

CURRICULUM VITAE of Riccardo Bertacco

PERSONAL INFORMATION

Bertacco Riccardo

Born in Varese (Italy), 25th July 1968

Orcid: orcid.org/0000-0002-8109-9166

Office: Dipartimento di Fisica – Polifab Politecnico di Milano
Via G. Colombo 81, 20133 Milano (Italy)

Personal address: Via V. Veneto 25, 21040 Morazzone (VA) – Italy

e-mail: riccardo.bertacco@polimi.it

web site: <http://nabis.fisi.polimi.it>



EDUCATION

1994 Master degree in Electronic Engineering at Politecnico di Milano (100/100 cum Laude, Supervisor: Prof. L. Braicovich)

2000 PhD in Physics on magnetic thin films investigated by spin resolved electron spectroscopy (Supervisor: Prof. F. Ciccacci).

PROFESSIONAL APPOINTMENTS

Current position:

2018 April: Appointment as Full professor at the Department of Physics of Politecnico di Milano.

2013 January - : Deputy Director of Polifab

Past positions

1994 January – July: Electronic designer at BTicino (Varese, Italy)

1994 – 1996: Volunteer in Cameroun in a social project granted by Ministero Affari Esteri

1996 – 1999: PhD in Physics at Politecnico di Milano

1999 – 2005: Assistant professor at the Physics Department of Politecnico di Milano.

2005 – 2018: Associated Professor at the Department of Physics of Politecnico di Milano

Visiting periods

2001 May - August: visiting researcher at the UMR137 CNRS-Thales (Paris), working on Pulsed Laser Deposition of thin films and characterization by XPS in the group of A. Fert, Nobel prize for Physics 2007.

2005 July: invited professor at LMOV, CNRS-Université de Versailles (France)

SHORT PERSONAL PROFILE

Riccardo Bertacco is associate professor at the Physics Department of Politecnico di Milano. He is the head of the Nanobiotechnology and Spintronics group (NaBiS) of the Physics Department, composed by two associate professors, 2 assistant professors, 2 post-doc, 3 PhD students, 4 undergraduate students. His group is currently coordinating 4 granted projects and participates in three additional projects.

Since January 2013 he is deputy director of Polifab (<http://polifab.polimi.it>), the new facility for micro and nanofabrication of Politecnico di Milano, consisting in a clean room of 370 m² and characterization laboratories, inaugurated in July 2015. He coordinates the activities of the technical staff and negotiates contracts with internal and external users.

RESEARCH ACTIVITY

Starting from a background on electron spectroscopy and surface magnetism, the research activity of R. Bertacco is nowadays devoted to the investigation of fundamental spintronics and to the applications of magnetism to biology and medicine.

The major achievements in the fields of nanomagnetism and spintronics have been:

- the demonstration of Ge based spin-photodiodes which still present the highest efficiency reported so far (*C. Rinaldi et al., Adv. Mat. 24, 3037 (2012)*),
- the discovery of a new class of ferroelectric semiconductor materials displaying Rashba effect (*M. Liebmann et al., Advanced Materials (2015)*, DOI: 10.1002/adma.201503459; *C. Rinaldi et al., Nanoletters (2018)*, DOI: 10.1021/acs.nanolett.7b04829)
- the demonstration of a pure electrical switching mechanism of magnetic order at the interface between ferroelectric and ferromagnetic materials (*G. Radaelli et al., Nature Communications, 10.1038/ncomms4404 (2014)*)
- the invention of a new technology for reconfigurable magnetic nanopatterning via localized field cooling (*E. Albisetti et al., Nature Nanotechnology, 10.1038/nnano.2016.25, (2016)*, Cover of the issue of June 2016)

The major achievements in the field of magnetic biochips have been:

