

## A. CURRICULUM VITAE

EUROPEAN FORMAT



### PERSONAL INFORMATION

Name, Surname	Fabio Biscarini
Telephone/Fax	+39-059-2058587; +39-346-2308958/ +39-059-2055410
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Website	<a href="http://www.bo.ismn.cnr.it/staff.php?idcur=28">http://www.bo.ismn.cnr.it/staff.php?idcur=28</a>
Nationality	Italy
Place and Date of birth	Perugia, 15/04/1962

### PROFESSIONAL EXPERIENCE

Date	15/02/2013 to date
Position held	<b>Full Professor of General and Inorganic Chemistry</b>
Main activities and responsibilities	Research in organic bioelectronics and nanomedicine; Teaching ; Coordinator of the Department Research Committee.
Name and address of employer	Life Science Dept.- Università di Modena e Reggio Emilia, Via Campi 103, 41125 Modena Italy
Type of business or sector	University
Dates (from – to)	15/12/2010-to 14/02/2013
Position held	<b>CNR Research Director</b>
Main activities and responsibilities	Head of Research group "Nanotechnology of Multifunctional Materials". Shortlisted as Director of Chemistry and Materials Technology Dept of the National Council of Research (3/9/2012), Vice-director of the National Flagship Project NANOMAX.
Name and address of employer	CNR-ISMN, Via Gobetti 101, 40129 Bologna
Type of business or sector	Research
Dates (from – to)	01/11/2004 – 31/10/2013
Position held	<b>Contract Professor</b>
Main activities and responsibilities	Lecturing "Nanotechnologies of Multifunctional materials" , supervising Laurea and PhD students
Name and address of employer	Chemistry Dept. "G. Ciamician", Alma Mater Studiorum Università di Bologna, 40125 Bologna
Type of business or sector	University
Dates (from – to)	1/09/2009-31/7/2013
Position held	<b>Chief Technology Officer</b>
Main activities and responsibilities	Coordinator of R&D Programs & supervisor of 10 Research Engineers & Technicians
Name and address of employer	Scriba Nanotecnologie Srl, Via Gobetti 52/3, 40129 Bologna
Type of business or sector	Industrial R&D
Dates (from – to)	16/03/2005-31/08/2009
Position held	<b>President of Scriba Nanotecnologie Srl</b>
Main activities and responsibilities	President of Executive Board, Founder
Name and address of employer	Scriba Nanotecnologie Srl, Viale Fanin 12, 40127 Bologna
Type of business or sector	Industrial R&D
Dates (from – to)	01/01/2002 – 14/12/2010
Occupation or position held	<b>Senior Scientist</b>
Main activities and responsibilities	Head, "Nanotechnology of Multifunctional Materials" group, first converging technology lab.
Name and address of employer	CNR-ISMN, Via Gobetti 101, 40129 Bologna, Italy
Type of business or sector	Research
Dates (from – to)	01/01/1996 – 31/12/2001
Occupation or position held	<b>Researcher</b>
Main activities and responsibilities	Building instruments and labs, SPM, organic thin film growth, OFET, first nanofabrication lab.
Name and address of employer	CNR-ISM, Via Gobetti 101, 40129 Bologna, Italy
Type of business or sector	Research
Dates (from – to)	16/12/1993 – 31/12/1995
Occupation or position held	<b>Postdoc</b>
Main activities and responsibilities	Built the first SPM lab at CNR Bologna, organic thin film growth

