

# Scientific Curriculum Vitae

## Vincenzo Grillo

### Personal data

Name **Vincenzo**  
Surname **Grillo**  
E-mail [vincenzo.grillo@unimore.it](mailto:vincenzo.grillo@unimore.it)  
Tel. Office **+39 059 205 5072**  
Mobile **+39 340 8610 327**

Nationality **Italian**  
Birth date **20<sup>th</sup> October 1973**  
Birth place **Genova**

### Education

Period **1997 – 2001**  
Institutes **University of Parma, Department of Physics  
CNR-IMEM, Parma  
University of Erlangen (Germany), Department of Microcharacterisation**  
Title **PhD in Physics**  
Thesis ***Study on nanoscopic scale of quantum confining structures by means of a transmission electron microscope***  
Supervisors **dr. Giancarlo Salviati (CNR-IMEM),  
dr. Martin Albrecht (University of Erlangen)**

Period **1993 – 1997**  
Institute **University of Genova**  
Title **Degree in Physics**  
Thesis ***Feasibility study of the measurement of the magnetic moment of the particle  $\Delta^+$***   
Final mark **110/110 cum laude**  
Supervisor **dr. Mario Taiuti (INFN – National Institute of Nuclear Physics, Genova)**

Period **1988 – 1993**  
Institute **Scientific High School “Leonardo da Vinci”, Genova**  
Title **Scientific High School Diploma**  
Final mark **60/60**

## Research activity

- Period **2015 – 2016**  
Institute **Ernst Ruska Center Jülich**  
Group **Electron Microscopy**  
Position **Friedrich W Bessel award**  
Whereas still been affiliated to CNR in Modena since October 2015 I have visited in different periods the Ernst Ruska center (ER-C) in Jülich to conduct advanced Electron microscopy experiments that make use of electron beam shaping and vortex beams. The visit is paid through a **Bessel Award** bestowed by the **Humboldt foundation**.
- Period **2014 – 2015 august**  
Institute **University of Oregon**  
Group **Electron Microscopy**  
Position **Associate Researcher (visiting scholar)**  
Whereas still been affiliated to CNR in Modena I have been a visiting scholar at the University of Oregon working in collaboration of Prof Benjamin McMorran. My main work has been the project and realisation of innovative experiments with vortex beams and structured electron beam illumination. The aim of this visit was indeed to coordinate the efforts of the two groups in the prospective to lead the international research in this field.  
We obtained interesting theoretical results in the theory of spin-orbit interaction of electron beams with magnetic materials.  
As for experiments we demonstrated practical examples of interaction of vortex beams of large OAM with magnetic particles.  
I also helped the activity of the local graduate student while conducting research.
- Period **2008 - present**  
Institute **S3 – NANO (Institute of Nanotechnology) CNR , Modena**  
Group **Electron Microscopy**  
Position **Associate Researcher**  
Main activities and responsibilities  
My activity in the centre S3 is concentrated in the methodological research in the field of transmission electron microscopy (TEM) and scanning transmission electron microscopy (STEM).  
My main focus is now on experimental and theoretical activity on the manipulation of vortex beams. In this field my group is among the world leaders.  
I am the **principal investigator** of the EU project FET-OPEN named **Q-Sort** that comprises some of the topmost player in electron microscopy and Optical Vortex beams. In collaboration with prof. E.Karimi and at university of Ottawa I have created the first electron-Orbital Angular Momentum Sorter for a parallel measurement of this physical quantity, published the first phase holograms, the first realization of Bessel Beams and the first experimental measurement for vertical magnetic fields based inside an electron microscope.  
In collaboration with the group of prof E. Santamato and L. Marrucci of university of Napoli “Federico II” I have collaborated to the publication of a method of spin polarization for a free electron beam for which we hold a Patent and we have created a new simulation framework to study spin effects in a TEM.  
The interest on these improvements is proved also by a recent publication of a comment on Nature (*Nature* 509, 37–38 doi:10.1038/509037a) and on Physics spotlight of exceptional research (*Physics* 8, 7 (2015) DOI: 10.1103/Physics.8.7).
- Part of my past activity was on the STEM-ADF (Annular Dark field) contrast on the study of the parametrical dependence of the ADF image contrast. In this field I have an international reputation and a long standing experience for which I collaborate with different groups.  
Among the results in this field I have studied the effect of the strain in HAADF imaging by accurate simulations: I have written an original set of **Grillo's equations** able to describe the channelling and de-channelling mechanism in ADF in presence of strain. I also created and distribute a large graphical software called “STEM\_CELL” for image analysis and simulations ( more than 350 registered users at <http://tem-s3.nano.cnr.it>).

For the experimental activity I'm using the microscopes in the IMEM laboratory in Parma, and I have collaborated with prof. A. Rosenauer in Bremen, with professor M.Albrecht working at the IKZ Leibnitz institute in Berlin (GERMANY) and J. Arbiol Institut de Ciència de Materials Barcelona (SPAIN).

In parallel with this methodological activity I'm working also on the application of advanced microscopy techniques to different nanostructures of interest in material science. Among these it is worth mentioning the case of Ag-NiO, Ag-MgO etherostructures, nanowires and nanocrystalline etherostructures grown by different techniques. In particular the experimental activity on nanowires covered the characterization of structures grown by electron beam induced deposition with metallorganic precursor (based on Pt and Co), by molecular beam epitaxy for the GaAs based semiconductor technology and by CVD at IMEM labs (ITALY). I am also performing structural characterisation of nanocrystalline structures based on Ti-oxide and magnetic materials grown by chemical synthesis at the NNL in Lecce (ITALY).

I have also been supervisor or "unofficial" menthor to 4PhD students..

I have also received the Italian habilitation to teach as full professor in experimental physics. I have been one of the youngest in Italy to receive such abilitation .

Period  
Institute  
Group  
Position  
Main activities  
and  
responsibilities

**2003 – 2008**

**TASC – INFM (National Institute of Material Sciences), Trieste**

**CME – Center for Electron Microscopy**

**Associate Researcher *Tenure Track***

I have worked for more than 5 years at the TASC National Laboratory, in the microscopy group. I have been also responsible for 2 years for the SEM facility inside TASC national laboratory.

As for the (S)TEM activities, my main task has been the methodological research in the field of the chemical quantification of materials based on the STEM-HAADF (high angle annular dark field) technique.

For this reason I set up of new experimental methodologies based on this technique and on the development of the software for simulation and data analysis. In particular, I modified the existing routines for the STEM simulation in the "frozen phonon" approximation and I produced the **first parallel computing** version of the code able to reduce the computational time virtually by orders of magnitude. As a final result I was able to produce the first quantitative compositional analysis based on HAADF contrast. Additionally I calculated for the first time quantitatively the effect in HAADF imaging of static disorder in solid alloys, a fundamental step in quantitative analyses of semiconductors.

