# CURRICULUM VITAE

VINCENZO PALERMO
PROFESSOR IN MATERIALS SCIENCE

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SEX M
DATE OF BIRTH 20/06/1972
NATIONALITY ITALIAN

**Scientific research**

- >200 articles published. Cited >11000 times, h-index=52.
- Awards from the Italian Society of Chemistry, Royal Society of Chemistry, Federation of the European Material Societies.
- Editor for Wiley of a book on Flexible Carbon-based Electronics.
- >70 invited talks at scientific conferences.

**Scientific dissemination**

- Lecturer for science festivals, university and high-school programs, television programs.
- >60 public lectures on science, chemistry, history and nanotechnology, given to general public and to >40 classes of high-school students.
- Columnist since 2014 for the scientific magazine "Sapere".
- Author of two biographies on A. Einstein and I. Newton.
- Scientific dissemination awards received in 2015-2016-2017.

**Scientific project management**

- Director of research institute ISOF.
- Coordinator of several European and national research projects (ESF, Marie-Curie actions).
- Supervisor of postdoc, Ph.D. and master students.
- Vice-director and work package leader of the *Graphene Flagship* project (>150 partners, 10 years duration, 1B€ budget).

## CURRENT DUTIES

2021-today Director of the Institute for Organic Synthesis and Photoreactivity
CNR - National Research Council of Italy, Bologna (I)

2021-today Affiliated Professor, Chalmers University of Technology, Goteborg (S)

## PAST DUTIES

2017-2021 Vice-director,
EU project GRAPHENE FLAGSHIP
Role: support the director of the project in managing the >150 partners of the consortium, involving >1200 personnel units. Act as a deputy of the director in internal and external meetings, executive board and management panel of the project. Chair of the nomination Committee (NC) of the Flagship, with the task of nominating new members of the Executive Board.

2017-2021 Research Professor
Department of Industrial and Materials Science. Chalmers University of Technology, Goteborg (S)

2017-2020 Leader of Work Package Dissemination, EU project GRAPHENE FLAGSHIP
Role: responsible for disseminating the results of the project to the general public, the scientific community, the industrial and political stakeholders.

2017-2021 Research director
Institute for Organic Synthesis and Photoreactivity
CNR - National Research Council of Italy, Bologna (I)

2013-2017 Leader of Work Package on Composites
EU project GRAPHENE FLAGSHIP
Role: coordinate the activities of 28 academic and industrial research groups working on research of composites within the project.

2010-2017 Researcher
Institute for Organic Synthesis and Photoreactivity, CNR, Bologna
Role: coordination of the activity of the NANOCHEMISTRY LAB.

2009-today Coordinator of research unit
CNR-ISOF, Bologna.
Role: coordination of the activity of research unit ADVANCED MATERIALS, composed of ca. ten personnel units among researchers and technician.

2005-2010 Researcher (tenure-track)
Institute for Organic Synthesis and Photoreactivity, CNR, Bologna
Role: coordination of the activity of the NANOCHEMISTRY LAB.

2005 Research fellow - European Project “BIONICS”
(Bio-Organics NanostructurIng for molecular electroniCS).
CNR-ISOF, Bologna.
Role: nanoscale characterization of organic materials using scanning probe microscopy.

2004 Research fellow - technology-transfer project DINACOS
Collaborative project between CNR and STMicroelectronics.
Role: nanoscale characterization of materials for electronics using scanning probe microscopy.

2001 Visiting fellow at the Steacie Institute for Molecular Sciences, Ottawa (Canada)
National Research Council Canada
Role: fabrication of nano-contacts for organic-inorganic molecular systems.

2000-2003 Ph.D. in Chemical Sciences
University of Bologna.
Thesis title: “Creation of Nanometer-Scale Islands, Wires and Holes on Silicon Surfaces for Microelectronics”.

1988-1999 Research fellow at Institute for the study of carbon compounds containing heteroatoms (ICOCEA), CNR Bologna.
CNR-ISOF, Bologna.
Role: setting up and operating a scanning probe microscope in ultra-high-vacuum.

Jul – Sep 1998 Research fellow at Procter & Gamble Co.
P&G research Center, Rome

Role: customer research on commercial bleach applications.

Nov 96- Oct 1997 — Military duty
Croce Rossa (Red Cross), Imola
Role: ambulance driver.

Mar-Aug 1996 — Research fellow at the University of Utrecht (NL).
Department of molecular biophysics, Utrecht.
Role: nanoscale characterization of organic materials using optical and confocal microscopy.

