

## CURRICULUM VITAE

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### b.1 POSITIONS AND EDUCATION

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1996: Full Professor in Experimental Physics, University of Brescia (Italy)  
1994: Full Professor in Experimental Physics, University of Ferrara (Italy)  
1987: Associate Professor in Physics, University of Brescia (Italy)  
1980: Laurea Degree in Physics, cum laude, University of Parma (Italy)

### b.2 RESEARCH ACTIVITY

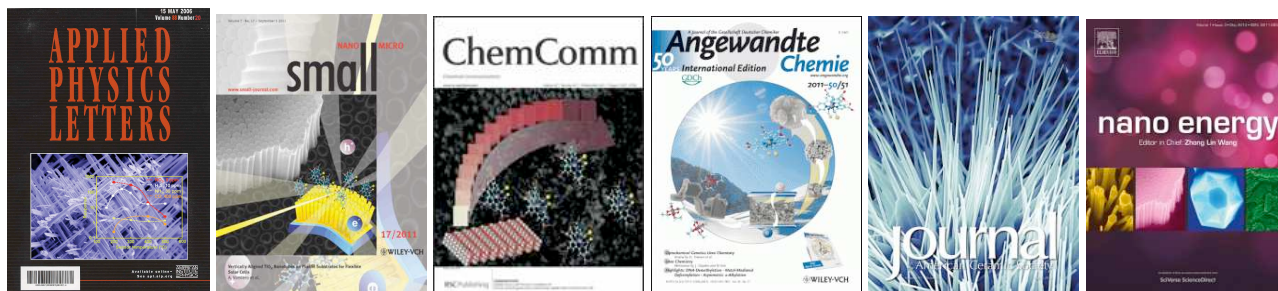
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My research activity is focused on applied physics and the development of functional materials and their applications. I started in the 70s working in the field of thin film solar cells (1971-1987). I after moved to the field of gas sensors focusing first on the development of thin film techniques and then on nanowire technology to develop functional metal oxide layers. My activity addressed both the study of the synthesis techniques to control and optimize the material structure at the micro and nanoscale to optimize its receptor and transducer function and the exploitation of these devices and electronic nose systems in different applicative fields including environmental monitoring, medicine, food quality, safety and security. Working in the field of gas sensors, in 1988 I founded the SENSOR laboratory (<http://sensor.ing.unibs.it/>). Originally composed by myself and a technician, it's now a well established lab in the field of gas sensors and solar cells (see next) where about 20 people work, including personnel from both the University of Brescia and the National Council for Research (CNR). In the period 2001-2003 I was the coordinator of the industrial-applicative network of the National Institute for the Physics of Matter (INFN), contributing to start about 23 spin-off companies in Italy. Recently, the activity on functional materials at SENSOR lab has been dedicated to explore applications other than gas sensors, including biosensors and solar cells, leading to several publications on high impact papers, including cover papers, and funded projects.

### b.3 PUBLICATIONS AND BIBLIOMETRIC RECORD

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I published about 428 papers, including 5 cover papers, 1 internal-cover paper, getting over 7700 citations and an h-index of 44 (40 excluding self-citations, Scopus source).



#### b.4 RESEARCH BREAKTHROUGH

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- 2011: My team, in collaboration with Prof. Rozati (Univ. of Guilan, Iran), demonstrated the capability of dye-sensitized solar cells to reach a photoconversion efficiency of 7.5% through the exploitation of hierarchically structured ZnO-based photoanodes to enhance its optical density, reduce light scattering and inhibit the back electron transfer at the anode interface with electrolyte (cfr. Section c.1, *Angew. Chemie – International Edition* 2011).
- 2011: My team demonstrate a photoconversion efficiency of 3.5% with flexible, dye-sensitized solar cells exploiting the growth of TiO<sub>2</sub> nanotube arrays over Kapton HN polymeric substrate (cfr. Section c.1, *Small* 2011).
- 2006: My team, in collaboration with Prof. Wang ZL (Georgia Tech, USA), demonstrated that the emerging technology of nanowires can be successfully exploited to prepare gas sensors with performances comparable with state of the art nanoparticle layers (cfr. Section c.1, *Appl. Phys. Lett.* 2006).
- 2002: My team, in collaboration with Prof. Wang ZL (Georgia Tech, USA) was the first to demonstrate the suitability of metal oxide nanowires as functional materials for gas sensing applications (*Appl. Phys. Lett.* 81, 1869-1871, 2002). This work targeted several works in the field (got over 750 citations, Scopus source, self-citations excluded), including projects I worked in (cfr. Section b.5).