Name and address of employer	CNR-ISM and CNR-LAMEL, Via Gobetti 101, 40129 Bologna (Italia)
Type of business or sector	Research
<b>EDUCATION AND TRAINING</b>	
Dates (from – to)	01/01/1991-15/12/1993
Name and type of organisation	University of Oregon - Institute of Molecular Biology & Dept. of Chemistry, Eugene, OR (USA)
Principal subjects occupational skills covered	Study of charge transport in molecules adsorbed on surfaces - theory of STM. Ability to work in multidisciplinary institutions and multicultural contexts. Teaching laboratories in undergraduate and post graduate (300-500 level courses).
Title of qualification awarded	<b>Ph.D. in Chemistry</b>
Dates (from – to)	01/01/1989-31/12/1990
Name and type of organisation providing education and training	University of New Mexico - Dept. of Chemistry Albuquerque, NM (USA)
Principal subjects occupational skills	Biophysics, SPM. Teaching undergraduate laboratories (300-400 level courses).
Dates (from – to)	09/01/1987-8/4/1988
Name and type of organisation	School of Infantry and Calvary - Italian Army
Principal subjects occupational skills	Commander of Mechanized Infantry platoon; learned management of people and resources.
Title of qualification awarded	Lieutenant of the Italian Army
Dates (from – to)	01/11/1981-13/10/1986
Name and type of organisation	Alma Mater Studiorum Università di Bologna – Faculty of Industrial Chemistry
Principal subjects occupational skills covered	Theory and Physical Chemistry of Liquid Crystals, Statistical Mechanics & Thermodynamics; Programming FORTRAN; use of operating systems on mainframe computers.
Title of qualification awarded	<b>Laurea In Industrial Chemistry</b>
Level in National classification	110/110 cum Laude
<b>RESEARCH</b>	
Research sectors	Organic Electronics and bioelectronics; Nanobiomedicine; Multifunctional Materials; Nanofabrication; Nanoscale characterization.
Specific Research Interests	<u>Organic Bioelectronics and Nanobiomedicine:</u> - Active Multifunctional Implantable Devices for the Treatment of Spinal Cord Injury: in-vitro and in vivo studies. - Multifunctional Implants for treating Parkinson's disease; - Organic electronics biosensors for POC diagnostics (inflammatory biomarkers); - Transduction of signals from neuronal cells and networks by novel ultra-thin-film OFETs; - Patterning of proteins and biochemical cues for cell adhesion and guidance; - Aggregation of beta amyloid peptides: role of surfaces and confinement. <u>Organic Electronics, Multifunctional Materials, Nanofabrication, Nanoscale Characterization:</u> - Physics of ultra-thin film OFETs; - Real-time-in-situ investigation of growth phenomena with SPM, XRD, XRR, electrical meas. - Growth and Self-Organization phenomena, including instrument development; - Unconventional nanofabrication for soft matter, including instrument development; - Advanced Scanning Probe Microscopies (EFM, bimodal AFM).
Major Achievements in the last 10 years	i) FB established quantitative SPM Analysis Methods in Organic Thin Film Growth, he consolidated the use of Universal Scaling Law to describe the morphology of organic semiconductor thin films. <i>These methods are widely used and highly cited.</i> ii) Experimental proof of the low-dimensional nature of charge transport in organic semiconductors, iii) Demonstrated molecular scale transport across SAM-OFET junctions showing odd-even effects for the first time. <i>These findings stimulated new experiments and are highly cited in OFET literature.</i> iv) Invented multiscale fabrication techniques for soft-matter applicable to any soluble material. v) Demonstrated information storage using bottom-up fabrication of soft matter nanostructures. <i>These techniques are widely adopted; these works are highly cited.</i> vi) Interfaced neurons to organic semiconductors, demonstrated the transduction of action potentials in neuronal networks cells using an ultra-thin film OFETs.; demonstrated in-vivo operations of an implanted organic electronics device for treating spinal cord injury in murine models; demonstrated specific ultrasensitive detection of dopamine. <i>These are major advancements in organic bioelectronics.</i>
Bibliometric Indicators	Papers on peer-reviewed journals and book chapters> <b>200</b> ; Source: Google Scholar 15/09/2015: <b>Number of citations &gt; 6700, h-index=47, h-index (5 yrs)=32.</b> Source WoS 15/09/2015: <b>Number of citations &gt; 5800, h-index=45.</b>
Talks	<b>6</b> plenary lectures, <b>&gt;150</b> invited talks at international conferences, universities and research