## EDUCATION AND TRAINING

Dec 2013 — National Habilitation as Full Professor in Chemistry + National Habilitation as Full Professor in Physics
Granted by the Italian Ministry for Instruction, University and Research (MIUR).

2000-2003 — Ph.D. in Chemical Sciences
University of Bologna.
Thesis title: "Creation of Nanometre-Scale Islands, Wires and Holes on Silicon Surfaces for Microelectronics".

1990-1995 — Master in Chemistry
University of Bologna.
Thesis title: "Computer simulation of liquid crystals on surfaces".
Final score 110/110 *cum laude*.

## SCIENTIFIC AWARDS

Dec 2017 — Scientific dissemination award, granted by the **Italian book association (AIB)**. 1st classified in the "articles" section.

Jan 2017 — ***ChemPlusChem* - Early carrier series,** an initiative to feature up and coming researchers whose focus is on multidisciplinary research centering on chemistry.

Dec 2016 — Scientific dissemination award, granted by the **Italian book association (AIB)**. 2nd classified in the "Books" section – mathematical, physical and natural science.

Dec 2015 — Scientific dissemination award, granted by the **Italian book association (AIB)**. 3rd classified in the "articles" section.

Jan 2014 — ***ChemPlusChem* - Early carrier series,** an initiative to feature up and coming researchers whose focus is on multidisciplinary research centering on chemistry.

Sep 2013 — Award of the **Italian Society of Chemistry (SCI)**, 1st prize young scientist in materials science.

Jan 2013 — Emerging Investigator of the **Royal Society of Chemistry for Chemical Communications** (best work from scientists in the early stages of their independent career).

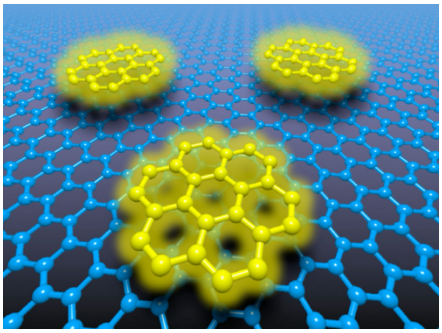
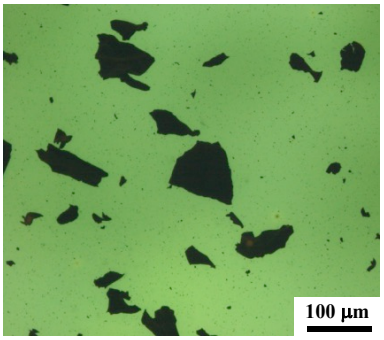
Jul 2012 — LECTURER AWARD by the **Federation of the European Material Societies (FEMS)** to selected young materials scientist who have contributed significantly to a recently emerging topic of materials science and engineering.

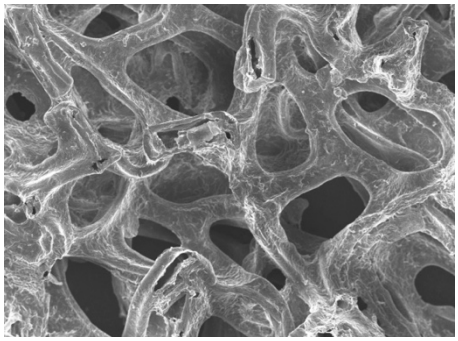
| | |
|---|---|
| Sep 2006 | 1st prize young scientist in materials science, Italian **Society for Microscopy Sciences (S.I.S.M.)**. |
| Jun 2005 | Best Ph. D. Thesis, 8th European Conference on Molecular electronics. |
| Jun 2003 | Best Graduate Student Award **E-MRS conference**, Strasbourg. |

## RESEARCH INTERESTS

### 1. Graphene-organic composite materials

We have exploited the specific interactions of graphene with small molecules to develop new techniques for graphene production, processing and applications.
We could modify the properties of graphene making use of the covalent and supramolecular approaches of carbon-based organic chemistry, thereby providing new functionalities to this already exceptional material, to enable its large-scale production and solution processing.
As example, we have used small polyaromatic molecules (featuring a strong affinity for graphene) to stabilize graphene sheets in commonly used solvents such as water, chloroform or THF.
Such molecules have highly tunable optical and electronic properties, and can give graphene-organic composites with novel light emission or charge transport properties.
Besides graphene, we have used graphene oxide (GO) as a versatile chemical platform to create new materials, which we have then used to obtain graphene-based transistors, sensors, batteries and composites for structural applications.