- the development of a technological platform for magnetic biosensing with sub-pM sensitivity (*E. Albisetti et al., Sensors and Actuators, B: Chemical, 200, 39-46 (2014)*)

the invention of a novel technology for on-chip manipulation of individual magnetic particles via domain wall conduits, which is at present the most efficient solution for magnetophoresis on chip. (*M. Donolato et al., Adv. Mater. 22, 2706 (2010)*)

SUPERVISION

In his career, he has been the tutor of more than 30 students for their master thesis (roughly 2/year), 14 PhD students and 5 post-docs. All former PhD students are still working in research, both in research institutions (IIT, CNRS, DTU, Institute of Physics Mainz, etc.) and in high-tech companies (STM, SAES Getters, KLA Tencor) where they also coordinate R&D groups. Two former students have founded in Denmark a spin-off in the field of biosensing (www.blusense-diagnostics.com). Another PhD student has been the head of the IIT start-up on graphene.

TEACHING

He gives annual courses of classical physics, an advanced course on "Nanomagnetism and Spintronics" at Politecnico di Milano and lectures in PhD schools (2012, 2014, 2016 editions of the AIMAGN School of Magnetism; PhD course on Lab on Chip 2010-2012, Politecnico di Milano; School "New frontiers in down-scaled materials and devices: realization and investigation by advanced methods", Otranto, 2014). Appointed as Member of the Examining Committees for PhD Thesis in Italian and European universities.

DIVULGATIVE LECTURES

"A scuola da un Nobel", Sala Casartelli, Como, 30 Novembre 2007

"Nanomedicina: manipolazione di particelle nanometriche per la diagnostica e la cura.", Ordine degli Ingegneri di Como, November 2011

"Nanotecnologie per le analisi mediche", participation in the TV show "Geoscienza" – RAI3 (may 5th 2013)

"A caccia di virus e batteri (con le nanotecnologie)", Meet me tonight, Milano September 26, 2014

"Nanomedicina: microchips per biomolecole e cellule", Lezioni Lincee di Fisica e Chimica 2016 and 2018

"Nanotecnologie per uno sviluppo sostenibile", Ordine degli Ingegneri di Varese, March 2018

ORGANIZATION OF SCIENTIFIC MEETINGS

He has been the chair of the first edition of the conference SuperFOx (Superconductivity and Functional Oxides) held in Como in June 2012, he is member of the scientific committee of four conferences (MAGNET, SuperFOx, Fismat, Magnonics) and organizer of symposia for the conference JEMS.

INSTITUTIONAL RESPONSIBILITIES

Faculty member, Deputy Director of the cleanroom of Politecnico di Milano (Polifab), Delegate of Politecnico di Milano for the participation in the Task Force for Research Infrastructures of Conference of European Schools for Advanced Engineering Education and Research (CESAER).

COMMISSIONS OF TRUST

Referee of prestigious journals (e.g. Nature Nanotechnology, Phys. Rev.Lett., Appl. Phys Lett, Phys. Review B, Lab Chip), evaluator of proposals for the FUNMAT-FIP-2016 call (ICMAB-CSIC) and for the French Agence Nationale de la Recherche (ANR), member of the Steering Committee of the European consortium on Spintronics (Spintronics Factory), member of the board of the Italian Association of Magnetism (AIMAGN).

MEMBERSHIP OF SCIENTIFIC SOCIETIES

He is member of IEEE, IEEE Magnetic Society and AIMagn - Società Italiana di Magnetismo.

PUBLICATIONS AND BIBLIOMETRIC INDICATORS ON THE WHOLE CAREER

Papers in international journals: 137 (Scopus)

2 chapters of scientific books.

Author of the article devoted to Spintronics in the IX Appendice of the Enciclopedia Treccani.