IP generation	centers.
Technology transfer	<b>18</b> patents, most of them extended PCT and in National phases; <b>16</b> of them licensed or sold. Founder of two spin-off companies, Scriba Nanotecnologie Srl (2005) e Nano4bio Srl (2008-2015).
<b>FUNDING ID</b>	As an independent PI, <b>30</b> competitive grants for a total of >8.0 M€ from 2000. <b>Coordinator of four EU</b> (3 EC and 1 ESF) projects, and <b>four National projects. PI in 11 EC, two ESF, and eight National projects.</b> Recent projects include: Bilateral Italy/Sweden Strategic Project "Poincaré" on POC diagnostics; EU-Small I-ONE-FP7 (coordinator) (2012-2014) on implantable organic nanoelectronics for spinal cord injury, budget 634 k€; EU-Small BIODOT developed the technology to interface OFETs to neurons and demonstrated electronic transduction of cellular signals; budget 550 k€; EU-Large ONE-P (2009-2011) and NAIMO (2004-2008) were focused on organic multifunctional materials and their nano-fabrication into devices. He was CTO of NAIMO and Member of Management Board in both. Budget was 1100 and 1400 k€ respectively. EU-Large CANAPE interfaced carbon nanotubes to neurons. Budget was 500 k€.

## B. TRACK RECORD LAST 10 YEARS

### TOP 10 PUBLICATIONS IN BIOELECTRONICS AND NANOMEDICINE AS SENIOR AUTHOR

1. E. Bystrenova, M. Jelitai, I. Tonazzini, A. Lazar, M. Huth, P. Stoliar, C. Dionigi, M. G. Cacace, B. Nickel, E. Madarasz, and F. Biscarini "Neural networks grown on organic semiconductors", *Adv. Funct. Mater.* 18, 1751-1756 (2008). Cit. 20.
2. T. Cramer, A. Kyndiah, M. Murgia, F. Leonardi, S. Casalini, F. Biscarini, "Double layer capacitance measured by organic field effect transistor operated in water" *Appl. Phys. Lett.* 100, Article Number: 143302 (2012) DOI: 10.1063/1.3699218. Cit.
3. T. Cramer, A. Campana, F. Leonardi, S. Casalini, A. Kyndiah, M. Murgia, and F. Biscarini [Water-gated organic field effect transistors—opportunities for biochemical sensing and extracellular signal transduction](#) *J. Mater. Chem. B* 1 3728-3741 (2013) DOI: 10.1039/C3TB20340A.
4. Fabio Biscarini, Quy Khac Ong, Cristiano Albonetti, Fabiola Liscio, Maria Longobardi, Kunal S Mali, Artur Ciesielski, Javier Reguera, Christoph Renner, Steven De Feyter, Paolo Samorì, Francesco Stellacci [Quantitative analysis of scanning tunneling microscopy images of mixed-ligand-functionalized nanoparticles](#), *Langmuir* 29, 13723-13734 (2013).
5. A. Campana, T. Cramer, P. Greco, G. Foschi, M. Murgia, F. Biscarini [Facile maskless fabrication of organic field effect transistors on biodegradable substrates](#) *Appl. Phys. Lett.* 103, 073302-073302-4 (2013).
6. I Tonazzini, E Bystrenova, B Chelli, P Greco, D De Leeuw, F Biscarini [Human Neuronal SHSY5Y Cells on PVDF: PTrFE Copolymer Thin Films](#) *Advanced Engineering Materials* 17, 1051–1056 (2014).
7. A. Campana, T. Cramer, D. Simon, M. Berggren, F. Biscarini [Electrocardiographic recording with conformable organic electrochemical transistor fabricated on resorbable bioscaffold](#) *Adv. Mater.* 2014, DOI: 10.1002/adma.201400263.
8. AC Dumitru, FM Espinosa, R Garcia, G Foschi, S Tortorella, F Valle, M Dallavalle, F Zerbetto, F Biscarini [In situ nanomechanical characterization of the early stages of swelling and degradation of a biodegradable polymer](#) *Nanoscale* 7 (12), 5403-5410 (2015).
9. Stefano Casalini, Andra C Dumitru, Francesca Leonardi, Carlo A Bortolotti, Elena T Herruzo, Alessandra Campana, Rafael F de Oliveira, Tobias Cramer, Ricardo Garcia, Fabio Biscarini [Multiscale Sensing of Antibody–Antigen Interactions by Organic Transistors and Single-Molecule Force Spectroscopy](#) *ACS NANO* 9, 5051-5062 (2015).
10. Cristiano Albonetti, Giulia Foschi, Fabiola Liscio, Pierpaolo Greco, Silvia Milita, Fabio Biscarini [Amorphous aggregation of amyloid beta 1-40 peptide in confined space](#) DOI: 10.1002/cphc.201500602, 15 settembre 2015