#### b.5 FUNDING PROJECTS

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##### Ongoing projects:

- **Unit Coordinator:** *Sniffer for concealed people discovery* (SNOOPY, project N. 313110), FP7-SEC-2012-1, Under Negotiation, Duration: 3 years,.
- **Unit Coordinator:** *Oxide Materials Towards a Matured Post-silicon Electronics Era* (ORAMA, project N. 246334), FP7-NMP-2009-2.2-1, Oct. 2010 – Sept. 2014, **Unit budget: 295 kEuro.**
- **Unit Coordinator:** *Carbon NanoTube (CNT) and Metal Oxide quasi-1D nanostructures-based electron emitters for X-ray sources* (Xnano, national project N. DM45975), May 2010 – May 2011, **Unit budget: 1020 kEuro.**

##### Already concluded projects:

- **Project Coordinator:** *Surface ionization and novel concepts in nano-MOX gas sensors with increased Selectivity, Sensitivity and Stability for detection of low concentrations of toxic and explosive agents* (S3, project N. 247768), FP7-NMP-2009-1.2-3, Sept. 2009 – Aug. 2012; **Unit budget: 595 kEuro.**
- **Project Coordinator:** *Fabrication of innovative metal-oxide nanowire-based dye sensitized and hybrid solar cells*, national project – CARIPO funding 2008.2393; Jan. 2009 – Oct. 2011; **Unit budget: 200 kEuro.**
- **Project Coordinator:** *Nano-structured solid-state gas sensors with superior performance* (NANOS4, project N. 001528), FP6-2002-NMP-1 Jan. 2004 – Dec. 2006; **Unit budget: 595 kEuro.**
- **Unit Coordinator:** *Mobile system for non-invasive wound state monitoring* (WOUNDMONITOR, project N. 27859), FP6-2004-IST-4, Jan. 2006 – Dec. 2008, **Unit budget: 280 kEuro.**
- **Unit Coordinator:** *Advanced Gas Sensor Technology for Portable Sensor Systems* (ADVANTAGAS, project N. 28483), FP5-2000-IST-1.1.2, Oct. 2000 – Sept. 2003, **Unit budget: 200 kEuro.**

#### b.6 TEACHING

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- Basic Physics (Mechanics and Thermodynamics) at the Univ. of Brescia (1987 – today).
- Basic Physics (Mechanics and Electrostatics) at the Univ. of Parma (1998 – 2005).
- Director of the PhD school in Materials for Engineering at the Univ. of Brescia (1997 – 2005).
- Basic Physics (Electromagnetism) at the Univ. of Ferrara (1994 – 1995).

### Section c. 10 YEAR TRACK RECORD

#### c.1 TOP 10 PUBLICATIONS IN THE LAST 10 YEARS (2003 – 2012)

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The list is composed by 4 most recent (2010 – 2012) and 6 most representative (2003 – 2009) papers of my research activities. Citations are shown in squared brackets (Scopus source, excluding self-citations). Papers are ordered from the most recent.

