A. CURRICULUM VITAE

EUROPEAN FORMAT

PERSONAL INFORMATION

Name, Surname	Fabio Biscarini
Telephone/Fax	+39-059-2058587; +39-346-2308958/ +39-059-2055410
E-mail	fabio.biscarini@unimore.it
Website	http://www.bo.ismn.cnr.it/staff.php?idcur=28
Nationality	Italy
Place and Date of birth	Perugia, 15/04/1962

PROFESSIONAL EXPERIENCE

Date	1/10/2017 to date
Position held	**Research Associate**
Main activities and responsibilities	Head of research team in neuroelectronics : organic electronics for cortical recording ; organic neuroprosthetics, devices for drug delivery. Istituto Italiano di Tecnologia – Center for Translational Neurophysiology, Via Fossato di Mortara 17-19, 44121 Ferrara Italy
Date	15/02/2013 to date
Position held	**Full Professor of General and Inorganic Chemistry**
Main activities and responsibilities	Head of the Laboratory of Organic Electronics-Life Science Dept.; scientist in organic bioelectronics sensors and transducers, nanomedicine; Teaching General Chemistry, Nanobiotechnologies, Advanced Topics in Soft Matter; Member of the Academic Senate (from 1 Nov 2015); Coordinator of the Life Science Department Research Committee (from Sept 2014).
Name and address of employer	Università di Modena e Reggio Emilia, Via Università 4, 41121 Modena Italy
Type of business or sector	University
Dates (from – to)	15/12/2010-to 14/02/2013
Position held	**CNR Research Director**
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 Flaghsip 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	**Contract Professor**
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	**Chief Technology Officer**
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	**President of Scriba Nanotecnologie Srl**
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	**Senior Scientist**
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	**Researcher**
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	**Postdoc**
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

EDUCATION AND TRAINING

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	**Ph.D. in Chemistry**
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	**Laurea In Industrial Chemistry**
Level in National classification	110/110 cum Laude

RESEARCH

Research sectors	Organic electronics and bioelectronics; Nanobiotechnologies; Nanomedicine; Multifunctional Materials; Nanofabrication; Nanoscale characterization; Scientific and Techical Instrumentation development.
Specific Research Interests	<u>Organic Bioelectronics and Nanobiomedicine</u>: - Electrocorticography in vivo. - Multifunctional Implants for treating Parkinson's disease; - Implantable devices for Treatment post-Radical Prosthataectomy; - Active Multifunctional Implantable Devices for the Treatment of Spinal Cord Injury. - Organic electronics biosensors for POC diagnostics (inflammatory biomarkers, neurotransmitters); - 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; <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) Demonstrated molecular scale transport across SAM-OFET junctions showing odd-even effects for the first time. *These findings stimulated new experiments and are highly cited in OFET literature.* ii) Invented multiscale fabrication techniques for soft-matter applicable to any soluble material. iii) Demonstrated information storage using bottom-up fabrication of soft matter nanostructures. *These techniques are widely adopted; these works are highly cited.* iv) 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. *These are major advancements in organic bioelectronics;* v) pioneered electrolyte gated organic transistor biosensors, and demonstrated their application to relevant pathological biomarkers; reported new sensors of neurotransmitters based on neuromorphic organic devices. *This activity is internationally acknowledged by many invited talks and funded in EU projects.*
Bibliometric Indicators	Papers on peer-reviewed journals and book chapters> **230**; Source: Google Scholar 10/09/2018: **Number of citations >9600**, **h-index=59 h-index (5 yrs)=36.**
Talks	**6** plenary lectures, >**200** invited talks at international conferences, universities and research centers.
IP generation	**19** patents, most of them extended PCT and in National phases.
Technology transfer	Founder of spin-off companies, Scriba Nanotecnologie Srl (2005) e Nano4bio Srl (2008-2015).
FUNDING ID	As an independent PI, **30** competitive grants for a total of >8.0 M€ from 2000. **Coordinator** of **five EU** (3 EC, 1 ESF, 1 ERANET) projects, and **four National projects**. **PI in 11 EC, two ESF**, and **eight** National projects. Recent projects include: EuroNanomed III 2017 "AMI" (2018-2020), Bilateral Italy/Sweden Strategic Project "Poincaré" on POC diagnostics (2015-2017); 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

