



SCHEDA BIOGRAFICA

Corso di Laurea: Ingegneria

Insegnamento/i: Fisica

Nome: Raffaella

Cognome: Calarco

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Curriculum (in italiano)

Ha conseguito la Laurea in Fisica nel 1996 presso l'Università di Roma Tor Vergata. Ha conseguito un dottorato di ricerca in Scienza dei Materiali nel 2001 presso l'Università degli Studi di Roma La Sapienza. Dal 2000 al 2001 ha lavorato come Post-Doc presso l'Università di Aquisgrana (RWTH) in Germania. Dal 2001 al 2010 è stata presso il Centro di ricerca Jülich, in Germania, dapprima nel programma di eccellenza "Tenure track" e poi come ricercatrice senior, concentrandosi su nanofili di nitruro di Gallio. Nel 2010 ha ricevuto l'abilitazione in fisica dalla RWTH di Aquisgrana e nel 2012 dall'Università Humboldt di Berlino. Nel 2013 e nel 2016 ha ottenuto l'Abilitazione Scientifica Nazionale Fis03 - 02 / B1 a professore ordinario. Da settembre 2010 ad agosto 2019 ha lavorato presso il Paul-Drude-Institut di Berlino Germania, lavorando da un lato sull'epitassia di nanostrutture e strati sottili di nitruro di Gallio e dall'altro sulla crescita epitassiale di materiali a cambiamento di fase per applicazioni di memorie elettriche. La Prof.ssa Raffaella Calarco è ora impiegata presso il Consiglio Nazionale delle Ricerche (CNR) presso l'Istituto per la Microelettronica e Microsistemi (IMM) come Primo Ricercatore e lavora su materiali a cambiamento di fase per applicazioni di memoria. È autrice o coautrice di circa 138 pubblicazioni, 28 atti di congressi, 64 conferenze su invito, 4 capitoli di libri, 6 articoli di recensioni su invito e 2 brevetti di cui 1 venduto a Micron Technology. Ha circa 5444 citazioni e il suo attuale indice di Hirsch è 39 (su Google Scholar). R. Calarco partecipa a numerosi comitati e organizza conferenze e simposi. La Prof.ssa Calarco ha un eccellente record di finanziamenti. Qui riportiamo solo gli ultimi due progetti che ha ottenuto. È coordinatrice del progetto BeforeHand del programma di ricerca e innovazione Horizon 2020 dell'Unione europea nell'ambito della convenzione di sovvenzione n. 824957. È stata coordinatrice del progetto SPRInG innovativo ITN Marie Skłodowska-Curie per l'Unione europea (642574).

Curriculum (in inglese)

She received her Master's degree in Physics in 1996 from the University of Rome Tor Vergata. She holds a Ph.D. in Material Science in 2001 from the University of Rome La Sapienza. From 2000 to 2001 she worked as a Post-Doc at the University of Aachen (RWTH), Germany. From 2001 to 2010 she was with the Research Center Jülich, Germany, at first in the "Tenure-track" excellence program and then as a Senior Research Scientist, focusing on III-nitride nanowires. In 2010 she received the Habilitation in Physics from the RWTH Aachen and in 2012 from the Humboldt University in Berlin. In 2013 and in 2016 she obtained the Abilitazione Scientifica Nazionale Fis03 - 02/B1 to full Professor. From September 2010 till August 2019 she was with the Paul-Drude-Institut in Berlin Germany, working on the one hand on the epitaxy of III-nitride nanostructures and layers on the other hand on the epitaxial growth of phase-change materials for memory applications. Prof. Raffaella Calarco is now employed at the Consiglio Nazionale delle Ricerche (CNR) at the Istituto per la Microelettronica e Microsistemi (IMM) as Senior Scientist and works on phase-change materials for memory applications. She is author or co-author of about 138 publications, 28 proceedings, 64 invited talks, 4 book chapters, 6 invited review papers, and 2 patents 1 sold to Micron Technology. She has about 5444 citations and her current Hirsch index is 39 (on Google Scholar). R. Calarco participates in several committees and organized conferences and symposia. Prof. Calarco has an excellent funding record. Here we report only the last two projects she has obtained. She is coordinator of the Project BeforeHand of European Union's Horizon 2020 research and innovation programme under grant agreement No 824957. She was coordinator of the European Union's Horizon 2020 Marie Skłodowska-Curie Actions (MSCA) Innovative ITN Project SPRInG (642574).

Education and Training

Date	Validity 2016 - 2023 Validity 2012 - 2019
Institution which issued the degree	MIUR, Italy
Type of Degree awarded	Abilitazione Scientifica Nazionale Fis03 - 02/B1
Date	30/05/2012
Institution which issued the degree	Physics faculty of the Humboldt University in Berlin , Berlin, Germany
Type of Degree awarded	Habilitation (qualification to conduct self-contained university teaching - key for access to a professorship at German University)
Date	04/02/2010
Institution which issued the degree	Physics faculty of the RWTH Aachen University , Aachen, Germany
Type of Degree awarded	Habilitation (the first time it is conferred for a thesis, which is reviewed by and successfully defended before an academic committee) Thesis title: "III-Nitride Nanowires: Growth and Electro-Optic Properties"
Date	28/01/2001
Institution which issued the degree	Università degli Studi di Roma - La Sapienza , Rome, Italy



Type of Degree awarded	Ph.D. in Materials Science Experimental work at the Institute for Solid State Electronics (IESS-CNR/ now Istituto di Fotonica-CNR, Rome). Thesis: "Si/Ge epitaxial layers for near-infrared detectors". Supervisor: Prof. Dr. F. Evangelisti.
Date	24/05/1996
Institution which issued the degree	Università degli Studi di Roma Tor Vergata, Rome, Italy.
Type of Degree awarded	Master in Physics Thesis: "STM studies of the epitaxial growth of the heterostructure Ge/Si(111)". Supervisor: Prof. Dr. N. Motta.
Date	1989
Institution which issued the degree	Liceo Classico Statale Tacito
Type of Degree awarded	High School – Maturità classica

Working experience

Dates	11/2018 till now - in leave from 01/12/2018 to 31/08/2019
Name and address of the Employer	National Research Council of Italy (CNR) , Institute for Microelectronics and Microsystems (IMM) Via del Fosso del Cavaliere, 100, 00133 Roma, Italy.
Position held	Staff senior scientist (Primo ricercatore)
Main activities/ responsibilities	<u>Research topics:</u> Phase-Change Materials for Memory Applications and 2D chalcogenide materials. <u>Projects:</u> Coordinator of H2020 project BeforeHand.
Dates	08/2010 till 31/08/2019
Name and address of the Employer	Paul-Drude Institute for Solid State Electronics , Hausvogteiplatz 5-7, 10117 Berlin, Germany. Public Government Institution.
Position held	Staff senior scientist and team leader Epitaxy department
Main activities/ responsibilities	<u>Research topics:</u> <ol style="list-style-type: none">1. Epitaxy of III-Nitrides2. Nitrides-based Nanowires: Growth and Morphological Characterization3. Phase-Change Materials for Memory Applications. <u>Tasks:</u> Responsible for 3 molecular beam epitaxy (MBE) systems, fundamental



equipments for major research activities. One of them acquired in 2010, for 1M€, took care of the final acceptance of the machine. From 2010 till 2013 responsible for 2 other MBE systems used for the realization of nanowires, subject on which she finished working in 2013.

At present she is also responsible for a laboratory in which a full optical pump-probe and an electro-optical pump-probe system are installed. Both equipments have been acquired using third part funding raised by R. Calarco. The electrical set-up can be used in statical configuration to perform standard measurements on phase change memory devices.