In parallel to these methodological studies, I have worked on the characterisation of different nanostructure, collaborating both with groups in the TASC laboratory and outside (IMEM – CNR Parma, NNL – INFM Lecce). Moreover I have collaborated with the IMEM laboratory in Parma to the application and improvement of my software "Alles" for the simulation of cathodoluminescence processes.

As person in charge of the SEM facility, I had to take care of the training of users by means of short training courses, consisting of theory and practice on the microscope. I also worked on possible methodological improvements and on simple "STEM in the SEM" as a possible rapid screening technique of embedded structures. In this field I coordinated the activity of a young post-doc researcher. In the field of SEM advanced application we have worked on the detailed description and understanding of the contrast mechanism from secondary electrons in selectively hydrogenated GaAsN structures (see M. Felici et al. Adv.mater **18**, (2006) 1993 ). This technique is proving to be a privileged characterisation tool to overcome the difficulties in mapping the presence of hydrogen for this system.

Period  
Institute  
Group  
Position  
Main activities

**2002 – 2003**

**CNR – IMEM Parma**

**Structural Characterisation**

**Post-doc fellowship**

During this period I carried on my research in different directions. On one side I

and responsibilities continued my previous work in the field of cathodoluminescence on semiconductor structures based on III-nitride materials. In particular I took part to the experimental study and data analysis on confining structures based on these materials: we characterized some of the earliest AlN/GaN QDs structures evaluating the band bending as a function of the injection. I also worked on the simulation software for cathodoluminescence and interpretation of the experimentally obtained spectra. As for HRTEM studies I worked on the analysis on simulation and analysis for the SiC/Si interfaces

Period  
Institute  
Group  
Position  
Main activities  
and responsibilities

**Tokyo Institute of Technology (Japan)**  
**Condensed Matter Physics Laboratory**  
**Post-doc fellowship**

I developed my research in the laboratory of Condensed Matter Physics of professors K. Takayanagi and N. Yamamoto. My work was mainly focused on cathodoluminescence in TEM environment. In addition in this period I started the development of the simulation software for the processes of injection and diffusion of charge carriers also valid for thin samples. These theoretical and experimental techniques have been applied to the study of Quantum Dot (QD) structures and in structures based on materials like III-nitrides. As for QD structures I succeeded to characterize the thermal activation process quenching the luminescence in QDs and to produce maps where the contribution of a single or few QDs were isolated. Additionally, I coordinated the experimental activities of a few students and collaborated to the set up of a new detection system for the infrared cathodoluminescence.

Period  
Institutes  
Position  
Main activities  
and responsibilities

**1997 – 2001**  
**University of Parma**  
**Institute CNR-IMEM, Parma**  
**University of Erlangen (Germany), Department of Microcharacterisation**  
**PhD student**

My research activity during the PhD was carried partly at IMEM Institute in Parma and partly at the Department of Microcharacterisation of the University of Erlangen (prof. Strunk). The aim of my thesis was the characterisation of III-nitrides based confined structures by means of conventional and high resolution techniques of electron microscopy. In particular I analysed Quantum Well (QW) structures based on InGaAsN/GaAs and InGaN/GaN systems. As for InGaN, I contributed to the clarification of the relation between the substrate quality in terms of defects and the compositional fluctuations. The compositional analysis was performed by means of the lattice fringes spacing analysis (DALI software). As for the study of InGaAsN my main contribution was to create a **new analysis procedure for quaternary alloys** based on the comparison of strain measurement results and diffraction contrast analysis. By means of this newly invented technique I succeeded to extract for the first time the compositional profiles across the QW for In and N composition independently. The analysis permitted to evidence the important role of In compositional fluctuations and the unexpected relative homogeneity of N incorporation. Moreover this methodology has been fundamental to clarify the effect of the annealing procedures and has demonstrated the role of the nitrogen diffusion.

## Publications on journals

H factor: The present impact factor of my publications is 23 (WOK)  
(29 according to Google Scholar)

2017

V Grillo, AH Tavabi, E Yucelen, PH Lu, F Venturi, H Larocque, L Jin, ...

**Towards a holographic approach to spherical aberration correction in scanning transmission electron microscopy**

arXiv preprint arXiv:1705.04903 submitted at OpticsExpress

F Venturi, M Campanini, G C Gazzadi, R Balboni, S Frabboni, R W Boyd, R E Dunin-Borkowski, E Karimi, V Grillo

**Phase retrieval of an electron vortex beam using diffraction holography**

**Autori**

arXiv:1703.08496 submitted APL

V Grillo, T. R. Harvey, F. Venturi, J. S. Pierce, R. Balboni, F. Bouchard, G C Gazzadi, S Frabboni, A H. Tavabi, Z Li, R E. Dunin-Borkowski, R W. Boyd, B. J. McMorran, and E Karimi

**Observation of nanoscale magnetic fields using twisted electron beams**

Submitted at Nat Comm

A Ponti, A M. Ferretti, E Capetti, M C Spadaro, G Bertoni, V Grillo, P Luches, S Valeri, S D'Addato  
**Steering the Magnetic Properties of Ni@CoO Core-Shell Nanoparticle Films: the Role of Core-shell Interface vs. Interparticle Interactions**

Accepted Phys Rev Mater

- 1 AH Tavabi, M Duchamp, V Grillo, RE Dunin-Borkowski, G Pozzi  
**New experiments with a double crystal electron interferometer**  
The European Physical Journal Applied Physics 78 (1), 10701
- 2 V. Grillo, A.H Tavabi, F Venturi, H Larocque, R Balboni, G C Gazzadi, S Frabboni, P-H Lu, E Mafakheri, F Bouchard, R E Dunin-Borkowski, R W Boyd, M PJ Lavery, M J Padgett, E Karimi  
**Measuring an electron beam's orbital angular momentum spectrum**  
Nat. Comm 8 (2017) 15536
- 3 E Mafakheri, AH Tavabi, P-H Lu, R Balboni, F Venturi, C Menozzi, GC Gazzadi, S Frabboni, A Sit, RE Dunin-Borkowski, E Karimi, V Grillo  
**Realization of electron vortices with large orbital angular momentum using miniature holograms fabricated by electron beam lithography**  
Applied Physics Letters 110 (9), 093113
- 4 TR Harvey, V Grillo, BJ McMorran  
**Stern-Gerlach-like approach to electron orbital angular momentum measurement**  
Physical Review A 95 (2), 021801
- 5 B J McMorran, A Agrawal, PA Ercius, V Grillo, A A Herzing, T R Harvey, M Linck, J S Pierce  
**Origins and demonstrations of electrons with orbital angular momentum**  
Phil. Trans. R. Soc. A **375** (2017) 20150434
- 6 C Frigeri, D Scarpellini, A Fedorov, S Bietti, C Somaschini, V Grillo, L Esposito, M Salvalaglio, A Marzegalli, F Montalenti, S Sanguinetti  
**Structure, interface abruptness and strain relaxation in self-assisted grown InAs/GaAs nanowires**  
Applied Surface Science **395** (2017) 29-36
- 7 P Schattschneider, V Grillo, D Aubry  
**Spin polarisation with electron Bessel beams**