1. *One-dimensional nanostructured oxides for thermoelectric applications and excitonic solar cells*; Vomiero A., Concina I., Comini E., Soldano C., Ferroni M., Faglia G., Sberveglieri G.; NANO ENERGY, Vol. 1, 372 (2012). **cover paper** [Cit. 0]
2. *Metal Oxides Mono-Dimensional Nanostructures for Gas Sensing and Light Emission*; Soldano, C.; Comini, E.; Baratto, C.; Ferroni, M.; Faglia, G.; Sberveglieri, G.; J. AM. CERAM. SOC. Vol. 95, 831 (2012), **cover paper** [Cit. 1]
3. *Hierarchically assembled ZnO nanocrystallites for high-efficiency dye-sensitized solar cells*; Memarian, N.; Concina, I.; Braga, A.; Rozati, SM; Vomiero, A.; Sberveglieri G.; ANGEW. CHEMIE - INTERNATIONAL EDITION 50, 12321 (2011), **cover paper.** [Cit. 7]
4. *Vertically aligned TiO<sub>2</sub> nanotubes on plastic substrates for flexible solar cells*; Galstyan, V.; Vomiero, A.; Concina, I.; Braga, A.; Brisotto, M.; Bontempi, E.; Faglia, G.; Sberveglieri, G.; SMALL Vol 7; 2437 (2011), **cover paper.** [Cit. 2]
5. *Quasi-one dimensional metal oxide semiconductors: Preparation, characterization and application as chemical sensors*; Comini E; Baratto C; Faglia G; Ferroni M; Vomiero A; Sberveglieri G.; PROGR. MATER. SCI. Vol 54, 1 (2009). [Cit. 142]
6. *Preparation of radial and longitudinal nanosized heterostructures of In<sub>2</sub>O<sub>3</sub> and SnO<sub>2</sub>*; Vomiero, A.; Ferroni; M, Comini; E, Faglia; G, Sberveglieri, G.; NANO LETTERS Vol. 7 3553 (2007). [Cit. 14]
7. *Ultrasensitive and highly selective gas sensors using three-dimensional tungsten oxide nanowire networks*; Ponzoni, A.; Comini, E; Sberveglieri, G.; Zhou, J; Deng, SZ; Xu, NS; Ding, Y; Wang, ZL; APPL. PHYS. LETT. Vol 88, 203101 (2006). **cover paper.** [Cit. 154]
8. *Gas sensing properties of MoO<sub>3</sub> nanorods to CO and CH<sub>3</sub>OH*; Comini, E; Yubao, L; Brando, Y; Sberveglieri, G.; CHEM. PHYS. LETT. Vol. 407, 368 (2005). [Cit. 63]
9. *Adsorption effects of NO<sub>2</sub> at ppm level on visible photoluminescence response of SnO<sub>2</sub> nanobelts*; Faglia, G; Baratto, C; Sberveglieri, G.; Zha, M; Zappettini, A; APPL. PHYS. LETT. Vol 86, 011923 (2005). [Cit. 47]
10. *Classification of electronic nose data with support vector machines*; Pardo, M; Sberveglieri, G.; SENS. ACTUATORS B: CHEMICAL Vol. 107, 730 (2005). [Cit. 42]

## c.2 BOOKS and BOOK CHAPTERS

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### Books:

1. *Solid State Gas Sensing*; Comini E, Faglia G, Sberveglieri G, (Eds.); Springer 2009. ISBN: 978-0-387-09664-3.
2. *Gas sensors: principles, operation, and development*; Sberveglieri G (Editor); Springer 1992. ISBN: 978-0-792-32004-3.

### Book chapters:

1. *Oxide Nanowires for New Chemical Sensor Devices*; in *Oxide Ultrathin Films: Science and Technology*, Pacchioni G. and Sergio V. (Eds), Wiley 2011. ISBN: 978-3-527-33016-4
2. *Transparent metal oxide semiconductors as gas sensors*; in *Transparent Electronics: From Synthesis to Applications*, A. Facchetti, T. Marks (Eds), Wiley 2010. ISBN: 978-0-470-99077-3.
3. *Exploiting Evolution for an Adaptive Drift-Robust Classifier*; in *Chemical Sensing in Lecture Notes in Computer Science*, Vol. 6024/2010, Applications of Evolutionary Computation, Giacobini M. et al. (Eds) Springer 2010. ISBN 978-3-642-12238-5.

## c.3 GRANTED PATENTS

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I've co-authored a total of 8 patents, 2 of which have been granted:

- Italian patent MI2011A001162 *Cella fotovoltaica sensitivizzata da coloranti e procedimento di fabbricazione di una cella fotovoltaica sensitivizzata da coloranti*; Galstyan, V; Sberveglieri, G; Vomiero, A; under contract with Oikos Srl Concesio (BS), Italy.
- Italian patent TO2003A000996 *Metodo ed apparecchiatura per l'analisi della vinaccia per la produzione di distillati mediante l'uso di una matrice di sensori di gas*; Sberveglieri, G; Falasconi, M; Pardo, M; Odello, L; now properties of Distillerie Franciacorta SpA, Gussago (BS), Italy.