Writing proposals for new funding. Establishing and maintaining collaboration with internal and external partners. Preparation, execution, analysis, and presentation of experiments.

Technical-scientific supervisor of 3 technicians, without gerarchical responsibility. Supervisor of Master and Ph.D. students (see list in teaching activity).

PostDocs supervision list:

1. Since 03/2015 Dr. E. Zallo - project *Phase-change materials for memory applications*
2. Since 03/2015 Dr. S. Cecchi - project *Phase-change materials for memory applications*
3. 03/2013-02/2017 Dr. J.E. Boschker - project *Phase-change materials for memory applications*
4. Since 03/2013 Dr. C. Chèze - project *Epitaxy of III-nitrides*
5. 2010-2014 Dr. P. Dogan - project *Epitaxy of III-nitrides*; she has now been appointed as Assistant Professor at Mugala University in Turkey
6. 2012-2013 Dr. M. Siekacz - project *Epitaxy of III-nitrides*
7. 2011-2013 Dr. A. Giussani - project *Phase-change materials for memory applications*
8. 2010-2012 Dr. S. Sadovef - project *Epitaxy of III-nitrides*

Guests supervision list:

1. 02/2017 Prof. Dr. F. Arciprete - project *Phase-change materials for memory applications*
2. 02/2017 E. Tisbi Ph.D. student of Prof. Dr. F. Arciprete
3. 10-12/2015 Prof. Dr. F. Arciprete - project *Phase-change materials for memory applications*
4. 10-12/2014 Dr. F. Arciprete - project *Phase-change materials for memory applications*

Dates	11/2001-08/2010
Name and address of the Employer	Research Centre Jülich GmbH, Institute for Bio- und Nanosystems IBN1 (previously ISG1), Jülich, Germany. Public Government Institution.
Position held	Started with a tenure-track position and moved to a permanent scientist



	position and then to a permanent senior scientist and team leader position.
Main activities/ responsibilities	<p><u>Research topics:</u></p> <ol style="list-style-type: none">1. Nitrides-based Nanowires: Growth and Morphological, Structural, Electrical, Piezoelectrical, and Optical Characterization2. Nitrides for Spinelectronics [diluted magnetic semiconductors (DMS), Fe/GaN]. <p><u>Tasks:</u></p> <p>Scientific, technical and organizational direction: III-Nitrides-MBE-Laboratory [Auger electron spectroscopy (AES), low energy electron diffraction (LEED), scanning tunneling microscopy (STM)], the MBE-Chamber was refurbished and converted from SiGe into III-Nitrides in 2002-2003 under R. Calarco responsibility.</p> <p>Responsible for the atomic force microscopy (AFM) Laboratory, the equipment was considered as a user facility.</p> <p>Responsible for the Raman-Laboratory.</p> <p>Responsibility for personnel: a senior scientist (Dr. T. Stoica) and 80% of a technician (Mr. K.-H. Deussen). Supervision of Master and Ph.D. students (see list in teaching activity), as well as a PostDoc:</p> <p>2007-2008 Dr. K. Jeganathan - <i>project Nitride-based nanowires</i></p> <p>2005-2006 Several visiting scientists - DAAD-Vigoni project with the University of Bologna, Italy on <i>Nitride-based nanowires</i>.</p> <p>Writing proposals for new funding. Establishing and maintaining collaboration with internal and external partners. Preparation, execution, analysis, and presentation of experiments.</p> <p>In 2006 successful conclusion of the Tenure-Track Program with a permanent contract.</p>
Dates	02/2000-10/2001
Name and address of the Employer	RWTH Aachen University , II. Physikalisches Institut - Physics department, Aachen, Germany. Public University.
Position held	PostDoc
Main activities/ responsibilities	<p><u>Research topics:</u></p> <ol style="list-style-type: none">1. Magnetoelectronics (Spindependent Transport) in Thin Films Co/Al₂O₃/Co/Si(100)2. Growth and Analysis of Epitaxial Thin Films: Fe(110)/Mo(110)/Al₂O₃(11-20). <p><u>Tasks:</u></p> <p>Preparation, execution, analysis, and presentation of experiments.</p>
Dates	07-08/1998
Name and address of	Johns Hopkins University, Baltimore , Maryland, USA, Public University.



the Employer	
Position held	Summer student at Materials Science and Engineering Department, group of Prof. Dr. P. Searson.
Main activities/ responsibilities	<u>Research topic:</u> Deposition of Cu on Si(100) and Si(111) from Pyrophosphate Solution. <u>Tasks:</u> Execution of experiments.

Scientific Leadership

For almost sixteen years she has gained in-depth knowledge of material growth using MBE. In addition she gathered knowledge and experience in several fields and used various experimental techniques for the fabrication and characterization of different materials and structures. R. Calarco mastered both the synthesis of the materials and the understanding of their properties, with the goal of exploiting new device concepts. She fabricated and investigated using different techniques thin layers and also epitaxial and non-epitaxial hybrid structures. Furthermore, she grew different self-organized nanostructures such as nanowires (NWs) and quantum dots.

The material systems R. Calarco worked with are listed in the following:

III-Nitrides (GaN, AlN, InN and their ternary and quaternary alloys); GaN:Mn, GaN:Cr (obtained by implantation); GaN/Fe (epitaxial growth); Co/ AlO_x / Co – Mo – Fe; Si – SiGe – Ge; GeTe-Sb₂Te₃ (and generally phase change materials); h-GaTe. Some of R. Calarco present and past research activities are briefly summarized below.

Spintronics	
2000-2001: Fabricated magnetic tunnel junctions with reproducible characteristics and relevant changes in the magnetoresistance at room temperature. Grew a ferromagnetic layer with a high spin polarization and a smooth surface / planar interface to the separating oxide (Co/AlO _x /Co). 2001-2005: Fabricated diluted magnetic semiconductors (n-type and p-type GaN layers implanted with Mn, Cr, or V ions) and realised hybrid ferromagnet/semiconductor structures, namely epitaxially grown bcc Fe(110) films on wurtzite GaN(0001). Since 2012: At present she works to deliver materials for the realization of a Datta and Das Spin Transistor employing the novel concept of giant spin Rashba effect predicted in the ferroelectric material GeTe.	<i>Outcome</i> >10 publications 1 project 10 conference participations
Optoelectronics	
1996-2000: During her Ph.D. she studied epitaxial Ge/Si(100) heterostructures to obtain photodetectors integrated on Si for the 1.55μm telecommunication wavelength, for which she correlated the photodetector efficiency to structural defects. 2008-2013: Participated in two German national projects on the realization of single photon emitters. Worked towards the fabrication of p-i-n junctions, Bragg reflectors, and the ternary alloy (In,Ga)N in nanowire (NW) structures with the aim to realize light emitting diodes (LEDs) in the visible range. NWs can be grown as single nano-crystals and show fewer structural defects than planar films; therefore they are capable to improve the device quality. For realistic device applications NWs need to be positioned, and to this end R. Calarco developed a very	<i>Outcome</i> ~10 publications 11 invited talks 1 invited review paper 5 projects 12 conference participations