Ultramicroscopy **174** (2017) 8

## 2016

- 8 E Mafakheri, AH Tavabi, P-H Lu, R Balboni, F Venturi, C Menozzi, GC Gazzadi, S Frabboni, A Sit, RE Dunin-Borkowski, E Karimi, V Grillo  
**Realization of electron vortices with large orbital angular momentum using miniature holograms fabricated by electron beam lithography**  
arXiv:1612.00654 submitted on Appl Phys Lett
- 9 H Larocque, F Bouchard, V Grillo, A Sit, S Frabboni, R E Dunin-Borkowski, M J Padgett, R W Boyd, E Karimi  
**Nondestructive measurement of orbital angular momentum for an electron beam**  
Physical review letters **117** (2017) 154801
- 10 V Grillo, J Harris, G C Gazzadi, R Balboni, E Mafakheri, M R Dennis, S Frabboni, R W Boyd, E Karimi  
**Generation and Application of Bessel Beams in Electron Microscopy**  
Ultramicroscopy **166** (2016) 48-60
- 11 M C Spadaro, P Luches, G Bertoni, V Grillo, S Turner, G Van Tendeloo, S Valeri, S D'Addato  
**Influence of defect distribution on the reducibility of CeO<sub>2</sub>- x nanoparticles**  
Nanotechnology **27** (2016) 425705

## 2015

- 12 P Luches, L Giordano, V Grillo, G C Gazzadi, S Prada, M Campanini, G Bertoni, C Magen, F Pagliuca, G Pacchioni, and S Valeri  
**Atomic Scale Structure and Reduction of Cerium Oxide at the Interface with Platinum**  
Adv. Mater. Int. 2 (18) 2015
- 13 J Harris, V Grillo, E Mafakheri, G C Gazzadi, S Frabboni, R.W. Boyd and E Karimi  
**Structured quantum waves**  
*NATURE PHYSICS* **11** (2015) 629
- 14 P Ranzieri, M Campanini, S Fabbri, L Nasi, F Casoli, R Cabassi, E Buffagni, V Grillo, C Magén, F Celegato, G Barrera, P Tiberto, and F Albertini  
**Achieving Giant Magnetically Induced Reorientation of Martensitic Variants in Magnetic Shape-Memory Ni-Mn-Ga Films by Microstructure Engineering**  
Advanced Materials **27** (2015) 4760
- 15 Frabboni, S; Gazzadi, GC; Grillo,; Pozzi, G  
**Elastic and inelastic electrons in the double-slit experiment: A variant of Feynman's which-way set-up**  
Ultramicroscopy **154** (2015) 49
- 16 M C Spadaro, S D'Addato, P Luches, S Valeri, V Grillo, E Rotunno, M A Roldan, S J Pennycook, A M Ferretti, E Capetti, A Ponti  
**Tunability of exchange bias in Ni@NiO core shell nanoparticles obtained by sequential layer deposition**  
Nanotechnology **26**(2015) 405704
- 17 M Campanini, R Ciprian, E Bedogni, A Mega, V Chiesi, F Casoli, C de Julián Fernández, E Rotunno, F Rossi, A Secchi, F Bigi, G Salviati, C Magén, V Grillo, F Albertini  
**Lorentz microscopy sheds light on the role of dipolar interaction in magnetic hyperthermia**  
Nanoscale **7**(2015) 7717
- 18 D. Scarpellini, C. Somarschini, A. Fedorov, S. Bietti, C. Frigeri, V Grillo et al  
**InAs/GaAs sharply defined axial nanostructure in self-assisted nanowire**  
*NanoLetters* **15** (2015)

- 19** V Grillo, G C Gazzadi,; E Mafakheri, S. Frabboni, E Karimi, R W Boyd  
**Holographic generation of highly twisted electron beams.**  
*Physical review letters* 114 (2015) 034801
- 20** M C Spadaro, S D'Addato, G Gasperi, F Benedetti, P. Luches, V. Grillo, G Bertoni, S. Valeri  
**Morphology, structural properties and reducibility of size-selected CeO<sub>2-x</sub> nanoparticle films**  
*Beilstein Journal Of Nanotechnology* 6 (2015) 60
- 21** S D'Addato, D Pinotti, M C Spadaro, G Paolicelli, V Grillo, S. Valeri, L Pasquali, L Bergamini, L , S Corni  
**Influence of size, shape and core-shell interface on surface plasmon resonance in Ag and Ag@MgO nanoparticle films deposited on Si/SiOx**  
*Beilstein Journal Of Nanotechnology* 6 (2015) 404
- 22** V. Zannier, T. Cremel, A. Artioli, D. Ferrand, K. Kheng, V. Grillo and S. Rubini  
**Optical properties of single wurtzite/zinc-blende ZnSe nanowires grown at low temperature**  
*J. Appl. Phys.* 118, 095702 (2015)
- 2014**
- 23** S Carapezzi, G Priante, V Grillo, L Montes, S Rubini, A Cavallini  
**Bundling of GaAs Nanowires: A Case of Adhesion-Induced Self-Assembly of Nanowires**  
*ACS NANO* 8 (2014) 8932
- 24** V Zannier, V Grillo, S Rubini  
**Diameter-dependent morphology of vapour-solid-solid grown ZnSe nanowires**  
*Journal Of Physics D-Applied Physics* 47 (2014) 39
- 25** D Naumenko, V Zannier, V Grillo, D Cassese, G Priante, G (Priante, S dal Zilio, S Rubini, M Lazzarino  
**Enhanced plasmonic properties of gold-catalysed semiconductor nanowires**  
*Nanoscale* 6 (2014) 13651
- 26** E. Rotunno, M. Albrecht , T. Markurt, T. Remmele and V.Grillo  
**Three dimensional analysis of the composition in solid alloys by variable probe in scanning transmission electron microscopy**  
*Ultramicroscopy* 146 (2014) 62
- 27** D'Addato, MC Spadaro, P Luches, V Grillo, S Frabboni, S (Frabboni, S Valeri, S, AM Ferretti, E. Capetti, A. Ponti  
**Controlled growth of Ni/NiO core-shell nanoparticles: Structure, morphology and tuning of magnetic properties**  
*Applied Surface Science* 2, 306 (2014)
- 28** V Zannier, V Grillo, F Martelli, JR Plaisier, A Lausi, S Rubini  
**Tuning nanowire growth mode via the interaction among seed, substrate and beam fluxes**  
*Nanoscale*, 2014, 6, 8392–8399
- 29** R. Zamani, M. Ibanez, M. Luysberg, N. Garcia-Castello, L. Houben, J.D. Prades V. Grillo, R. Dunin-Borkowski, J.R. Morante, A. Cabotet, J. Arbiol  
**Polarity-driven polytypic branching in cu-based quaternary chalcogenide nanostructures.**  
*ACS nano Volume: 8, 2290 (2014)*
- 30** E. Karimi, V Grillo, R.W Boyd, E. Santamato  
**Generation of a spin-polarized electron beam by multipole magnetic fields**  
*Ultramicroscopy* 138, 22 (2014)
- 31** V Zannier, F. Martelli, V. Grillo , J.R. Plaisier, A. Lausi, S. Rubini  
**Strong blue emission from ZnSe nanowires grown at low temperature**

