S. Surdo, L.M. Strambini, G. Barillaro, V. Leva, A. Montecucco, G. Mazzini, “TOWARDS A NEW LABEL-FREE CYTOMETRIC ANALYSIS BASED ON SILICON PHOTONIC CRYSTALS”, I-56, *Convegno Nazionale di Bioingegneria 2012, GNB2012*, Roma (Italy), 26-29 June 2012. ISBN: 978885553182-5.

## Seminars:

- “**Dispositivi ottici a cristalli fotonici in silicio microlavorato per applicazioni biomediche**”, within IEEE Student Branch program, University of Pavia, Italy, 16 March 2012.
- “**Misure ottiche sui cristalli fotonici in silicio microlavorato per il monitoraggio di attività cellulari**”, presentations at meetings of the project “Toward the development of a cell-based optical biosensor: investigation of silicon micromachined photonic crystals as micro-opto devices for monitoring cellular activities,” funded by FAMT (Fondazione Alma Mater Ticinensis, Pavia, Italy), 14 July 2011 and 13 February 2012.
- “**Sviluppo di biosensori basati su sistemi micro-opto-fluidici a cristalli fotonici**,” within the Biomedical Optoelectronics class of the Master’s degree in Biomedical Engineering, University of Pavia, Italy, 18 January 2011.
- “**Sistemi micro-opto-fluidici per biosensori a cristalli fotonici**,” within the Biomedical Optoelectronics class of the Master’s degree in Biomedical Engineering, University of Pavia, Italy, 25 May 2010.

## Conference attendance:

- “**Technology Assessment and Management Conference**”, Pavia, Italy, 21-22 June 2010.
- “**13° Convegno Nazionale delle Tecnologie Fotoniche, FOTONICA 2011**”, Genova, Italy, 9-11 May 2011.
- “**IEEE International Workshop BIOPHOTONICS**”, Parma, Italy, 8-10 June 2011.
- **XXX Bioengineering’s Annual School "Neuroinformatics"**, Bressanone, 19-23 September 2011.
- “**IOP Physics meets Biology**”, Oxford, UK, 3-5 September 2012.
- “**3° Congresso del Gruppo Nazionale di Bioingegneria**”, Roma, Italy, 26-29 June 2012.

Pavia, 20-11-2012

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