<p>challenging growth procedure to selectively grow NWs at predefined position without the help of any metals (full semiconductor layout, which is compatible with production requirements). In 2012 she presented a study on single-NW LEDs operated in parallel.</p> <p>2010-2018: Work on planar nitrides. She worked on the growth of InN on In₂O₃. A coincidence lattice between In₂O₃ and InN is possible and reduces the mismatch to < 1%. This makes bcc-In₂O₃ an interesting alternative substrate for InN. She further works on the investigation of the In content in (In,Ga)N/GaN short period superlattices for the realization of digital alloys, interesting for their implementation in the active region of Laser diodes.</p>	
Nanoelectronics	
<p>2004-2010: Focused on the growth and characterization of III-nitride NWs, deeply investigating growth mechanisms and electronic properties. Due to the large surface-to-volume ratio of NWs, the surface has a strong influence on NW physical behavior and on device performance. Especially targeted on surface space charge layer effects in both narrow gap (InN) and wide band gap (GaN) materials in which accumulation and depletion layers are present, respectively. The investigation of the electrical properties of GaN NWs showed that the band-to-band photoelectric effect varies by orders of magnitudes as a function of the NW diameter. R. Calarco explained this unusual behavior by modeling the effect of the electron depletion region at the nanowire sidewall surfaces. The publication of these findings gained high recognition in the NW community and this paper has been highly cited.</p>	<p><i>Outcome</i></p> <ul style="list-style-type: none">>50 publications and 4 book chapters1 patent2 invited review papers15 invited talks1 project15 conference participationsGerman Habilitation1 Ph.D. grant1 PostDoc grant
Memories	
<p>Since 2009: She worked on phase-change materials (PCM), at first fabricating GeSbTe (GST) NWs and later demonstrating the successful growth of epitaxial layers of PCM on different substrates including Si(111). The high degree of spatial perfection of such layers open up new possibilities of structural property studies, and allowed the demonstration of topological insulator behavior. Furthermore in the EU-Project PASTRY such MBE grown materials was used to realize memory prototypes.</p> <p>The work carried out in the last years was acknowledged by receiving the Ovshinsky Lectureship Award 2017.</p>	<p><i>Outcome</i></p> <ul style="list-style-type: none">>60 publications>30 invited talk4 projects5 conference participations3 conference organization2 Awards

Author or coauthor of 138 publications on semiconductors in peer-reviewed international journals (1 Adv Mat impact factor (if) 19.79, 12 in Nano Letters if 12.7, 2 Adv Func Mat if 13.32, 1 Nature Asia Materials if 10.08, 6 invited review papers, a special issue as guest editor), 28 proceedings, 64 invited talks, 4 book chapters, and 2 patents.

Professional Training Management

In addition to her scientific activities R. Calarco attended advanced professional training courses to improve her personal and management skills. Over the past years she was given additional management accountability as well as increasing project responsibility and she learned to accomplish all those different assignments. Importantly she learned to manage more than one working group of in average five to seven persons each. She successfully initiated and managed several collaborations with internal and external partners, as can be seen in different publications and in the funding record. R. Calarco participated in several committees and organized conferences and symposia. For more information on each topic please see the dedicated sections below.

Over a period of two years (2004-2005) R. Calarco took part in a peer-mentoring program, to create a business plan for scientific career. In particular, she learned to clearly specify a goal, plan how to reach it and constantly monitor the progress. Furthermore, she took advantage of these different management courses in order to improve the project management and in general the working efficiency.

From 2009 till 2011 she participated at the "Helmholtz-Akademie für Führungskräfte", the Management Academy of the Helmholtz society with a training focused on science, in the program for excellent young scientists. From all the German Helmholtz Centres (18 Centres and about 38.000 staff members) only 30 participants per year were allowed to take part in this exclusive program. The Academy training was performed by the Institute for Systemic Management and Public Governance of the University of St. Gallen (Switzerland) and constituted the first part of the Master of Business of that University. The Academy consisted of 8 Workshops of each 2,5 days with participation on person. Between the latter workshops other 5 teaching units were undertaken on-line with trainers and course mates; furthermore e-learning units corresponding to 20 modules had to be completed by answering correctly on-line the related questions. Course materials remained accessible after the workshops via an online e-learning platform; in addition a networking platform for exchange and discussion with other course mates was available. For more information on each topic of the 20 units please see the dedicated section below. The program included also a mentoring program with top-flight mentors from the Helmholtz Association, business and industry. R. Calarco's mentor was Prof. Dr. Martha Ch. Lux-Steiner, Director of the Institute for Heterogeneous Materials Systems of the Helmholtz Zentrum Berlin. At the end of the Academy a written and oral examination was performed and a mark assigned.

[07.10.2015]	Enabling innovation
[25.09.2015]	Conflict management
[10.2009-2011]	<p>Helmholtz-Akademie für Führungskräfte program for excellent young scientists. Mark 109/120 (Excellent).</p> <p><u>Modules:</u></p> <ol style="list-style-type: none"> 1. Management as your mission: Assignments and tools 2. Integrated management system: Malik management 3. Orientation to the corporative goals and strategy 4. Organization of your own division 5. Taking decisions 6. Control of results and performance achievements 7. Promotion and personnel development 8. Organization of successful meetings 9. How to efficiently appoint your personnel 10. Self-management 11. Systematic garbage disposal 12. Communication 13. Presentation and moderation 14. Confident with your costumers 15. Increase your market efficiency 16. Customer value analysis



	17. Innovations 18. Management controlling and controller 19. Cost accounting 20. Financial overall management
[23.10.2007]	Performance appraisal interview for executive staff
[30.-31.05.2007]	Diversity as a management mission
[20.-21.07.2006]	Efficient project management
[2004-2005]	Peer mentoring in non-university research institutions
[11.-12.02.2005]	Chairing and moderating discussions in practice
[10.-12.01.2005]	Management skills in science
[09.-10.10.2004]	Business plan for your career
[30.-31.08.2004]	Communication and negotiation strategies

Training in experimental techniques

Growth techniques:

For almost sixteen years she has been using MBE, working over the time on many different MBE systems of several companies. She had experience both with Knudsen cells as well as with electron guns.

Since she started in FZ-Jülich in 2001 she focused on III-nitrides epitaxial growth using radio frequency plasma-assisted MBE. Initially, she had to completely refurbish and convert this MBE system.

For the fabrication of oxides she employed UV oxidation in ultra high vacuum (UHV). Furthermore, she used reactive deposition epitaxy to deposit Ge quantum dots on Si(111). Additionally, R. Calarco became familiar with the deposition through shadow masks in order to realize magnetic tunnel junctions (MTJs) *in situ*. She used droplet epitaxy consisting of Ga deposition and subsequent nitridation in UHV to obtain GaN nanodots. R. Calarco additionally employed a condensation oven for the growth of nanowires of phase change materials refurbishing and up-grading an existing system.

Characterization techniques:

AFM including piezo force (PFM) and electro force microscopy (EFM); STM; scanning electron microscopy (SEM); reflection high-energy electron diffraction (RHEED) and LEED; AES; X-ray photoelectron spectroscopy (XPS); current - voltage measurements (I-V); photocurrent measurements; Raman spectroscopy; cathodoluminescence (CL) and photoluminescence spectroscopy (PL), X-ray diffraction (XRD).

Processing methods: Optical lithography; electron beam lithography (EBL); reactive ion etching (RIE); metallization; deposition of oxides; general understanding of processing steps for the realization of simple device structures.

Analysis of measurements performed by others within cooperations:

Rutherford back scattering (RBS), secondary-ion mass spectroscopy (SIMS), high-resolution transmission electron microscopy (HRTEM); superconducting quantum interference devices (SQUID); magnetic force microscopy (MFM); magneto-optic Kerr effect (MOKE); surface photovoltage spectroscopy (SPS).