SELECTED 10 PUBLICATIONS IN BIOELECTRONICS AND NANOMEDICINE AS SENIOR AUTHOR

1. 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).
2. 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).
3. 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.
4. 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).
5. Di Lauro, Michele; Berto, Marcello; Cramer, Tobias; Murgia, Mauro; Geoghegan, Mark; Bortolotti, Carlo A.; Biscarini, Fabio "The substrate is a pH-controlled second gate of electrolyte-gated organic field-effect transistor" ACS Appl. Mater. Interfaces, 8, 31783–31790 (2016).
6. Berto, Marcello; Casalini, Stefano; Di Lauro, Michele; Marasso, Simone L; Cocuzza, Matteo; Perrone, Denis; Pinti, Marcello; Cossarizza, Andrea; Pirri, Candido F; Simon, Daniel T; Berggren, Magnus; Zerbetto, Francesco; Bortolotti, Carlo A; Biscarini, Fabio "Biorecognition in Organic Field Effect Transistors Biosensors: The Role of the Density of States of the Organic Semiconductor" Anal. Chem., 88, 12330–12338 (2016). DOI: 10.1021/acs.analchem.6b03522.
7. Casalini, Stefano; Bortolotti, Carlo Augusto; Leonardi, Francesca; Biscarini, Fabio "Self-assembled monolayers in organic electronics" Chem. Soc. Rev. 46, 40-71 (2017). DOI: 10.1039/C6CS00509H.
8. Di Lauro, M. Berto, M. Giordani, S. Benaglia, G. Schweicher, D. Vuillaume, C. A. Bortolotti, Y. H. Geerts, F. Biscarini, "Liquid-Gated Organic Electronic Devices Based on High-Performance Solution-Processed Molecular Semiconductor" Adv. Electron. Mater. 2017, *1700159.*
9. Marcello Berto, Chiara Diacci, Roberta D'Agata, Marcello Pinti, Elena Bianchini, Michele Di Lauro, Stefano Casalini, Andrea Cossarizza, Magnus Berggren, Daniel Simon, Giuseppe Spoto, Fabio Biscarini and Carlo A. Bortolotti, "EGOFET Peptide Aptasensor for Label-Free Detection of Inflammatory Cytokines in Complex Fluids" Adv. Biosystems (2017). DOI: 10.1002/adbi.201700072.
10. M Giordani, M Berto, M Di Lauro, CA Bortolotti, M Zoli, F Biscarini, "Specific Dopamine Sensing Based on Short-Term Plasticity Behavior of a Whole Organic Artificial Synapse" ACS Sensors 2, 1756–1760 (2017).

Reviews/Chapters in collective volumes

1. F. Biscarini, "Scanning Force Microscopy of Conjugated Oligomer Thin Films Grown in High-Vacuum" Chapt. in "Scanning Probe Microscopy of Polymers", eds. B. B. Ratner and V.V. Tsukruk (ACS Book, Washington D.C., 1998), p. 163.
2. C. Taliani, F. Biscarini, and M. Muccini, "Intermolecular Interactions and Energy Transfer in Solid α-sexithienyl", Chapt. 8 in "Conjugated Oligomers, Polymers, and Dendrimers: from Polyacetylene to DNA" ed. J.-L. Brédas, (DeBoeck Université, Brussels, 1999), p. 163.
3. C. Taliani, F. Biscarini, and M. Muccini, "Electronic Structure and Energy Transfer in Solid α-Sexithienyl", Chapt. 6 in "Conjugated Oligomers, Polymers, and Dendrimers: from Polyacetylene to DNA" ed. G. Hadzioannou and P. F. van Hutten, (Wiley VCH, New York,

1999) p. 149.

4. C. Albonetti, R. Kshirsagar, M. Cavallini, F. Biscarini, « Charter 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).
5. C. Albonetti, R. Kshirsagar, M. Cavallini, F. Biscarini, "Microscopie a scansione di forza di nanostrutture molecolari: morfologia, proprietà, nanofabbricazione" in "1956-2006 50 anni di Microscopia in Italia tra storia, progresso ed innovazione", Ed. D. Quaglino et al., Società Italiana di Scienze Microscopiche (SISM) editore, p. 181-206 (2006).
6. F. Biscarini, D. Gentili, E. Margapoti, M. Cavallini, "Technological Applications of Dewetting", in "Nanoscale Liquid Interfaces: Wetting, Patterning and Force Microscopy at the Molecular Scale" Ed.s Thierry Ondarcuhu and Jean-Pierre Aimeé, PanStanford ISBN: 978-981-4316-45-3 (2012).
7. 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, ISBN: 978-1-118-01601-5 (2013).
8. F. Biscarini, Marcello Berto, Alessandra Campana, Michele di Lauro: "Elettronica Organica" Enciclopedia italiana di scienze, lettere ed arti - IX Appendice, 2 voll., Istituto della Enciclopedia Italiana, Roma, ISBN 978-88-12-00557-4 (2015).