9 patent applications (5 granted patents)

H-index: 25 (Scopus)

Total citations: 2031 (Scopus)

INVITED TALKS OVER LAST 5 YEARS

1. "Reconfigurable metamaterials for spin computing", Advances in Magnetism 2018 (AIM 2018), La Thuile, 5-7 February 2018.
2. "Ferroelectric tunnel junctions for memcomputing", 8th International Workshop on Characterization and Modeling of Memory Devices (IWCM2), Milano, September 28-29, 2017.
3. "Crafting magnetic anisotropy landscapes in exchange-bias multilayers for the manipulation of spin waves", Intermag 2017, Dublin, April 24-28, 2017
4. "Electrically switchable bulk giant Rashba in GeTe", Technologically relevant Quantum Materials: growth, experiments and theory, Trieste, December 20, 2016
5. "Magnetic domain wall tweezers: a nano-tool for mechanobiology at subcellular level", NanoItaly 2016, Rome, September 2016
6. "Crafting a magnetic anisotropy landscape at the nanoscale", EMSA 2016, Torino, July 2016
7. "Ferroelectric and hybrid magnetic-ferroelectric tunnelling junctions based on BaTiO₃ barriers", FISMAT, Palermo, September 29 2015
8. "The Nanotechnology behind a Sensor for Food Safety", Food-safety workshop connected to EXPO 2015, Milano, May 5 2015
9. "On-off switching of the interfacial magnetic order at the Fe/BaTiO₃ interface: impact on hybrid magnetic-ferroelectric tunneling junctions", MMM conference, Beijing, May 2015
10. "Ferroelectric Rashba Semiconductors: a new paradigm for semiconductor spintronics", Workshop on "Frontier of Spintronics and Magnetic Sensing", Beijing, May 11 2015
11. "GeTe: a prototypical ferroelectric Rashba semiconductor", MRS Spring meeting, San Francisco, 21-25 April 2014
12. "Magnetic particles manipulation and detection at the nanoscale: novel tools for biology and medicine", Nanomedicine Seminar Series@Politecnico di Milano, Milano, 24 October 2013
13. "Magnetic particles manipulation and detection at the nanoscale: novel tools for biology and medicine", MIME (Materials in medicine), Faenza, 9-11, October 2013

14. “Inverse magnetoelectric effects at ferromagnet-ferroelectric interfaces”, Fismat 2013, Milano, 9-13, September 2013

GRANTED PROJECTS COORDINATED

1. SPINBIOMED – Spintronic biosensors for medicine (Cariplo Foundation, 400 k€, coordinator). 2009-12
2. ECOMAG – Electric control of magnetization in spintronic devices” (Cariplo Foundation, 250 k€, coordinator) . 2011-13
3. NANOMED – Feasibility study for the application of nanotechnology to medical diagnostics in lab-on-chip devices”, (Cariplo Foundation, 50 k€, coordinator). 2011-12
4. LOCSSENS - Innovative platform based on analytical systems for the rapid detection of bacterial and viral contamination in agrifood applications (MIUR- Regione Lombardia, 208.000 €, coordinator of POLIMI unit). 2012-15
5. FIRB Project RBAP115AYN "Oxides at the nanoscale: multifunctionality and applications” (MIUR, NaBiS grant 110.000 €, coordinator of the NaBiS activity). 2012-14
6. POLIFAB - Realization of a facility for micro and nanofabrication at Politecnico di Milano (Politecnico di Milano – 2ML of €, deputy/technical director). 2012-15
7. ESCHILO - Early Stage Cancer diagnosis via Highly sensitive Lab-On-chip multitarget systems (MIUR-Regione Lombardia –150.000 €, coordinator of the NaBiS activity). 2013-16
8. Tid Mekii - Rapid diagnostic test for malaria (Polisocial Award – POLIMI), 90.000 €, 2016-18
9. READy – Network REgionAle per lo sviluppo di metodi Diagnostici in risposta rapida a epidemie emergenti e bioemergenze, (EU-FERS Lombardy Region, 418.000 €, coordinator POLIMI) 2017-19
10. SWING Patterning Spin-Wave reconfigurable Nanodevices for loGics and computing, (MSCA-IF-2015-GF, 244.000 €, POLIMI coordinator), 2016-19

Milano, 13/07/2018