Synchrotron activity



[1998-2017] R. Calarco participated to several beamtimes at synchrotrons: BESSY II - Berlin, ESRF- Grenoble. Her activities at BESSY II are as user, as sample deliverer for other colleagues, and as member of the scientific selection committee for proposal (see below for further information).

[Recent beamtime applications at BESSY II as main user group:](#)

1. Femtosecond dynamics of optical switching in rewritable optical media I (2014)
2. Investigation of electronically induced structural rearrangement upon switching of GeSbTe alloys I (2014)
3. Investigation of electronically induced structural rearrangement upon switching of GeSbTe alloys II (2015)
4. THz investigation of Phase Change Materials superlattices (2015)
5. Femtosecond dynamics of optical switching in rewritable optical media II (2016)

Coordination of research and technology transfer groups and projects

- **Patent disclosure:**

US patent number US10553792B2 Titled "TEXTURED MEMORY CELL STRUCTURES" filed on July 29th 2016
Inventors: A. Redaelli, M. Boniardi, E. Varesi, R. Calarco and J.E. Boschker, Current Assignee Micron Technology Inc. Sb₂Te₃ buffer layer or PCM memory - **rights sold to Micron Technology**

- **FUNDING awarded through a peer-review process**

1. 01-01-2019 till now (End in 12/2021) Project: "**Boosting Performance of Phase Change Devices by hetero- and nano-structure material design**" BeforeHand funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 824957- R. Calarco **Coordinator of the whole RIA Project**. Funding: **3.999.451€**.
2. 01-07-2015 till now (End in 06/2019) Project: Funding through the **Leibniz Competition of the Leibniz Association** "Epitaxial Phase Change Superlattices Designed for the Investigation of Non-Thermal Switching" over 3 years. - R. Calarco **principal investigator (PI)**, Funding: **983.000€**.
3. 01-01-2015 / 31-12-2018 Project: "Short Period Superlattices for Rational (In,Ga)N" EU Project 642574 of the Marie Skłodowska-Curie Actions (MSCA) **Innovative Training Networks (ITN) H2020** over 4 years - R. Calarco **Coordinator of the whole ITN Project**. Funding: **1.200.000€**.
4. 01-11-2016 Funding through **Micron Foundation** Project:"selective area growth of GST" - R. Calarco **PI**, Funding: **10.000€**.
5. 01-01-2013 / 31-12-2015 Project: "Phase Change Memory Advanced universal Switches through Thin alternating layers" **EU ICT FTP7** Partners: Micron Italia, RWTH Aachen, Uni Groningen, Uni Cambridge, ELETTRA, PDI - R. Calarco **responsible of unit WP2 leader and PI** for PDI, Budget for Calarco/PDI: **910.000€**.
6. 01-01-2011 / 31-12-2011 **Deutsche Forschungsgemeinschaft** (DFG – German research association) travel funds "Structural analysis of phase change nanoscale materials" with AIST Tsukuba Japan and PDI - R. Calarco **coordinator** from the German side. Funding: **8.000€**.
7. 01-01-2010 / 31-12-2014 Project: "SINOPLE" Marie Skłodowska-Curie Actions (MSCA) **Innovative Training Networks (ITN) FTP7** over 4 years - Calarco as **responsible of unit PI** for PDI.



8. 01-01-2010 / 01-08-2010 **Special research area SFB** Project Funding through the **DFG** Resistively switching chalcogenides for Future Data storage - Structure, Kinetics and Device Scalability, Partners: RWTH Aachen (IWE II – Inorganic Chemistry – CME – Physik IIB – Physik IIA Physical Chemistry – ERC), FZ-Jülich (IBN1-IFF1-IFF3- IFF6- IFF8- IFF9) - R. Calarco only **fund raiser** execution of the project by Dr. H. Hardtdegen. Funding: **140.000€**.
9. 01-01-2009 / 31-12-2011 Funding through **Federal Ministry of Education and Research (BMBF)**, Project:"EPHQAM Effiziente, kompakte und kontrollierbare Einzelphotonenquellen für die Quantenkommunikation", Partners: Physikalisch-Technische Bundesanstalt, Uni München, Uni Stuttgart, Technical Uni Braunschweig, Uni Saarland, FZJülich - R. Calarco **fund raiser and PI** for FZJülich. Funding: **298.000€**.
10. 01-07-2008 / 30-06-2011 Funding through Federal Ministry of Education and Research **BMBF**, Project:"QPENS GaAs und GaN basierte Quantenpunkt-Halbleiteremitter und optimierte Nachweiselektroniken für Systemuntersuchungen zu Quantenkryptographie-Übertragungsprotokollen", Partners: Uni Würzburg, Becker & Hickl GmbH, Uni München, Uni Bremen, Aixtron AG Qutools GmbH, FZJülich - R. Calarco **Participant**. Funding: **499.000€**.
11. 01-01-2005 / 31-12-2006 German Academic Exchange Service **DAAD - VIGONI** travel support "Photocurrent measurements on NWs" with Uni Bologna and FZJülich - R. Calarco **PI** and **responsible** for the German side. Funding: **15.000€**.
12. 01-01-2005 / 31-12-2007 Impact **and Network Funding Program of the Helmholtz-Association**, Project:"Virtual Institute of Spin Electronics ViSel", Participants: RWTH – Aachen, Uni Göttingen, FZJülich - R. Calarco **member of the scientific committee**. Funding: **240.000€**.

International reputation and professional activity for the scientific community

- **Conference Organization**

[from 2018]	Stable member of the scientific committee of the SPIE Photonic West Opto, Symposium on Gallium Nitride Materials and Devices
[from 2018]	Stable member of the scientific committee for awarding the Ovshinsky Lectureship Award
[from 2015]	Stable member of the scientific committee of the European\Phase Change and Ovonic Symposium E/PCOS
[14-18.05.2017]	In scientific committee of the Compound Semiconductor Week CSW Berlin (D)
[21-25.04.2014]	Organizer of the MRS spring meeting Symposium Phase-change materials HH San Francisco (USA).
[08.-11.09.2013]	Local organizer of the European\Phase Change and Ovonic



	Symposium E\PCOS Berlin (D).
[01.-05.04.2013]	Organizer of the MRS spring meeting Symposium Phase-change materials EE San Francisco (USA).
[22.-26.05.2011]	In scientific committee of the International Symposium on Compound Semiconductors ISCS-2011 , Berlin (D).
[21.-23.-02.2011]	Organizer of the WE-Heraeus Seminar "III-V Nanowires: Growth, Properties, and Applications", Bad Honnef (D).
[22.-27.08.2010]	Chair of the nanostructure subcommittee at the International conference on MBE 2010 in Berlin (D).
[22.-27.03.2009]	Organizer of the Symposium "Novel nanowire electronic device concepts" at the DPG Spring meeting 2009 , Dresden (D).
[01.-02.10.2007]	Local organizer of the Deutscher MBE-Workshop 2007 , Forschungszentrum Jülich, (D).
[04.-07.11.2004]	Local organizer of the 8. Deutsche Physikerinnentagung 2004 , Aachen, (D).
[20.-21.04.2001]	Local organizer SUBMAGDEV European TMR Network meeting, Aachen (D).

- **Editorial activity**

Editor of the Special Issue of Nanoscience and Nanotechnology Letters (IF = 1.431; www.aspbs.com/nnl) on the subject of "Effects of strain in semiconductor heterostructures", published in 2017.