*Physica Status Solidi-Rapid Research Letters* **8**, 182 (2014)

**32** V Grillo, E. Karimi, GC Gazzadi, S. Frabboni, MR Dennis, RW Boyd  
**Generation of Nondiffracting Electron Bessel Beams**  
*Physical Review X* **4**, 011013 (2014)

**33** V. Grillo, GC Gazzadi, E. Karimi, E Mafakheri, RW Boyd, S. Frabboni  
**Highly efficient electron vortex beams generated by nanofabricated phase holograms**  
*Applied Physics Letters* **104**, 043109 (2014)

**34** C Frigeri, S Bietti, A Scaccabarozzi, R Bergamaschini, CV Falub, V Grillo, M Bollani, E Bonera, P Niedermann, H von Kanel, et al  
**A Structural Characterization of GaAs MBE Grown on Si Pillars**  
*Acta Physica Polonica A* **125** (2014) 986

2013

**35** S D'Addato, V Grillo, A. di Bona, P. Luches, S. Frabboni, S. Valeri, P. Lupo, F. Casoli, F. Albertini  
**Controlled co-deposition of FePt nanoparticles embedded in MgO: a detailed investigation of structure and electronic and magnetic properties**  
*Nanotechnology* **24**, 495703 (2013)

**36** V. Grillo, L. Marrucci, E. Karimi, R. Zanella, E. Santamato  
**Quantum simulation of a spin polarization device in an electron microscope**  
*New Journal Physics* **15**, 093026 (2013)

**37** Y. Xie, L. Carbone, C. Nobile, V. Grillo, S. D'Agostino, F Della Sala, C Giannini, D Altamura, C Oelsner, C Kryschi, and P D Cozzoli  
**Metallic-like Stoichiometric Copper Sulfide Nanocrystals: Phase- and Shape-Selective Synthesis, Near-Infrared Surface Plasmon Resonance Properties, and Their Modeling**  
*ACS Nano*, **7352**, 7 (2013)

**38** G. Trevisi, I. Suárez, L. Seravalli, D. Rivas, P. Frigeri, G. Muñoz-Matutano, V. Grillo, L. Nasi and J. Martínez-Pastor  
**The effect of high-In content capping layers on low-density bimodal-sized InAs quantum dots**  
*J. Appl. Phys.* **113**, 194306 (2013)

**39** M De Luca, G Lavenuta, A Polimeni, S Rubini, V Grillo, F Mura, A Miriametro, M Capizzi, and Faustino Martelli  
**Excitonic recombination and absorption in InxGa1-xAs/GaAs heterostructure nanowires**  
*Phys. Rev. B* **87**, 235304 (2013)

**40** T. Markurt, L. Lymperakis, J. Neugebauer, P. Drechsel, et al  
**Blocking growth by an electrically active subsurface layer: The effect of Si as an antisurfactant in the growth of GaN**  
*Phys. Rev. Lett.* **110** (2013) 036103

**41** T.Grieb, K.Muller,R.Fritz, V.Grillo M.Schowalter, K.Volz A.Rosnauer  
**Quantitative chemical evaluation of dilute GaNAs using ADF STEM: avoiding surface strain induced artifacts**  
*Ultramicroscopy* **129** (2013), 1–9

**42** E. Rotunno, L.Lazzarini, M.Longo, V.Grillo  
**Crystal structure assessment of Ge–Sb–Te phase change nanowires**  
*Nanoscale* **5**(2013) 1557



- 43 V. Grillo, E Rotunno  
**STEM\_CELL: a software tool for electron microscopy. Part I Simulations**  
*Ultramicroscopy* **125** (2013) 112–129
- 44 V. Grillo, F. Rossi  
**STEM\_CELL: A software tool for electron microscopy. Part2 analysis of crystalline materials**  
*Ultramicroscopy* **125** (2013) 97–111
- 2012
- 45 E. Karimi, L Marrucci, V Grillo, E Santamato  
**Spin-to-Orbital Angular Momentum Conversion and Spin-Polarization Filtering in Electron Beams**  
*Phys. Rev. Lett* **108**, (2012) 044801
- 46 Bertoni G, Grillo V, Brescia R, Ke X, Bals S, Catellani A, Li H, And Manna L  
**Direct Determination of Polarity, Faceting, and Core Location in Colloidal Core/Shell Wurtzite Semiconductor Nanocrystals.**  
*ACS Nano* **6** (2012) 6453
- 47 Frabboni S, Grillo V, Gazzadi GC, Balboni R, Trotta R et al.  
**Convergent beam electron-diffraction investigation of lattice mismatch and static disorder in GaAs/GaAs<sub>1-x</sub>N<sub>x</sub> intercalated GaAs/GaAs<sub>1-x</sub>N<sub>x</sub>:H heterostructures.**  
*Applied Physics Letters* **101** (2012) 111912
- 48 D'Addato S, Grillo V, Altieri, S, Frabboni S, Valeri, S  
**Assembly and structure of Ni/NiO core-shell nanoparticles.**  
*Applied Surface Science* **260** (2012) 13
- 2011
- 49 Ambrosini S; Fanetti M; Grillo V; Franciosi A; Rubini S  
**Vapor-liquid-solid and vapor-solid growth of self-catalyzed GaAs nanowires**  
*AIP advances* **1** (2011) 042142
- 50 G.C. Gazzadi, H. Mulders, P. Trompenaars, A. Ghirri, M. Affronte, V. Grillo, S. Frabboni,  
**Focused Electron Beam Deposition of Nanowires from Cobalt Tricarbonyl Nitrosyl Co(CO)<sub>3</sub>-NO Precursor**  
*Journal of Physical Chemistry C* **115**(2011) 19606
- 51 L. Felisari, V. Grillo, F. Jabeen, S. Rubini, C. Menozzi, F. Rossi, F. Martelli  
**Imaging with low-voltage scanning transmission electron microscopy: a quantitative analysis**  
*Ultramicroscopy* **111** (2011) 1018–1028
- 52 S. D'Addato, V. Grillo, S. Altieri, R. Tondi, S. Valeri and S. Frabboni  
**Structure and stability of nickel/nickel oxide core-shell nanoparticles**  
*J. Phys.: Condens. Matter* **23** (2011) 1750
- 53 G. Trevisi, L. Seravalli, P. Frigeri, C. Bocchi, V. Grillo, L. Nasi, I. Suárez, D. Rivas, et al  
**MBE growth and properties of low-density InAs/GaAs quantum dot structures**  
*Crystal research and technology* **46** (2011) 801
- 54 V.Grillo F.Rossi  
**A new insight on crystalline strain and defect features by STEM- ADF imaging**  
*J.Cryst .Growth* **318**(2011) 1151