SELECTED PAPERS ON THIS TOPIC

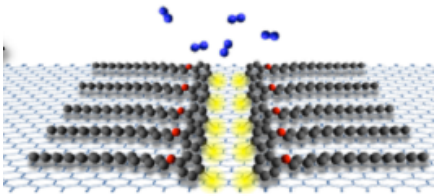
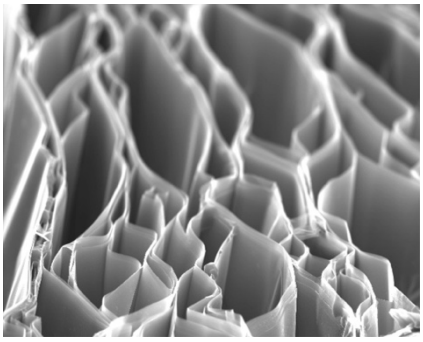
- Nanoscale insight into the exfoliation mechanism of graphene with organic dyes: effect of charge, dipole and molecular structure, **Nanoscale**, (2013) **5**, 4205.
- Light-enhanced liquid-phase exfoliation and current photoswitching in graphene-azobenzene composites, **Nature Communications**, (2016) **7**, #11090.
- Graphene-based coatings on polymer films for gas barrier applications, **Carbon**, (2016) **96**, 503.
- Graphene oxide for gas detection under standard humidity conditions, **2D Materials**, (2015) **2**, #035018.
- Graphene Transistors via in Situ Voltage-Induced Reduction of Graphene-Oxide under Ambient Conditions, **Journal of the American Chemical Society**, (2011) **133**, 14320.
- Local Current Mapping and Patterning of Reduced Graphene Oxide, **Journal of the American Chemical Society**, (2010) **132**, 14130.
- High-Contrast Visualization of Graphene Oxide on Dye-Sensitized Glass, Quartz, and Silicon by Fluorescence Quenching, **Journal of the American Chemical Society**, (2009) **131**, 15576.

REVIEW

- Nanoscale Mechanics of Graphene and Graphene Oxide in Composites: A Scientific and Technological Perspective, **Advanced Materials**, (2016) **28**, 6232.
- Graphene-based nanocomposites for structural and functional applications: using 2-dimensional materials in a 3-dimensional world, **2D Materials**, (2015) **2**, 030205

## 2. Electrochemical modification of graphene and graphene oxide

We used electrochemical techniques to improve the processability, production yield and applications of graphene-based materials.
In particular, by exploiting electric potentials we could exfoliate rapidly bulk graphite into isolated nanosheets, tuning in a simple way the solubility and electrical properties of the nanosheets. We could also enhance the chemical reactivity of "perfect", chemically inert graphene, allowing to functionalize it with specific molecules in a fast a quantitative way.
On macroscopic scale, we have produced 3-dimensional foams based on graphene by electrochemical methods, and used them as electrodes in batteries and capacitors.


**SELECTED PAPERS ON THIS TOPIC**

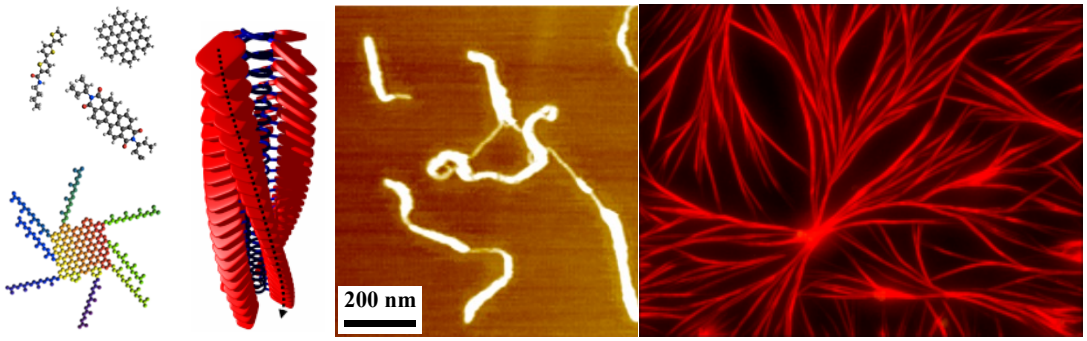
- Electrochemical Functionalization of Graphene at the Nanoscale with Self-Assembling Diazonium Salts, **ACS Nano**, (2016) **10**, 7125.
- Systematic study of the correlation between surface chemistry, conductivity and electrocatalytic properties of graphene oxide nanosheets, **Carbon**, (2017) **120**, 165.
- Electrochemically exfoliated graphene oxide/iron oxide composite foams for lithium storage, produced by simultaneous graphene reduction and Fe(OH)(3) condensation, **Carbon**, (2015) **84**, 254.
- Synergic Exfoliation of Graphene with Organic Molecules and Inorganic Ions for the Electrochemical Production of Flexible Electrodes, **ChemPlusChem**, (2014) **79**, 439.