- **Referee activity**

Journals:

Science,
Nature Communications,
Nature Scientific Reports,
Nano Letters,
Nanotechnology,
Applied Physics Letters,
Journal of Applied Physics,
Physical Review B,
Journal of American Chemical Society,
ACS Nano,
Crystal Growth & Design,
Physica Status Solidi,
Journal of Crystal Growth,
Solid State Electronics,
Applied Physics A,
Thin Solid Films,
Electrochemical and Solid-State Letters.

Proposals:



1. PRIN 2019, Italian MIUR. Serving also as adjudication referee.
2. PRIN 2015, Italian MIUR.
3. Montalcini 2019, Italian MIUR. Referee of 1 proposal.
4. Swedish National Research Council since 2018 in NT-15 Panel. Around 23 full proposals for evaluation and assessment with mandatory presence in person to the final discussion panel.
5. Deutsche Forschungsgemeinschaft DFG.
Referee of 1 DFG Emmy Noether Programme.
6. European Research Council Executive Agency (ERCA) referee for one ERC Advanced Grants evaluation.
7. National Science foundation NSF USA. Referee of 1 proposals.
8. Energy Department USA. Referee of 1 proposals.
9. Austrian Science Fund FWF. Referee of 1 proposals.
10. In the list of Experts for the Horizon2020 and the FTP7 of the European Community.
11. In the list of Experts for Australian Research Council since 2018.
12. In the list of Experts for Rumanian Council.
13. [2010] MRS Spring meeting Student Award Judge.

- **Memberships**

Materials Research Society MRS - Deutsche Physikalische Gesellschaft DPG till 2019.

- **Honors**

1. **Ovshinski Lectureship Award 2017. Prize for Excellence in Chalcogenides** for her exceptional work on epitaxial phase change materials.
2. E/PCOS 2012 excellent oral presentation Award.
3. Helmholtz-Akademie für Führungskräfte 2009-2011.
4. NRW Nano-Konferenz 2008, Dortmund (D) 1. Award for Poster.
5. "Tenure-track"- excellence program of the Forschungszentrum Jülich 2001-2005.
6. Ph.D. scholarship as result of Italian national competition (successful in 2 competitions).

- **Invited talks at international conferences or workshops**

1. **[22-24.10.2018] NVMTS Sendai** Japan (JP)
2. **[24-25.09.2018] European \Phase Change and Ovonic Symposium E/PCOS** Catania Italy (IT)
3. **[17-20.09.2018] EMRS Fall Meeting** Warsaw Poland (PL)
4. **[12-14.09.2018] Nanoinnovation**, Rome (IT)
5. **[06-07.09.2018] Sino German Workshop** in X'ian, (China)
6. **[02-05.09.2018] 20th International Conference on Molecular Beam Epitaxy** Shanghai (China)



7. **[05.10.2017] FISMAT 2017** Trieste (IT)
"Fabrication of Ordered Phase Change Materials: From Fundamental Properties to Applications"
8. **[18.09.2017] EUROMAT 2017** Thessaloniki (GR)
"Investigation via Synchrotron Radiation X-rays of ordered phase change materials"
9. **[05.09.2017] European \Phase Change and Ovonic Symposium E/PCOS** Aachen (D)
Lecturship Award: "Epitaxial Phase-Change Materials"
10. **[05.09.2017] European \Phase Change and Ovonic Symposium E/PCOS** Aachen (D)
Invited given on behalf of S. Cecchi "Molecular Beam Epitaxy and Characterization of Ge-Sb-Te Superlattices"
11. **[06.04.2017] MRS Spring Meeting** in Phoenix (USA)
"Epitaxial Ultra-Thin GeTe Films"
12. **[29-30.09.2016] IWCM2 2016** in Milano (IT)
"Metal - Insulator Transition Driven by Vacancy Ordering in GeSbTe Phase Change Materials investigated via electrical transport, Terahertz and Raman spectroscopy"
13. **[29.08-02.09.2016] ICSFS 2016** in Chemnitz (D)
"Realization of Ordered Phase Change Materials Investigated via Electrical Transport, Terahertz and Raman spectroscopy"
14. **[07.06.2016] CIMTEC 2016**, in Perugia (IT)
"Epitaxial Chalcogenide Superlattices for Memory Application"
15. **[28.03.2016] MRS Tutorial 2016** in Phoenix (USA)
Tutorial MD4 "Phase-Change Materials: From Fundamental Properties to Recent Applications: Single-crystalline phase change materials: from alloys to superlattices"
16. **[07.03.2016] DPG 2016** in Regensburg (D)
"Epitaxial paradigms of van der Waals bonded chalcogenide materials"
17. **[02-03.11.2015] Sino German Workshop Aachen**, in Aachen (D)
"Ordered phase change materials grown by molecular beam epitaxy for memory applications"
18. **[06-10.04.2015] MRS Spring Meeting** in San Francisco (USA)
"Role of substrate preparation in order to employ molecular beam epitaxy grown phase change materials for devices"
19. **[22-26.09.2014] 100th National Congress of the Italian Physical Society** in Pisa (IT)
"Epitaxial registry between 2-dimensional bonded materials and 3-dimensional bonded substrates"
20. **[08-10.09.2013] European \Phase Change and Ovonic Symposium E \PCOS 2013** Berlin (D)
"Epitaxial GeSbTe grown on Si(111)"



21. **[21-26.07.2013] Int. Conference on Defects in Semiconductors 2013** in Bologna (IT) "Growth of III-Nitride-Based LED Nanowires"
22. **[24-28.06.2013] Fundamentals of Laser Assisted Micro- & Nanotechnologies** St. Petersburg – Russia
"Switching of Epitaxial Phase Change Materials by short laser pulses"
23. **[27-31.05 2013] EMRS Spring meeting** in Strasbourg (FR)
"Growth and Applications of III-Nitride Nanowires"
24. **[01-06.03.2013] MRS Spring Meeting** in San Francisco (USA)
"On the epitaxy of phase-change materials"
25. **[11-13.03.2013] DPG Spring meeting** Regensburg (D)
"III-nitride nanowires: From growth phenomena to light emitting diodes"
26. **Award** for the excellent presentation
[08-10.07.2012] European Phase Change and Ovonic Symposium E\PCOS 2012 Tampere (Finland)
"Epitaxial phase change materials: growth, structure and phase transition"
27. **[10.05.2012] NTH nano School for contacts in nanosystems Spring workshop** Goslar (D)
"III-nitride nanowires: growth, contact issues and transport properties"
28. **[07-11.05.2012] "Epitaxial semiconductors on patterned substrates and novel index surfaces" ESPS-NIS 9**, Eindhoven, The Netherlands (NL)
"Control of position, size, and shape of GaN nanowires by selective area growth"
29. **[19-23.06.2011] 16th International Semiconducting and Insulating Materials Conference (SIMC-XVI)** Stockholm, (SW)
"Growth and characterization of GaN nanowires"
30. **[04-05.02.2011] OPTOTRANS2011** Berlin (D)
"Size dependences III-nitride nanowires"
31. **[24-27.01.2011] SPIE Photonic West 2011** San Francisco (USA)
"Growth and optoelectrical properties of single III-nitride nanowires"
32. **[27.09-01.10.2010] Nanowire 2010** Crete (GR)
"Size dependence in nucleation growth and electrooptical properties of III-nitride nanowires"
33. **[04-08.07.2010] ISGN3 2010** Montpellier (FR)
"III-nitrides nanowires: growth and electrooptical properties"
34. **[28.06-02.07.2010] Nanosea 2010** Cassis (FR)



"III-nitride nanowires: from nucleation to optoelectrical measurements"