- 55 S. Ambrosini, M. Fanetti, V. Grillo, A. Franciosi and S. Rubini  
**Self-catalyzed GaAs nanowire growth on Si-treated GaAs(100) substrates**  
*Journal of Applied Physics* **109** (2011), 094306
- 56 S. D'Addato, V. Grillo, S. Altieri, S. Frabboni, F. Rossi, S. Valeri  
**Assembling and Fine Analysis of Ni/MgO Core-Shell Nanoparticles**  
*Journal of Physical Chemistry C* **115** (2011) 14044
- 57 F. Jabeen, V. Grillo, F. Martelli and S. Rubini  
**InGaAs/GaAs core shell nanowires grown by molecular beam epitaxy**  
*IEEE J. of Selected Topics in Quantum Electronics* **17** (2011) 794
- 2010
- 58 L. Pescatori, A. Boccia, F. Ciesa, F. Rossi, V. Grillo, A. Arduini, A. Pochini, R. Zanoni,  
and A. Secchi  
**The Effect of Ligand Denticity in Size-Selective Synthesis of Calix[n]arene-  
Stabilized Gold Nanoparticles: A Multitechnique Approach**  
*Chem. Eur. J.* **2010**, **16**, 11089 – 11099
- 59 F. Jabeen, M. Piccin, L. Felisari, V. Grillo, G. Bais, S. Rubini, F. Martelli, F. d'Acapito,  
M. Rovezzi, and F. Boscherini  
**Mn-induced growth of InAs nanowires**  
*J. Vac. Sci. Technol. B* **28**, 478 (2010)
- 60 S. Heun, B. Radha D. Ercolani G. U. Kulkarni F. Rossi V. Grillo G. Salviati F. Beltram L. Sorba  
**Coexistence of VLS and VSS growth modes in Pd-assisted InAs nanowires**  
*Small* **6**, 1935 (2010)
- 61 F. Martelli, F. Jabeen, S. Rubini, L. Felisari, and V. Grillo.  
**On the growth of InAs nanowires by molecular beam epitaxy**  
*J. Cryst. Growth* **323** (2011) 297
- 62 S. Heun, B. Radha, D. Ercolani, K. Giridhar, F. Rossi, V. Grillo, G. Salviati, F. Beltram, L. Sorba  
**Pd-assisted growth of InAs nanowires**  
*Crystal growth and design* **10** (2010) 4197
- 63 R. Buonsanti V. Grillo, E. Carlino, C. Giannini, F. Gozzo, M. Garcia-Hernandez, M. A. Garcia, R.  
Cingolani, P. D. Cozzoli  
**Architectural Control of Seeded Grown Iron Oxide/TiO<sub>2</sub> Nanorod Heterostructures: The Role  
of Seeds in Topology Selection**  
*J. Am. Chem. Soc.* **132** (2010) 2437–2464
- 2009
- 64 D. Ercolani, F. Rossi, A. Li, S. Roddaro, V. Grillo, G. Salviati, F. Beltram, L. Sorba  
**InAs/InSb nanowire heterostructures grown by chemical beam epitaxy**  
*Nanotechnology* **20** (2009) 505605
- 65 V. Grillo  
**The effect of surface strain relaxation on HAADF imaging**  
*Ultramicroscopy* **109** (2009) 1453–1464
- 2008
- 66 Felisari L, Grillo V, Martelli F, Trotta R, Polimeni A, Capizzi M, Jabeen F, Mariucci L