### Reviews/Chapters in collective volumes

- M. Cavallini, C. Albonetti, F. Biscarini "Nanopatterning Soluble Multifunctional Materials by Unconventional Wet Lithography" *Adv. Mater.* 21, 1043-1053 (2009). cit. 37
- C. Albonetti, R. Kshirsagar, M. Cavallini, F. Biscarini, "Chapter 5: Patterning Organic Nanostructures by Scanning Probe Lithography", in "Scanning Probe Microscopy: beyond imaging", Ed. P. Samorì, (Wiley-VCH Verlag GmbH, Weinheim) p. 101-140 (2006).
- D. Gentili, G. Foschi, F. Valle, M. Cavallini and F. Biscarini "Applications of dewetting in micro and nanotechnology", *Chem. Soc. Rev.*, 41(12), 4430-4443 (2012), DOI: 10.1039/C2CS35040H
- F. Biscarini, D. Gentili, E. Margapoti, M. Cavallini, "Technological Applications of Dewetting", Ed.s Thierry Ondarcuhu and Jean-Pierre Aimeé, (Panstanford Publisher, Singapore) p. 529-576 (2012).
- S. Casalini, T. Cramer, F. Leonardi, M. Cavallini and F. Biscarini "Low Dimensionality Effects in Organic Field Effect Transistors" in "Organic Nanomaterials: Synthesis, Characterization, and Device Applications", ed.s Tomas Torres and Giovanni Bottari, Wiley in press (2012).

### Invited presentations

International conferences and schools (top 15 out of 115)

1. III Lundqvist Conference on Advancing Frontiers of Condensed Matter Physics, ICTP Trieste, 11-15/8/2003,.
2. International Conference on Synthetic Metals 2003 (ICSM 2003), Wollongong, Australia 28/6/2004.

3. ICONSAT 2006, New Dehli India, 17/3/2006.
4. German Physical Society Conference, Regensburg, 26-30/3/2007.
5. Symposium N, MRS Spring 2007, San Francisco, USA, 10/4/2007.
6. 7th International conference on pi-conjugated polymers and functional self-assemblies (OP2007), Turku, Finland 11-15/6/2007.
7. International Workshop in Scanning Probe Lithography, Madrid 17-19/6/2009.
8. European Conference on Molecular Electronics ECME 2009, Copenhagen, Denmark 10/9/2009.
9. F-PI-9, Atlanta USA 23-28 May 2010.
10. MRS-Symposium M, San Francisco, 29/04/2011.
11. E-MRS, Nice, May 2011.
12. European Conference on Molecular Electronics ECME 2011, Barcelona 7-11/09/2011.
13. Gordon Research Conference 2012 on Biointerface Science 2012, Les Diablerets, Switzerland, 20-25/05/2012
14. Lorentz Center Workshop on Future Directions of Molecular Electronics, Leiden, Netherland, 25-28/06/2012
15. MRS, Boston, Massachusetts, 26-30/11/2012.

#### *Seminars at International Universities & Research Centers (16 out of 71)*

16. CNRS-Institut Charles Sadron, Strasbourg, FR, 13/6/2003.
17. Université Libre de Bruxelles, 10/3/2004; University of Edinburgh, UK 16/3/2004.
18. Oberseminar, Center for Nanosciences, Ludwig Maximilians Universität, Munich, Germany, 18/6/2004.
19. 6th Warren Workshop, Max Planck Institut für Metallforschung Stuttgart, Tegernsee Germany, 13/1/2005.
20. Institut of Nanotechnology, Helmholtz Institut, Forschungszentrum Karlsruhe, Germany, 19/1/2005.
21. EPFL, Lausanne CH, 3/2/2005.
22. National Chemical Laboratory, Pune, India 18/5/2005; Dept. of Physics, Univ. Pune, India, 18/5/2005.
23. Indian Institute of Science, Bangalore, 19/5/2005; Jawahar Nehrū Center for Advanced Research, Bangalore, 21/5/2005.
24. Interdisciplinary Centre for NANO Technology (iNano), Universitaet Aarhus, 28/4/2006.
25. MESA + Colloquium, Technical Universiteit Twente, the Netherlands, 12/12/2006.
26. CSIRO Molecular & Health Technologies Division, Clayton, Melbourne, Australia, 25/9/2007.
27. Dept. of Chemistry, Univ. of California Berkeley, 3/4/2008.
28. Australia-EC Workshop, Brussels 13/10/2009.
29. Bruxelles, EC-workshop on Industrial Technologies, 20/10/2010.
30. Slovak Academy of Sciences, Kosice, Slovakia 21/08/12.
31. BioElectronics Winter School 2014, Kirchberg, Austria, 28 February 2014.
32. Nanyang Technical University, Singapore, 22/10/2014.