35. **[05-09.04.2010] MRS Spring meeting 2010** San Francisco (USA)

"Optical and electrical properties of single InN nanowires: influence of Mg and Si doping"

36. **[04-06.03.2009] PDI Topical Workshop on MBE-grown Nitride Nanowires**, Berlin (D)

"Self-assembled GaN and InN nanowires: doping effects"

37. **[15-16.09.2008] 3rd International Workshop on Nanowire Growth Mechanisms**, Duisburg-Essen (D)

"Growth and characterization of Si and Mg doped GaN and InN nanowires"

38. **[15-17.10.2007] 397. WE-Heraeus Seminar "Semiconducting Nanowires: Physics, Materials and Devices"**, Bad Honnef (D)

"Diameter dependent properties of GaN nanowires"

- **Invited talks and invited lectures at Institutions/companies**

1. **[22.02.2019] Lund Nanoscience colloquium**, Lund (SW)

2. **[27.03.2018] CNR IMM Catania** (IT)

"Phase Change Materials: Strain Engineering"

3. **[11.12.2017] EPFL Lausanne** (CH)

"Basic Research and applied perspectives of chalcogenide phase-change materials grown by molecular beam epitaxy"

4. **[02.10.2017] CNR IMM Agrate Milano** (IT)

"Phase Change Materials: Ordered Phases Grown Epitaxially"

5. **[21.07.2017] Politecnico di Milano** (IT)

"Performance of Phase Change Memory Cells Grown by Molecular Beam Epitaxy"

6. **[22.03.2017] University of Bologna** (IT)

"GeTe-Sb₂Te₃ Based Materials: From van der Waals Epitaxy to Applications"

7. **[25.10.2016] CNR ISM Roma Tor Vergata**, Rome (IT)

"Phase change materials for non-volatile memory application"

8. **[08.06.2016] L-foundry**, Avezzano (IT)

"Exploiting the potential of advanced epitaxial structures grown by molecular beam epitaxy"

9. **[25.05.2015] Rome University of Tor Vergata**, Rome (IT)

"Chalcogenide phase-change materials grown by molecular beam epitaxy: Basic Research and applied perspectives"

10. **[03.04.2015] Micron Technology Inc. Friday Forum**, Boise (USA)

"Exploiting the potential of chalcogenide superlattice memory cells grown by molecular beam epitaxy"



11. **[09.02.2015] Fritz Haber Institut**, Berlin (D)
„Role of substrate to epilayer interface for the synthesis of phase change materials for devices”
12. **[05.11.2013] RWTH Aachen Lecture**, Aachen (D)
“Growth and characterization of epitaxial phase change materials”
13. **[07.11.2012] RWTH Aachen Lecture**, Aachen (D)
“Epitaxial phase change materials: growth, structure and phase transition”
14. **[25.06.2012] Università degli Studi di Milano Bicocca**, Milano (IT)
“Epitaxial phase change materials: growth, structure and phase transition”
15. **[20.07.2011] Micron Technology Inc.**, Milan (IT)
“Design of phase change materials through epitaxial growth”
16. **[05.07.2011] Walter Shottky Institut, Technische Universität München**, München (D)
“III-nitride Nanowires for Optoelectronic Applications: Growth and Characterization”
17. **[24.06.2011] Ferdinand-Braun-Institut**, Berlin (D)
“Growth and Characterization of III-nitride Nanowires”
18. **[27.10.2008] Physikalisches Kolloquium at the RWTH Aachen**, Aachen (D)
“Halbleiter-Nanodrähte: Physik zwischen Oberfläche und Volumen”
19. **[17.06.2008] Seminar Helmholtz-Zentrum Berlin für Materialien und Energie**, Berlin (D)
“Growth and characterization of III-N based Nanowires”
20. **[22.05.2008] Seminar IV. Physics Institute University of Göttingen**, Göttingen (D)
“Role of Sizes on GaN Nanowires Properties”
21. **[29.03.2008] Kolloquium Institut für Kristallzüchtung**, Berlin (D)
“Growth and Optoelectric Properties of III-N based Nanowires”
22. **[14.11.2007] Seminar University of Augsburg – Chair in Experimental physic I**, Augsburg (D)
“Size effects on Growth and Optoelectric Properties of GaN Nanowires”
23. **[13.11.2006] University of Bologna – Dipartimento di Fisica**, Bologna (I)
“III-nitride nanowires: growth, optical measurements and electrical transport”
24. **[21.07.1999] II. Physikalisches Institut RWTH Aachen** (D)
“Ge/Si heterostructures: STM studies of Ge/Si(111) and near infrared photodetectors on Si(100)”
25. **[30.06.1999] Institut d'Electronique Fondamentale** Université Paris Sud Orsay (FR)
“Ge/Si heterostructures: STM studies of Ge/Si(111) and near infrared photodetectors on Si(100)”



26. [27.10.1998] IBM T. J. Watson Research Center, Yorktown Heights (NY) USA
"S.T.M. studies of Ge/Si films on Si(111): intermixing, strain relaxation and island formation"

• **Miscellaneous Presentations and conference participation**

1. [28-29.10.2017] IWCM2 Milan, (IT)

2. [30.08.2017] NVMTS Aachen, (D)

Poster: "Exploiting the potential of advanced phase change material epitaxial structures" R. Calarco, S. Cecchi, J. E. Boschker, E. Zallo

3. [08-09.09.2015] E\PCOS Amsterdam (NL)

Oral: "Growth onset study of GeTe ultra-thin- films" R. Calarco, R. Wang, J.E. Boschker, M. Wuttig

4. [09-10.09.2014] E\PCOS Marseille (FR)

Oral: "Control of the epitaxial registry between chalcogenide films and Si(111)" Jos E. Boschker, Rui Ning Wang and Raffaella Calarco

5. [09-13.04.2012] MRS spring meeting San Francisco (USA)

Oral: "Growth Morphology and Structure of GeTe/Sb₂Te₃ heterostructures grown on Si(111) substrates" P. Karthick, A. Giussani, P. Rodenbach, M. Hanke, R. Calarco, and H. Riechert

6. [22-26.05.2011] ISCS Berlin (D)

Oral: "Selective area growth of GaN nanowires using molecular beam epitaxy" T. Gotschke, T. Schumann, F. Limbach, T. Stoica, R. Calarco.

Oral: "Growth of epitaxial Ge_{0.46}Te_{0.54} on Si(111)" P. Karthick, R. Calarco, F. Grosse, W. Braun, H. Riechert

7. [24-29.04.2011] MRS spring meeting San Francisco (USA)

Oral: "Selective area growth of GaN nanowires using molecular beam epitaxy" T. Gotschke, T. Schumann, F. Limbach, T. Stoica, R. Calarco

8. [07-09.12.2009] ICON Atlanta (USA)

Oral: "Doping effects of GaN and InN nanowires" T. Stoica, F. Limbach, T. Gotschke, R. Caterino, E. Sutter, K. Jeganathan, T. Richter, M. Marso, R. Calarco

9. [29.11-04.12.2009] MRS fall meeting Boston (USA)

Oral: "p-doping of GaN and InN nanowires: growth and optical properties" T. Stoica, F. Limbach, T. Gotschke, R. Caterino, E. Sutter, R. Calarco

10. [26-27.10.2009] 4th International Nanowire Growth Workshop Paris (FR)

Oral: "Doping effects of MBE-grown InN NWs by means of Si and Mg" T. Gotschke, F. Limbach, R. Caterino, T. Stoica, K. Jeganathan, E. Sutter R. Calarco