- The Exfoliation of Graphene in Liquids by Electrochemical, Chemical, and Sonication-Assisted Techniques: A Nanoscale Study, **Advanced Functional Materials**, (2013) **23**, 4684.

## 3. Self-assembly of Nano-materials using weak, reversible supramolecular interactions.

We have used weak, reversible forces such as Van der Waals or hydrogen bonding to drive the spontaneous assembling of small molecules into mesoscopic structures such as nanocrystals, self-assembled monolayers (SAM) or macroscopic bulk structures.

The nanostructured materials obtained in this way feature high order, novel optoelectronic properties and complex hierarchical structures mimicking the ones of natural materials, and have been used for applications in organic electronics and photovoltaics.




**SELECTED PAPERS ON THIS TOPIC**

- Supramolecular self-assembly of graphene oxide and metal nanoparticles into stacked multilayers by means of a multitasking protein ring, **Nanoscale**, (2016) **8**, 6739.
- Bottom-Up Fabricated Asymmetric Electrodes for Organic Electronics, **Advanced Materials**, (2010) **22**, 5018.
- The Relationship between Nanoscale Architecture and Charge Transport in Conjugated Nanocrystals Bridged by Multichromophoric Polymers, **Journal of the American Chemical Society**, (2009) **131**, 7055.
- Nucleation-governed reversible self-assembly of an organic semiconductor at surfaces: Long-range mass transport forming giant functional fibers, **Advanced Functional Materials**, (2007) **17**, 3791.
- Macromolecular Scaffolding: The Relationship Between Nanoscale Architecture and Function in Multichromophoric Arrays for Organic Electronics, **Advanced Materials**, (2010) **22**, E81.
- Electric-field-assisted alignment of supramolecular fibers, **Advanced Materials**, (2006) **18**, 1276.
- Processing of giant graphene molecules by soft-landing mass spectrometry, **Nature Materials**, (2006) **5**, 276.

Review

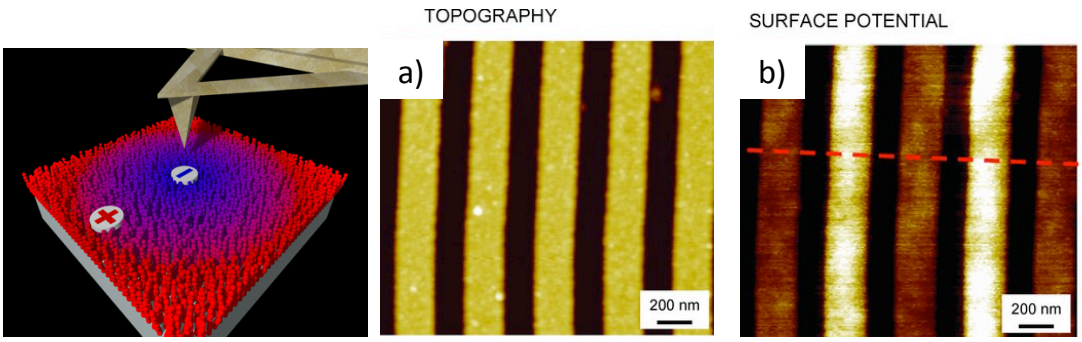
- Molecular self-assembly across multiple length scales, **Angewandte Chemie-International Edition**, (2007) **46**, 4428.
- Non-conventional Processing and Post-processing Methods for the Nanostructuring of Conjugated Materials for Organic Electronics, **Advanced Functional Materials**, (2011) **21**, 1279.