***In-plane band gap modulation investigated by secondary electron imaging of GaAsN/GaAsN : H heterostructures***

*Appl.Phys.Lett.* **93**(2008)102116

- 67 Jabeen, F. Rubini, S., Grillo, V., Felisari, L., Martelli, F.  
***Room temperature luminescent InGaAs/GaAs core-shell nanowires***  
*Appl.Phys.Lett.* **93**(2008) 83117
- 68 R. Buonsanti, V. Grillo, E. Carlino, C. Giannini, T. Kipp, R. Cingolani, and P. D. Cozzoli  
***Nonhydrolytic Synthesis of High-Quality Anisotropically Shaped Brookite TiO<sub>2</sub> Nanocrystals***  
*J. Am. Chem. Soc* **130** (2008) 11223
- 69 F. Jabeen, V. Grillo, S. Rubini and F. Martelli  
***Self-catalyzed growth of GaAs nanowires on Si by molecular beam epitaxy***  
*Nanotechnology* **19** (2008) 275711
- 70 V. Grillo, E. Carlino, F. Glas  
***On the influence of the static atomic displacement on atomic resolution Z-contrast imaging***  
*Phys.Rev. B* **77** (2008), 054103
- 71 L. C. Campos, M. Tonzetter, A. S. Ferlauto, V. Grillo, R. Magalhães-Paniago, S. Oliveira, L. O. Ladeira and R. G. Lacerda  
***Epitaxially induced low temperature growth of ZnO nanowires from solid Au-Zn catalysts***  
*Advanced Materials* **20** (2008) 1499
- 72 G. Caputo, C. Nobile, T. Kipp, L. Blasi, V. Grillo, E. Carlino, L. Manna, R. Cingolani, D. Cozzoli, and A. Athanassiou  
***Reversible Wettability Changes in Colloidal TiO<sub>2</sub> a Nanorod***  
*J. Phys. Chem. C* **112** (2008), 701
- 2007**
- 73 M. Casavola, V. Grillo, E. Carlino, C. Giannini, F. Gozzo, M. A. Garcia, L. Manna, R. Cingolani, P. Davide Cozzoli  
***Topologically Controlled Growth of Magnetic – Metal – Functionalized Semiconductor Oxide Nanorods***  
*Nano Letters* **7** (2007) 1386
- 74 M. Piccin, G. Bais, V. Grillo, F. Jabeen, S. De Franceschi, E. Carlino, M. Lazzarino, F. Romanato, L. Businaro, S. Rubini, F. Martelli, A. Franciosi  
***Growth by molecular beam epitaxy and electrical characterization of GaAs nanowires***  
*Physica E-Low-Dimensional Systems & Nanostructures*, **37**(2007)134
- 2006**
- 75 R. Buonsanti, V. Grillo, E. Carlino, C. Giannini, M. L. Curri, C. Innocenti, C. Sangregorio, K. Achterhold, F. G. Parak, A. Agostiano, P. D. Cozzoli  
***Seeded Growth of asymmetric Binary Nanocrystals made of a semiconductor TiO<sub>2</sub> rodlike section and a magnetic  $\gamma$ -Fe<sub>2</sub>O<sub>3</sub> spherical domain***  
*J. Am. Chem. Soc.*; **51** (2006)16953
- 76 S. Heun, G. Biasiol, V. Grillo, E. Carlino, L. Sorba, G. B. Golinelli, A. Locatelli and T. O. Mendes F. Z. Guo  
***Morphology and composition of InAs/GaAs quantum dots***  
*Journal of Nanoscience and nanotechnology*, **7**(2007) 1–5
- 77 F. Martelli, S. Rubini, M. Piccin, G. Bais, F. Jabeen, S. De Franceschi, V. Grillo, E. Carlino, F. D'Acapito, F. Boscherini, S. Cabrini, M. Lazzarino, L. Businaro, F. Romanato, A. Franciosi  
***Mn induced growth of GaAs nanowires***

*Nano Letters*, **6**, (2006) 2130

78 V. Grillo, E. Carlino  
**A novel method for the focus assessment in atomic resolution STEM HAADF experiments**  
*Ultramicroscopy* **106** (2006), 603

79 E. Carlino, V. Grillo  
**Atomic resolution STEM-HAADF imaging in the study of interfaces**  
*Archives of metallurgy and materials* **51** (2006), 23

## 2005

80 G. Salviati, L. Lazzarini, M. Z. Zha, V. Grillo, E. Carlino  
**Cathodoluminescence spectroscopy of single SnO<sub>2</sub> nanowires and nanobelts**  
*Phys. Stat. Sol. (a)* **202** (2005) 2963 - 2970

81 D. Nakaji, V. Grillo, N. Yamamoto, T. Mukai  
**Contrast analysis of dislocation images in TEM-cathodoluminescence technique**  
*J. Electron Microsc.* **54** (2005) 223 - 230

82 E. Carlino, V. Grillo  
**Atomic-resolution quantitative composition analysis using scanning transmission electron microscopy Z-contrast experiments**  
*Phys. Rev. B* **71** (2005) 235303

## 2004

83 A. Reale, A. Di Carlo, A. Vinattieri, M. Colocci, F. Rossi, N. Armani, C. Ferrari, G. Salviati, L. Lazzarini, V. Grillo  
**Investigation of the recombination dynamics in low In-content InGaN MQWs by means of cathodoluminescence and photoluminescence excitation**  
*Phys. Stat. Sol. (c)* **2** (2005) 817 - 821

84 F. Capotondi, G. Biasiol, D. Ercolani, V. Grillo, E. Carlino, F. Romanato, L. Sorba  
**Strain induced effects on the transport properties of metamorphic InAlAs/InGaAs quantum wells**  
*Thin Solid Films* **484** (2005) 400

85 A. Colli, E. Carlino, E. Pelucchi, V. Grillo, A. Franciosi  
**Local interface composition and native stacking fault density in ZnSe/GaAs(001) heterostructures**  
*J. Appl. Phys.* **96** (2004) 2592 - 2602

86 N. Armani, F. Rossi, C. Ferrari, L. Lazzarini, A. Vinattieri, M. Colocci, A. Reale, A. Di Carlo, V. Grillo  
**Polarization field effects on the recombination dynamics in low-In-content InGaN multi-quantum wells**  
*Superlattices Microstruct.* **36** (2004) 615 - 624

87 K. Akiba, N. Yamamoto, V. Grillo, A. Genseki, Y. Watanabe  
**Anomalous temperature and excitation power dependence of cathodoluminescence from InAs quantum dots**  
*Phys. Rev. B* **70** (2004) 165322

88 A. Vinattieri, M. Colocci, F. Rossi, C. Ferrari, N. Armani, G. Salviati, A. Reale, A. Di Carlo, P. Lugli, V. Grillo  
**Recombination dynamics in InGaN/GaN quantum wells: role of the piezoelectric field versus carrier localization**  
*Phys. Stat. Sol. (c)* **1**(2004) 1397

89 G. Salviati, F. Rossi, N. Armani, V. Grillo, O. Martinez, A. Vinattieri, B. Damilano, A. Matsuse, N. Grandjean

**Optical and structural characterisation of self-organized stacked GaN/AlN quantum dots**  
*J. Phys.: Condensed Matter* **16** (2004) S115

2003

90 N. Yamamoto, H. Itoh, V. Grillo, S. Chichibu, S. P. DenBaars  
**Cathodoluminescence characterization of dislocations in GaN using a transmission electron microscope**  
*J. Appl. Phys.* **94** (2003) 4315

91 V. Grillo, A. Genseki, N. Yamamoto, Y. Watanabe  
**Characterization of ultra-thin InAs quantum wells by TEM-CL and TEM techniques**  
*Surface and Interface Analysis* **35** (2003) 40

2002

92 V. Grillo, T. Remmele, L. Lazzarini  
**On the morphology and composition in InAs/GaAs Quantum Dots**  
*Material Science and Engineering B* **91 - 92**(2002), 264

93 N. Armani, V. Grillo, G. Salviati, M. Manfredi, M. Pavesi, A. Chini, G. Meneghesso, E. Zanoni  
**Characterization of GaN-based metal-semiconductor field-effect transistors by comparing electroluminescence, photoionization and cathodoluminescence spectroscopies**  
*Journal of Applied Physics* **92**(2002), 2401

94 M. Albrecht, V. Grillo, T. Remmele, H. P. Strunk, A. Yu. Egorov, Gh. Dumitras, H. Riechert, A. Kaschner, R. Heitz, A. Hoffmann  
**Effect of annealing on the In and N distribution in InGaAsN quantum wells**  
*Appl. Phys. Lett.* **81**(2002), 2719

95 O. Martinez, F. Rossi, V. Grillo, M. Mazzoni, N. Armani, G. Salviati, A. Vinattieri, N. Grandjean, B. Damilano  
**Correlation between internal electric fields, residual strain and optical transition in GaN/AlN stacked QDs**  
*Phys. Stat. Sol. (c)* **1** (2002), 346

2001

96 V. Grillo, M. Albrecht, Th. Remmele, H. P. Strunk, A. Yu Egorov, H. Riechert  
**Simultaneous assessment of In and N in InGaAsN QWs**  
*Journal of Applied Physics* **90**(2001), 3792.