Invited presentations

International conferences and schools (20 recent ones out of 120)

1. BioElectronics Winter School 2014, Kirchberg, Austria, 28/02/2014.
2. ICOE 2015, 15-18 June 2015, Erlangen Germany.
3. ISSON 2015, Thessaloniki Greece, 5/07/2015.
4. ECME 2015, Strasbourg France, 3/09/2015.
5. IFSOE 2015, Moscow, Russia, 24/09/2015.
6. Workshop "Seeing Molecules", Accademia dei Lincei, Roma, 15/11/2015.
7. MRS Fall Meeting, Symposium CC, Boston USA 1/12/015.
8. Workshop in Honor of Carlos Bustamante, Berkeley (CA) USA 18/5/2016.
9. Advanced Functional Materials, Norkoepping Sweden 22/8/2016.
10. SPIE Symposium "Organic Bioelectronics" San Diego (CA) USA 29/8/2016.
11. Workshop in "Organic Bioelectronics", Asilomar (CA) USA, 6/9/2016.
12. Solvay Workshop on "Organic Electronics", Bruxelles Belgium 16/11/2016.
13. InnoLAE Workshop on Flexible Electronics, Cambridge UK 2/2/2017.
14. E-MRS Symposium in Organic Electronics, Strasbourg France 25/5/2017.
15. ICOE 2017, San Petersburg, Russia 7/6/2017.
16. Winter School on Bioelectronics and Biophotonics, Hirschegg, Austria 19/2/2018
17. Workshop on "Electrochemistry and more…", Wiener Neustadt, 28/05/2018.
18. ICOE 2018, Bordeaux, 20/06/2018
19. NN2018, Thessaloniki, 5/07/2018
20. Advanced Functional Materials, Norkoepping Sweden 22/8/2018.

Seminars at International Universities & Research Centers (10 out of 82)

21. Nanyang Technical University, Singapore, 22/10/2014.
22. IIT Genova, 31/3/2016
23. Dip. Chimica, Università di Firenze, 12/3/2017
24. ICMM CSIC Madrid 16/3/2017
25. Dip. Chimica, Università di Bari, 23/3//2017
26. NanoGUNE San Sebastian 12/7/2017
27. CNR Nanotec, Lecce 23/11/2017
28. Dip. Chimica, Università di Siena, 12/2/2018
29. CNR ISOF Bologna, Coffee Talk, 13/03/2018
30. Chemistry Dept., Chalmers University, Göteborg 7/9/2018

Organisation of International Conferences (6 most recent of 15)

1. Workshop on "Implantable Organic Electronics", Modena 9 June 2014.
2. Tenth International Conference on Organic Electronics (ICOE 2014), Modena 11-13 June 2014.
3. 1st Workshop on Organic Bioelectronics OrBItaly 2015, Modena, 10-11 September 2015.
4. Chairperson, "Workshop in Memoriam of Carlo Taliani", Bologna 8-10 June 2016
5. Chairperson, "From Colloids to Toxicology in the Nano-era: the legacy of Francesco Selmi", Accademia Nazionale delle Scienze, Lettere ed Arti, Modena 7 April 2017.
6. Organising Committee Member, Conferenza d'Ateneo "Potenzialità e innovazione nella ricerca biomedica: approcci interdisciplinari", Modena 26 June 2018.

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	**Fellow of the Royal Society of Chemistry (FRSC)**
Conferred by	Sir Harold Kroto - Royal Society of Chemistry - London (UK)
Date	15/03/2008
Award	**EU- Descartes Prize 2007**
Conferred by	European Commission - DG Research, Bruxelles
Date	5/06/2012
Award	**Premio Sapio Industria 2012**
Conferred by	Sapio Spa
Date	1/01/2018
Award	**Socio Corrispondente dell'Accademia Nazionale delle Scienze, Lettere ed Arti di Modena**
Conferred by	Sezione di Scienze dell'Accademia Nazionale delle Scienze, Lettere ed Arti di Modena

Membership to Editorial Boards of International Journals

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