## 4. Electronic Characterization of nano-materials by nanoscale contactless electrostatic techniques (Scanning Probe Microscopy)

In the production of nano-materials for electronics, it is important to measure the electronic properties at the nanoscale, possibly in real time and in a quantitative way. To this aim, we have used the interaction of a conductive scanning tip with a charged surface to map the electric surface potential of different surfaces, with a lateral resolution of few nanometers and a potential resolution of few millivolts. We have used this technique (called Kelvin Probe Force Microscopy) to create 2D maps of charges produced in photovoltaic materials, measure charge transport in transistors and in thin graphene layers, or detect exchange of electrons between adjacent nano-objects.
To improve the lateral resolution of this technique, we have also developed deconvolution models that remove the artefacts due to long-range electrostatic interactions, and provide a quantitative explanation of results.

**SELECTED PAPERS ON THIS TOPIC**

- Charge transport in graphene-polythiophene blends as studied by Kelvin Probe Force Microscopy and transistor characterization, **Journal of Materials Chemistry**, (2011) **21**, 2924.
- Probing local surface potential of quasi-one-dimensional systems: A KPFM study of P3HT nanofibers, **Advanced Functional Materials**, (2008) **18**, 907.
- Photovoltaic charge generation visualized at the nanoscale: A proof of principle, **Journal of the American Chemical Society**, (2008) **130**, 780.
- Tuning the Work-Function Via Strong Coupling, **Advanced Materials**, (2013) **25**, 2481.
- Quantitative measurement of the local surface potential of pi-conjugated nanostructures: A Kelvin probe force microscopy study, **Advanced Functional Materials**, (2006) **16**, 1407.

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## SCIENTIFIC MANAGEMENT AND LEADERSHIP

- Vice-director of the EU project GRAPHENE FLAGSHIP, supporting the director of the project in managing the >150 partners of the consortium, involving >1200 personnel units. Act as a deputy of the director in internal and external meetings, executive board and management panel of the project.

- Work Package leader of the **GRAPHENE FLAGSHIP (**Graphene-Driven Revolutions in ICT and Beyond). I coordinate the largest WP of the whole graphene flagship, composed of 28 partners, including large companies (AIRBUS; FIAT, SELEX, etc.) universities (Cambridge, Strasbourg, Hamburg, Bologna, etc.) and small enterprises.

- Leader Project **GOSPEL,** Graphene-Organic SuPramolEcular functionaL composites, of the European Science Foundation, completed in 2013.

- Leader of ITN Marie Curie project **GENIUS,** GraphenE-orgaNIc hybrid architectures for organic electronics: a mUltiSite training action.

- Directly leading a research group of >15 personnel units, including tenure track researchers, postdocs and Ph.D. students.

## EXPERT-EVALUATOR-REFEREE FOR THE FOLLOWING INSTITUTIONS:

Research Institutions:

- European Science Foundation (ESF)
- The Royal Society
- Swiss National Science Foundation (SNSF)

- Academy of Finland (AKA)
- Dutch technology foundation (STW)
- Research Foundation of Flanders (FWO)
- The Engineering and Physical Sciences Research Council (EPSRC)
- Italian Ministry for Research and Instruction (MIUR)

Scientific publishers:

- American Chemical Society (ACS)
- American Physical Society (APS)
- Elsevier
- Nature Publishing Group
- RSC Publishing
- Wiley

## BIBLIOMETRIC INDICATORS

Total ISI publications: >200. H-index: 52. Total times cited: >11000. (source: SCOPUS)

1 PCT and 2 Italian patents submitted (+ one IT patent already granted).

## Organization of scientific conferences

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|---|---|
| **FUNCTIONAL MULTISCALE ARCHITECTURES** conference, May 2010, Bologna (I) | *Conference organizer* |
| **EUROGRAPHENE SYMPOSIUM**, November 2010, Strasbourg (F) | *Symposium organizer* |
| **GRAPHENE 2012**, workshop "Graphene Chemistry & Materials ", April 2012 Brussels (B) | *Workshop organizer* |
| **CIMTEC 2012 -** International Conference on Modern Materials and Technologies , focussed session on "Graphene, from science to technology", June 2012, Montecatini (I) | *Session organizer* |
| **GRAPHENE 2013**, April 2013 Bilbao (E) | *Member of Scientific Committee* |
| **GRAPHENE WEEK 2013,** June 2013, Chemnitz (D) | *Member of Program Committee* |
| **EUROMAT 2013**, symposium on "CARBON NANOTUBES AND GRAPHENE" September 2013, Sevilla, Spain (E) | *Symposium organizer* |
| **GRAPHENE STUDY 2014, February 2014, Obergurgl (A)** | *Teacher* |
| **GRAPHENE CONNECT**, MAY 2014, TOULOUSE (F) | *Workshop organizer* |
| **GRAPHITA,** SEPTEMBER 2015, BOLOGNA (I) | *Member of Scientific Committee* |
| **GRAPHENE WEEK 2015**, Manchester (UK) | *Member of Scientific Committee* |