## c.4 INVITED PRESENTATIONS

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During the last 10 years I had several presentations at international conferences, including 50 invited talks and 12 plenary presentations. A selection of 10 recent presentations (held in 2010-2012) follows:

1. *Advances in metal oxides nanostructure preparation and their application in chemical sensing*, G. Sberveglieri et al., Semiconductor Gas Sensors workshop, Sept. 11-15, 2012, Krakow, Poland. **Invited**
2. *Surface Ionization on Metal Oxide Gas Sensors*, G. Sberveglieri et al., COST Session, IMCS 2012, May 20-23, 2012, Nuremberg (Germany). **Invited**
3. *Metal oxide nanoscience and nanotechnology for chemical sensors*, G. Sberveglieri et al., Asia-Pacific Conference on Analytical Science and Regional Electrochemistry Meeting of South- East Asia and Philippine Chemistry Congress, Apr. 11-13, 2012, Manila, Philippines. **Invited**
4. *Preparation of n- and p-type metal oxide nanowires and nanostructures for chemical sensing*, G. Sberveglieri et al., 36th International Conference and Exposition on Advanced Ceramics and Composite, Jan. 22-27, 2012, Daytona Beach, USA. **Invited**
5. Q1D Metal OXides (MOX) for chemical sensing, G. Sberveglieri et al., Asia-Pacific Microscopy Conference and the International Conference on Nanoscience and Nanotechnology and the 22nd Australian Conference on Microscopy and Microanalysis, Feb. 5-9, 2012 Perth, Australia. **Invited**
6. *Nanoscience and Nanotechnology of Metal Oxides for Gas Sensing*, G. Sberveglieri et al., 9th International Meeting of Pacific Rim Ceramic Societies, July 10-14, 2011 Cairns, Australia. **Plenary**
7. *Metal Oxide Nanowires and Nanotubes for Lighting Applications*, G. Sberveglieri et al., 3rd Int. Symposium on Transparent Conductive Materials (TCM), Oct. 17-21, 2010, Analipsi, Greece. **Plenary**
8. *Applications of metal oxides nanowires in safety and security*, G. Sberveglieri et al, International Symposium on Olfaction and Electronic Nose (ISOEN), May 2-5, 2011, New York City, USA,. **Invited**
9. *TCO nanostructures for dye-sensitized solar cells*, G. Sberveglieri et al., Oxide-Based Materials and Devices Conference OE107, SPIE-Photonics West, Jan. 23-28, 2010, San Francisco, USA. **Invited**
10. *Nanowires and Colloidal Quantum Dots for Improved Light Harvesting and Energy Conversion Efficiency in Excitonic Solar Cells*, G. Sberveglieri et al., Int. Workshop on Adv. Mater. and Tech. for Global Energy and Environmental Challenges, Dec. 6-8, 2010, Pretoria, South Africa. **Invited**

#### c.5 ORGANISATION OF INTERNATIONAL CONFERENCES

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1. 28<sup>th</sup> Eurosensors conference, to be held in Brescia (Italy) on 2014; **(General Chair)**
2. 14<sup>th</sup> International Symposium on Olfaction and Electronic Nose (ISOEN), New York (USA), May 2-5, 2011; **(Executive Chair)**
3. 13<sup>th</sup> International Symposium on Olfaction and Electronic Noses (ISOEN), Brescia (Italy), Apr. 15-17, 2009; **(General Chair)**
4. 11<sup>th</sup> International Meeting on Chemical Sensors (IMCS), Brescia (Italy), Jul. 16-19, 2006; **(General Chair)**

#### I belong to the steering committee of the following conferences:

1. International Meeting on Chemical Sensors (IMCS) – Chair of the Steering Committee since 2006
2. Eurosensors – International Program Committee since 2011

#### c.6 INTERNATIONAL PRIZES/AWARDS/ACADEMY MEMBERSHIPS

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- International Society for Olfaction and Chemical Sensing (ISOCS) – Vice President;
- Associate Editor: *IEEE Sensors Journal* (2005-2010) and *Journal of Sensors* (since 2011).

#### c.7 MAJOR CONTRIBUTIONS TO EARLY CAREERS OF EXCELLENT RESEARCHERS

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During the last 10 years I contributed to the early career of several PhD students and young researchers. Several of them are now estimated colleagues in the field (h-index from Scopus, excluding self citations):

- E. Comini, now Assistant Professor at the University of Brescia (Italy), h-index: 30
- M. Ferroni, now Assistant Professor at the University of Brescia (Italy), h-index: 25
- A. Helwig, now employed at EADS GmbH, Munich (Germany), h-index: 7
- P. Candeloro, now Assistant Professor at the Univ. Magna Graecia of Catanzaro (Italy), h-index: 10.

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