### Publications in conference proceedings (selection)

TR Harvey, V Grillo, BJ McMorran  
**Proposal for Magnetic Dichroism With a Standard STEM Probe Beam**  
*Microscopy and Microanalysis* **22** (S3), 1708-1709 (2016)

V Grillo, JS Pierce, E Karimi, TR Harvey, R Balboni, GC Gazzadi,  
**Structured Electron Beam Illumination: A New Control Over the Electron Probe Weird Probes and New Experiments**  
*Microscopy and Microanalysis* **21** (S3), 25-26 (2015)

TR Harvey, V Grillo, BJ McMorran  
**An Orbital Angular Momentum Spectrometer for Electrons**  
*Microscopy and Microanalysis* **21** (S3), 23-24 (2015)

V Grillo, S Alexander, J Ruzs, A Edstrom, A Lubk, BJ McMorran, E Karimi  
**Spin-Multisllice Applied to the Electron Spin Interaction with Materials**  
*Microscopy and Microanalysis* **21** (S3), 1961-1962 (2015)

- E Mafakheri, V Grillo, R Balboni, GC Gazzadi, C Menozzi, S Frabboni, ...  
**Holograms for the Generation of Vortex States with  $L=500h$  Fabricated by Electron Beam Lithography**  
*Microscopy and Microanalysis* 21 (S3), 667-668 (2015)
- V Grillo, E Karimi, R Balboni, GC Gazzadi, F Venturi, S Frabboni, ...  
**Electron holograms encoding amplitude and phase for the generation of arbitrary wavefunctions**  
*Microscopy and Microanalysis* 21 (S3), 503-504 (2015)
- V Grillo, E Rotunno, B McMorran, S Frabboni  
**Propagation of Bessel Beams along Atomic Columns in Crystal: a Bloch Wave and Multi-slice Analysis**  
*Microscopy and Microanalysis* 21 (S3), 1889-1890 (2015)
- V Grillo, E Karimi, R Balboni, GC Gazzadi, S Frabboni, E Mafakheri and RW. Boyd  
**Experiments and potentialities for the use of Bessel beam in superresolution STEM**  
*Microscopy and Microanalysis* (2014)
- E. Rotunno V.Grillo, T. Markurt and T. Remmele and M. Albrecht  
**Methods for Scanning Transmission Electron Microscopy High Angle Annular Dark Field based for three dimensional analysis of the local composition in solid alloys**  
*Microscopy and Microanalysis* (2014)
- V Grillo, E Karimi, R Balboni, G C Gazzadi, S Frabboni, E Mafakheri and R W. Boyd  
**Innovative phase plates for beam shaping**  
*Microscopy and Microanalysis* (2014)
- C. Frigeri, S. Bietti, A. Scaccabarozzi, R. Bergamaschini, C.V. Falub, V. Grillo, M. Bollani, E. Bonera, P. Niedermann, H. von Känelc, S. Sanguinetti and L. Miglio  
**A Structural Characterization of GaAs MBE Grown on Si Pillars**  
*ACTA PHYSICA POLONICA A* 125(2014) 986
- L Lazzarini, E Rotunno, V Grillo, M Longo  
**Determination of the atomic stacking sequence of Ge-Sb-Te nanowires by HAADF STEM**  
*MRS Proceedings* 1512, mrsf12-1512-ff10-06 (2013)
- T Grieb, K Müller, M Schowalter, A Rosenauer, R Fritz, K Volz, V Grillo  
**A method to avoid strain field induced artifacts in 2d chemical mapping of dilute GaNAs by HAADF STEM**  
*Microscopy and Microanalysis* (2012) 18 (S2), 1028-1029
- V Grillo**  
**Advances in STEM-CELL a free software for TEM and STEM analysis and simulations: probe deconvolution in STEM-HAADF**  
*Microscopy and Microanalysis*, (2011) vol. 17, issue S2, pp. 1292-1293
- V Grillo, K Mueller, K Volz, F Glas, T Grieb and A Rosenauer**  
**Toward simultaneous assessment of In and N in InGaAsN alloys by quantitative STEM-ADF imaging**  
*Microscopy and Microanalysis*, (2011) vol. 17, issue S2, pp. 1862-1863
- V. Grillo, S. D'Addato, S. Altieri, S. Frabboni, S. Valeri**  
**HRTEM and HAADF analysis of Ni multi-twinned nanoparticles**  
*Microscopy and Microanalysis*, (2011) vol. 17, issue S2, pp. 1870-1871
- V. Grillo, E. Carlino, G. Ciasca, M. De Seta, C. Ferrari**  
**On the role of specimen thickness in the chemistry quantification by HAADF**  
*Inst. Phys. Conf. Series.* in press vol.120 (2007) 173-176

**V. Grillo, E. Carlino, L. Felisari, L. Manna, L. Carbone**  
***Z-contrast STEM 3D information by Abel transform in rotational symmetric systems***  
Inst. Phys. Conf. Series. in press vol.120 (2007) 181-184

**V. Grillo, E. Carlino**  
***Novel method for the measure of STEM specimen thickness by HAADF imaging***  
Inst. Phys. Conf. Series. in press vol 120 (2007) 165-168

**E. Carlino, V. Grillo, P. Palazzari**  
***Accurate and Fast Multi-slice Simulations of HAADF Image Contrast by Parallel Computing***  
Inst. Phys. Conf. Series. vol 120 (2007) 177-180

**E. Carlino, V. Grillo**  
***0.12 nm resolution in HAADF experiment performed by conventional 200kV FEG TEM/STEM microscope***  
Proceedings MCEM VII, Portoroze (Slovenia), June 2005, p. 159

**V. Grillo, P. Verecchia, V. Rosato, E. Carlino**  
***STEM\_CELL: computer simulation for HAADF simulation and analysis***  
Proceedings MCEM VII, Portoroze (Slovenia), June 2005, p. 163