### **Organisation of International Conferences**

1. "EU-China Workshop on Multifunctional Materials by Design", Bologna, 21-23/10/2003.
2. "Organic Field Effect Transistors: towards the molecular scale", Symposium E, E-MRS 2004 Spring Meeting, Strasbourg, 24-28/5/2004.
3. VIII-European Conference on Molecular Electronics (ECME 8), Bologna, 29/6-3/7/2005.
4. Director of the First NAIMO School on "Multifunctional Materials, Fabrication and Devices", Erice, Sicily 24/9-2/10/2005.
5. ESF-Functional Supramolecular Architectures (FUNMARCH) Workshop Bologna, 3-5/05/2010.
6. Swedish-Italian Workshop on Nanoscience and Medical technology, Stockholm (S) 29-30/09/2011.
7. First Avogadro Colloquia on "Organic Bioelectronics: Challenges and Opportunities for Chemistry", Società Chimica Italiana, Bologna 29/10/2012.
8. Workshop on "Implantable Organic Electronics", Modena 9 June 2014.
9. Tenth International Conference on Organic Electronics (ICOE 2014), Modena 11-13 June 2014.
10. 1st Workshop on Organic Bioelectronics OrBIItaly 2015, Modena, 10-11 September 2015.

### **Granted Patents**

1. "Fabrication method at micrometer- and nanometer- scales for generation and control of anisotropy of structural, electrical, optical and optoelectronic properties of thin films of conjugated materials" - priority number MI2001A002075 on 08/10/2001; PCT/EP02/11218 on 07/10/2002; CN grant of patent No. ZL 02819781.X on 18/02/2009.
2. "Method for manufacturing and controlling structures and patterns of soluble and colloidal substances by printing on the micrometer and nanometer scale and with reduction of the dimensions of the stamp's features" - priority number MI2002A001961 on 16/09/2002; PCT extension EP03/10242 deposited on 16/09/2003; USA grant of patent No. 7320283 B2 on 22/01/2008.
3. "Process for obtaining spatially organised nanostructures on thin films" - priority number BO2002A000759 on 04/12/2002; PCT extension EP03/13594 deposited on 02/12/2003; USA grant of patent No. 754468 B2 on 19/05/2009.
4. "Method for providing a thin film having a chemical composition that is spatially structured on a micrometric or nanometric scale on a substrate" - priority number BO2004A000076 del 17/02/2004; PCT extension EP2005/001494 deposited on 15/02/2005; EU grant of patent No. 1716552 on 10/09/2008.

### **Awards/International Prizes/Membership**

Date 1/04/2004

Award	<b>Fellow of the Royal Society of Chemistry (FRSC)</b>
Conferred by	Sir Harold Kroto - Royal Society of Chemistry - London (UK)
Date	15/03/2008
Award	<b>EU- Descartes Prize 2007</b>
Conferred by	European Commission - DG Research, Bruxelles
Date	5/06/2012
Award	<b>Premio Sapio Industria 2012</b>
Conferred by	Sapio Spa
Date (from-to)	2010-to date
Membership	Scientific Advisory Board of the Italian Chemical Society.
Date (from-to)	2008-to date
Membership	Scientific Advisory Board of CNR-Department of Molecular Design.
Date (from-to)	2008-to date
Membership	American Chemical Society.
Date (from-to)	2009-to date
Membership	Biophysical Society.
Date (from-to)	1998-to 2004; 2007- to date
Membership	Material Research Society
Date (from-to)	2003-to date
Membership	European Microscopy Society

### **Membership to Editorial Boards of International Journals**

Period	2004-2008
Journal	Board Member of Chemical Society Reviews (Royal Society of Chemistry), UK