Poster: "Influence of Mg-doping on growth and optical properties of GaN-nanowires" F. Limbach, T. Soica, R. Caterino, E. Schäfer-Nolte, T. Gotschke E. Sutter and R. Calarco



11. **[18-23.10.2009] ICNS8** Jeju (Korea)

Poster: "Si and Mg doping in GaN nanowires: from nucleation to electrical measurements" T. Stoica, R. Caterino, F. Limbach, T. Gotschke, R.J. Meijers, T. Richter, M. Marso, H. Lüth, R. Calarco

12. **[08-11.06.2009] E-MRS** Spring meeting 2009, Strasbourg (F)

Oral: "Si and Mg doping of GaN and InN self-assembled nanowires" R. Calarco, T. Stoica, E. Sutter, E. Schäfer-Nolte, F. Limbach, T. Gotschke, R. Caterino, T. Richter, M. Marso, R. K. Debnath, K. Jeganathan

13. **[23-25.02.2009] DPG** Spring meeting 2009, Dresden (D)

Oral: "GaN and InN nanowires: Si and Mg doping" T. Stoica, E. Sutter, R.J. Meijers, R. K. Debnath, K. Jeganathan, T. Richter, M. Marso, H. Lüth, R. Calarco

14. **[08-11.03.2009] Euro MBE 2009**, Zakopane, (PL)

Poster: "From GaN Nanodot template to GaN Nanowires" R. Calarco, R. K. Debnath, T. Stoica, A. Besmehn, K. Jeganathan, E. Sutter, R. Meijers, H. Lüth, D. Grützmacher

Poster: "Si and Mg Doped GaN and InN Nanowires" R. Calarco, T. Stoica, R.J. Meijers, E. Sutter, T. Richter, K. Jeganathan, R. K. Debnath, M. Marso, H. Lüth, D. Grützmacher

15. **[21-24.09.2008] ISCS**, Rust (D)

Oral: "GaN nanowires for nano-optoelectronic applications"

R. Calarco, R.J. Meijers, T. Stoica, T. Richter, K. Jeganathan, R. K. Debnath, M. Marso, E. Sutter, H. Lüth, L. Polenta, A. Cavallini, M. Rossi, and D. Grützmacher

16. **[03-08.08.2008] ICMBE 2008**, Vancouver (Canada)

Poster: "Photoconductivity investigation of GaN nanowires: focus on localised states" R. Calarco, T. Stoica, R.J. Meijers, M. Marso, T. Richter, H. Lüth, L. Polenta, A. Cavallini, M. Rossi

17. **[13.-16.05.2008] Nanoelectronics Days**, Aachen (D)

18. Oral: "GaN and InN Nanowires for Nano-Optoelectronics"

19. R. Calarco

20. **[28.04.2008] Workshop LETI-CEA / IBN1-Jülich**, Grenoble (FR)

Oral: "Self assembled III-N based nanowires: growth and characterization" R. Calarco, T. Stoica, R.J. Meijers, T. Richter, K. Jeganathan, R. K. Debnath, M. Marso, E. Sutter, H. Lüth, L. Polenta, A. Cavallini, M. Rossi, D. Grützmacher

21. **[24-28.03.2008] MRS08** Spring Meeting 2008, San Francisco (USA)

Oral: "Si-doping Effect on GaN and InN MBE-grown Nanowires" R. Calarco, R.J. Meijers, T. Stoica, T. Richter, K. Jeganathan, R. K. Debnath, M. Marso, E. Sutter, H. Lüth

22. **[25-29.02.2008] DPG** Spring meeting 2008, Berlin (D)

Oral: "Franz-Keldysh effect in GaN nanowires" R. Calarco, A. Cavallini, L. Polenta, M. Rossi, T. Stoica, R. J. Meijers, T. Richter, H. Lüth

23. **[18-19.02.2008] NRW Nano-Konferenz**, Dortmund (D)



a. **Award for Poster:**

"GaN and InN Nanowires for Information Technology" R. Calarco, R. J. Meijers, T. Stoica, T. Richter, R. K. Debnath, E. Sutter, M. Marso, H. Lüth, D. Grützmacher

24. **[01-02.10.2007] Deutscher MBE-Workshop 2007**, Jülich (D)

Oral: "Nucleation and Growth of GaN Nanowires on Si(111)" R. Calarco, T. Stoica, R. K. Debnath, R. J. Meijers, E. Sutter, H. Lüth

25. **[04-08.03.2007] Euro MBE 2007**, Sierra Nevada, (E)

Poster: "Size Dependence of GaN and InN Nanowire Properties" R. Calarco, R. Meijers, T. Stoica, T. Richter, R. K. Debnath, E. Sutter, M. Marso, H. Lüth

26. **[11-13.10.2006] Nanoelectronics Days**, Aachen (D)

Poster: "Self-assembled Group-III Nitride Nanowires Grown by Molecular Beam Epitaxy" R.J. Meijers, R.K. Debnath, T. Stoica, T. Richter, R. Calarco and H. Lüth

27. **[19.09.2006] Symposium on Semiconductor Nanowires** – Eindhoven, (NL)

Poster: "Size-dependent electrical characterisation of GaN and InN Nanowires" T. Richter, M.Marso, R.J. Meijers, R. Calarco and H. Lüth

Poster: "Self-assembled group-III Nitride Nanowires grown by MBE" R.J. Meijers, T. Richter, R.K. Debnath, T. Stoica, R. Calarco and H. Lüth.

28. **[04.04.2006] VISEL Workshop** Jülich (D)

Oral: "Nitrides based MBE-whiskers" R. Calarco, M. Marso, R. Meijers, T. Richter, K.R. Debnath, T. Stoica, A.I. Aykanat, N. Thillozen, H. Lüth

29. **[10-11.03.2005] Spin-FET Workshop 2005**, Jülich (D)

Oral: "Epitaxial Growth of Fe on GaN for spintronic applications" R. Calarco, R. Meijers, M. von der Ahe, V. Guzenko, H. Lüth, M. Buchmeier, and D. Bürgler

30. **[03-09.03.2005] DPG Spring meeting 2005**, Berlin (D)

Oral: "Electrical Transport in GaN-whiskers" R. Calarco, R. Meijers, T. Richter, A.I. Aykanat, T. Stoica, M. Marso, and H. Lüth

31. **[09-11.02.2005] Nanoelectronics Days**, Aachen (D)

Poster: "Epitaxial Growth of Fe on GaN for spintronic applications" R. Meijers, M. von der Ahe, V. Guzenko, R. Calarco, H. Lüth

Poster: "Epitaxial Growth and Structural Characterization of GaN Nanowhiskers" T. Richter, R. Meijers, N. Thillozen, R. Calarco, T. Stoica, H. Lüth

32. **[04-07.11.2004] DPT04**, Aachen (D)

Oral: "FZJ`s Innovative Programme for Promoting Talented Women in Science" R.Calarco

Poster: "Structural and Magnetic Studies of thin epitaxial Fe(110) on GaN(0001)" R. Calarco, R. Meijers, M. v. d. Ahe, N. Kaluza, V. A. Guzenko, N. Thillozen, Th. Schäpers, H. Lüth, M. Buchmeier, D. Bürgler.