**V. Grillo, E. Carlino**  
***Atomic resolution quantitative composition analysis by annular dark field STEM Z-contrast experiments***  
Proceedings MCEM VII, Portoroze (Slovenia), June 2005, p. 277

***A novel method for the focus assessment in atomic resolution STEM - HAADF experiments***  
Proceeding of 13th European Electron Microscopy Conference EMC 2004 1 p. 121- Antwerpen (B)  
Ed. D. Schryvers & J-P Timmermans Published by Belgium Microscopy Society

**V. Grillo, H. Itoh, N. Yamamoto**  
***AILES: A random walk simulation approach to cathodoluminescence processes in semiconductors***  
Inst. Phys. Conf. Series 180 (2003) 565

**F. Rossi, N. Armani, C. Ferrari, V. Grillo, L. Lazzarini, A. Passaseo**  
***Indium distribution and influence of internal fields in InGaN quantum wells***  
Inst. Phys. Conf. Series 180 (2003) 277

**V. Grillo, S. Frabboni, G. Cicero, G. Savini, A. Catellani**  
***Combined HREM and theoretical analysis of SiC/Si interfaces***  
Inst. Phys. Conf. Series 180(2003) 69

**V. Grillo, A. Genseki, N. Yamamoto, Y. Watanabe**  
***Characterization of ultra-thin InAs quantum wells by TEM-CL and TEM techniques***  
ALC '01 conference proceedings (2001)

**M. Albrecht, V. Grillo, J. Borysiuk, T. Remmele, H. P. Strunk, T. Walther, W. Mader, P. Prystawko, M. Leszczynski, I. Grzegory, S. Porowski**  
***Compositional fluctuations and luminescence properties of InGaN QWs grown onto single crystal GaN(0001) substrates: a TEM study***  
Inst. Phys. Conf. Series 169,267 (2001)

**G. Salviati, F. Rossi, N. Armani, L. Lazzarini, L. Nasi, V. Grillo, A. Passaseo, R. Cingolani, M. Longo, O. Martinez**  
***Depth resolved cathodoluminescence study of optical transitions in MOVPE grown hexagonal GaN***  
Inst. Phys. Conf. Series 169, 251 (2001)

**N. Armani, A. Chini, M. Manfredi, G. Meneghesso, M. Pavesi, V. Grillo, G. Salviati, E. Zanoni**

**Characterisation of GaN based MESFETs by comparing electroluminescence, photoionization and cathodoluminescence spectroscopy**  
Inst. Phys. Conf. Series 169, 503 (2001)

### **Books (co-author in one chapter)**

- 1 Ed. G. Salviati, T. Sekiguchi, S. Heun, A. Gustavsonn  
**Beam injection based nano-characterisation of advanced materials**  
Transworld Researcher
- 2 Ed. C. Lamberti  
**Characterisation of semiconductor heterostructures**  
Elsevier
- 3 Ed. SISM  
**1956 - 2006 50 anni di microscopia in Italia tra storia, progetto ed innovazione.**

### **Software**

- 1 **STEM\_CELL a software for (S)TEM simulation and image analysis**  
(<http://tem-s3.nano.cnr.it/software>). The software includes a parallel computing version of the Frozen phonon simulation algorithm.
- 2 **ALLES a comprehensive simulation suite to simulate injection, diffusion and optical response in SEM and TEM cathodoluminescence**

### **Invited lectures, talk or seminars**

- 2017 Invited Speaker at the FEMMS conference in Johannesburg South Africa
- 2016 Invited speaker WE\_heraus seminar: Interaction of Shaped Electron Wavefunctions with Light and Matter
- 2016 Chairman at the European microscopy conference EMC 2016
- 2015 Invited talk at the M&M (Microcopy and microanalysis) conference in Portland USA
- 2015 Lectures of tutorial classes on simulation at the Microscopy school in Hamilton (Canada)
- 2014 Invited for a seminar at the "Ernst Ruska" centre for electron microscopy Jülich
- 2014 Lectures of tutorial classes on simulation at the M&M conference
- 2013 Invited speaker at the Annual meeting of the Microscopy society of Canada
- 2013 Invited speaker at Sinople workshop in Warsaw
- 2012 Lectures of pre-workshop classes on simulation at the EMC2012 conference
- 2011 Invited speaker at microscopy of semiconducting materials in Cambridge
- 2010 Invited for a seminar at the Leibnitz Institut für Kristallzüchtung
- 2010 Lectures at the Scuola Orsini (Univrsty of Trento)



- 2010 Invited speaker at the ICCG 16 In Peking
- 2009 Invited for a Seminar at the University of Bremen
- 2008 Invited speaker at the European Microscopy Conference 2008
- 2007 Societ  Franaise des Microscopies, Xeme colloque  
*Invited practical lectures on « practical on STEM »*

## Specialisations and schools

- 2005 Individual classes on parallel computing at ENEA – Computing and Modelling Unit (Casaccia, Italy)
- 2000 Summer school “Enrico Fermi” on *nanoscale technology* organised by Societ  Italiana di Fisica (Varenna, Italy)
- 1999 Summer school on High Resolution Electron Microscopy “New Techniques in Electron Microscopy for Materials Sciences” organised by Max Plank Institute (Halle, Germany)
- 1998 “Electron Microscopy Course” organised by the University of Surrey (Guilford, UK)

## Awards

- 2015 “Friedrich Wilhelm Bessel Research Award “ offered from the Humboldt Foundation
- 2014 2014 EMS (European Microscopy Society) Outstanding Paper Award in the category “Materials Sciences”.
- 2008 SISM award (Societ  Italiana di Scienze Microscopiche) for young researchers in the field of microscopy
- 2005 “Carla Milanese” award for the best oral at the conference “*Multinational Congress on Microscopy*”

## Teaching activities

- 2013 Habilitation licence as a full professor in experimental physics (one of the youngest in Italy)
- 2010-2012 Lecturer in a course for PhD students in Physics, University of Modena, on advanced techniques of microscopy
- 2008 Lecturer of semiconductor physics at the Diploma course in the ICTP(International Centre for Theoretical Physics) of Trieste (classes were held in English and included a final examination)
- 2006 & Lecturer in a course for PhD students in Physics, University of Trieste, on advanced techniques of microscopy  
2007
- 2006 Teacher in a laboratory course for Bachelor students in Physics, University of Trieste, on “nano-fabrication”

## Workshops organisation

- 2007 I was in the organisation committee of the III<sup>rd</sup> “CHIRALTEM” workshop

## Language skills

English : Very good  
German : Good  
French : Sufficient  
Japanese : Basic comprehension

Modena, 8<sup>th</sup> Aug 2017