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| **GRAPHENE WEEK 2017**, Athens (Greece) | *Member of Scientific Advisory Board* |
| **GRAPHENE WEEK 2018**, San Sebastian (Spain) | *Member of Scientific Advisory board* |
| **CHEM2DMAT 2021,** Bologna (Italy) | *Conference Chair* |

## DISSEMINATION AND DIDACTIC ACTIVITIES

Good communication skills developed through my experience as speaker at international scientific conferences (more than 50 invited talks given in last 5 years, plus many oral presentations), at science dissemination events and in frontal teaching to university and high-school students. Even if CNR researchers have no teaching commitment and are often fully dedicated to research activities, I use a significant part of my time for didactic activities, training of junior researchers and dissemination of scientific results to younger people.

| Ph.D. Students supervised: | |
|---|---|
| 1. Emanuele Treossi | *Now Researcher at CNR, Bologna* |
| 2. Konstantinos Kouroupis - Agalou | *Now Editor at Wiley* |
| 3. Elżbieta Anitowska | *Now employee at CAPAROL Polska, Poland* |
| 4. Alessandro Kovtun | |
| 5. Nicola Mirotta | |
| 6. Simone dell'Elce | |
| 7. Giulio Maccaferri | *Now researcher at BASF, Bologna, Italy* |
| 8. Filippo Valorosi | |
| 9. Vanesa Quintano | |
| 10. Vasiliki Benekou | |

| Postdoc students supervised | |
|---|---|
| 1. Dr. Anna Maria Talarico | *Now at University of Cosenza, Department of Chemistry* |
| 2. Dr. Reza Dabirian | |
| 3. Dr. Omar Pandoli | *Now Assistant Professor at Pontificia Universidade Católica do Rio de Janeiro* |

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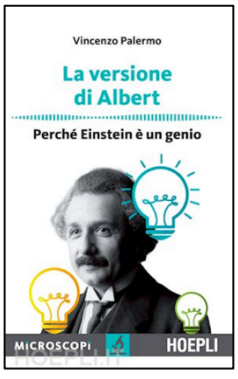
|---|---|
| 4. Dr. Salvatore Timpanaro | *Now Project Manager of Polight – Cluster of Innovation Green Building and Hydrogen Technologies, turin* |
| 5. Dr. Simona Irrera | |
| 6. Dr. Giovanni Ridolfi<br>7. Dr. Giovanna De Luca | *Now researcher at at Centro Ceramico Bologna*<br>*Now Professor at Univ. Messina* |
| 8. Dr. Andrea Liscio | *Now Researcher at CNR-IMM, Rome* |
| 9. Dr. Zhen Yuan Xia | *Now researcher at Chalmers university, Sweden* |
| 10. Dr. Jinhua Sun | *Now researcher at Chalmers university, Sweden* |
| 11. Dr. Alessandra Scidà | *Now Technologist at CNR-ISOF, Bologna* |
| 12. Dr. Alessandro Porciello | |
| 13. Dr. Meganne Christian | |
| 14. Dr. Alex Boschi | |
| 15. Agata Licata | |
| 16. Laura Malavolta | |
| 17. Dr. Maria Del Rosso | |
| 18. Dr. Giacomo Foli | |
| 19. Dr. Lidia Lancellotti | |

## Other skills

I like writing books and short stories, either fiction or essays on science and history. I published an historical novel in 2008. In 2015 I published a book on the life and science of Albert Einstein.and one on the life and science of Isaac Newton in 2016. One of my fiction stories has been selected for publication on Nature journal, in the "Futures" section. Since 2014 I work as columnist for the Italian scientific magazine "Sapere" (Knowledge), publishing articles on history of science.
Science dissemination books for general audience I wrote:








## PERSONAL SKILLS

Mother tongue(s) Italian

Other language(s)

| | UNDERSTANDING | | SPEAKING | | WRITING |
|---|---|---|---|---|---|
| | Listening | Reading | Spoken interaction | Spoken production | |
| English | C1 | C2 | C1 | C2 | C2 |

Levels: A1/A2: Basic user - B1/B2: Independent user - C1/C2 Proficient user
Common European Framework of Reference for Languages