33. **[20-22.10.2004] ASDAM'04** Conference, Smolenice, (Slovakia)
Oral: "GaN Nanocolumns on Si(111) Grown by Molecular Beam Epitaxy" R. Calarco, M. Marso, R. Meijers, T. Richter, A.I. Aykanat, T. Stoica and H. Lüth.
34. **[19-23.07.2004] IWN 2004**, Pittsburgh, (USA)
Poster: "Epitaxial Growth of Fe on GaN(0001): Structural and Magnetic Properties" R. Calarco, R. Meijers, N. Kaluza, V. A. Guzenko, N. Thilloßen, Th. Schäpers, H. Lüth, M. Fonin, S. Krzyk, R. Ghadimi, B. Beschoten, G. Güntherodt
Poster: "Piezoresponse Force Microscopy for Imaging of GaN" R. Calarco, R. Meijers, T. Stoica, H. Lüth
35. **[08-12.03.2004] DPG** Spring meeting 2004, Regensburg (D)
Poster: "Growth of GaN on Si(111) by Molecular Beam Epitaxy" R. Meijers, R. Calarco, H. Lüth
36. **[03-04.04.2003] VISEL** Workshop, Aachen (D)
Oral: "MBE and CVD growth: basics and technology" R. Calarco
37. **[17.12.2001] SUBMAGDEV** European TMR Network meeting, Cavendish Laboratory Cambridge (UK)
Oral: "SUBMAGDEV Activities in Aachen" R. Calarco, U. Rüdiger, G. Güntherodt
38. **[12-13.10.2001] SUBMAGDEV** European TMR Network meeting, University of Glasgow (UK)
Oral: "Half metallic ferromagnetic materials for magneto-electronic applications" R. Calarco, Y. Dedkov, M. Fonine, C. König, U. Rüdiger, G. Güntherodt
39. **[20-21.04.2001] SUBMAGDEV** European TMR Network meeting, RWTH Aachen (D)
Oral "Magnetic Tunnel Junctions: Oxidation and Characterization" R. Calarco, J.O. Hauch, H. Kittur, K. Samm, M. Sperlich, M.R. Ghadimi, U. Rüdiger, and G. Güntherodt
40. **[02-05.04.2001] Mass Innovative Storage Technologies 2001 Conference**, Grenoble (FR)
Oral: "Compositional and Electrical Characterization of UV-light oxidized Co/AlO_x/Co/Si(100) Magnetic Tunnel Junctions (MTJs)" R. Calarco, J.O. Hauch, H. Kittur, K. Samm, U. May, M.R. Ghadimi, U. Rüdiger G. Güntherodt
41. **[24-29.06.2001] MML'01 Conference**, Aachen (D)
Poster: "Co/AlO_x/Co/Si(100) Magnetic Tunnel Junctions with UV-light assisted oxidized barriers" R. Calarco, J.O. Hauch, H. Kittur, K. Samm, U. May, M.R. Ghadimi, U. Rüdiger G. Güntherodt
42. **[29-30.09.2000] SUBMAGDEV** European TMR Network meeting, Gif sur Yvette (FR)
Oral: "Subcomponents for Magneto - Electronic Devices" R. Calarco, U. Rüdiger, U. May, M. Rabe, H. Kittur, J. Hauch, M. Fraune, C. König, K. Samm, G. Güntherodt
43. **[14-18.06.1999] INFM Meeting**, Catania (IT)
Poster: "Auger -Photoelectron Coincidence Spectroscopy Study on Si" R. Calarco, M. Fiordelisi, P. Calicchia, F. Scarinci, S. Lagomarsino.
44. **[15-19.09.1997] Silicon Heterostructures: from physics to devices**, Barga (IT),



Oral: "Thick pure Ge films for photodetectors", F. Scarinci, M. Fiordelisi, R. Calarco, S. Lagomarsino, L. Colace, G. Masini, G. Barucca, S. Coffa, S. Spinella;

Poster: "S.T.M. studies of Ge/Si films on Si(111): from layer by layer to quantum dots", N. Motta, A. Sgarlata R. Calarco, Q. Nguyen, J. Castro Cal, P. Proposito, M. De Crescenzi and A. Balzarotti.

45. [22-25.04.1996] **15th General Conference of the Condensed Matter Division**, Baveno (IT)

Poster: "S.T.M. studies of the epitaxial growth of Ge-Si alloy on Silicon", N. Motta, R. Calarco, M. Fanfoni, Q. Nguyen, A. Sgarlata, M. De Crescenzi, J. Derrien, and A. Balzarotti.

- **Schools**

[04-06.02.1997] "P.G.Orsini" – "Microstructural characterisations", Trento (Italy).

[29.09.-10.10.1997] "VII Materials Science School", Genova (Italy)

- **Teaching activity**

1. 10.2017 "Introduction to crystal growth" University of Rome Tor Vergata (Physics), 6 hours lectures.
2. 10.2016 "Introduction to crystal growth" University of Rome Tor Vergata (Physics), 6 hours lectures.
3. Winter Semester (WS) 2011 Ü2 exercises "Solid State Physics I" Humboldt University Berlin (Physics).
4. Summer Semester (SoS) 2010 Ü2 exercises "Solid State Physics II" RWTH Aachen (Physics).
5. 07-11.09.2009 (in the lecture free time) P5 JARA-FIT Ferienpraktikum Nanoelektronik und Vorgeschriftene Praktikum of the RWTH Aachen (Physics) Experiment 11: GaN Nanowires
6. SoS 2009: V2Ü1 "Physics of semiconductors", RWTH Aachen (lecturer: Prof. Dr. D. Grützmacher), substitution.
7. WS 2008/2009: V4Ü4P5 "Physics I" for natural scientists, mathematicians und engineers (approx. 400 students) RWTH Aachen (lecturer: Prof. Dr. D. Grützmacher), substitution of 43% of lectures.
8. WS 2008/2009: Supervision of two students in the Student-Seminar "Experimental Methods in Solid State Physics" with the subjects: "Growth of III-V Semiconductor-Nanowires" and "Electric transport in III-V Semiconductor-Nanowires". (together with Prof. Dr. H. Lüth).
9. 08-12.09.2008 (in the lecture free time) P5 CNI Praktikum Nanoelektronik und Vorgeschriftene Praktikum of the RWTH Aachen (Physics) Experiment 11: GaN Nanowires (together with Dr. T. Stoica).
10. SoS 2008: V2 "Physics of semiconductors", RWTH Aachen (lecturer: Prof. Dr. D. Grützmacher), substitution on the subjects: band structure, transport in semiconductors.
11. WS 2007/2008: V2 "Physics of semiconductors", RWTH Aachen (lecturer: Prof. Dr. D. Grützmacher), substitution on the subjects: band structure, transport in semiconductors.



12. 17-21.09.2007 (in the lecture free time) P5 CNI Praktikum Nanoelektronik, Experiment 11: GaN-Nanowires (together with Dr. M. Marso).
13. SoS 2007: V2Ü1 "Semiconductor devices" for students of Informatic, RWTH Aachen (lecturers: Priv. Doz. Dr. Th. Schäpers, Prof. Dr. A. Vescan), exercises (subjects: main features of quantum mechanics, bandstructure, transport in semiconductors, pn-junction, transistors).
14. SoS 2004: Correction of exams for the lecture "Semiconductor devices" for students of Informatic, RWTH Aachen (lecturer: Prof. Dr. H. Lüth).

- **Ph.D. Thesis Supervision**

1. Erdi Kusdemir Ph.D. Physics at the Humboldt University in Berlin since June 2016.
2. Co-supervision Pawel Wolni Ph.D. Physics at the University of Warsaw since Mai 2015.
3. Torsten Ernst Ph.D. Physics at the Humboldt University in Berlin since Mai 2015.
4. "Investigation of order-disorder transition in epitaxial phase change materials" by V. Bragaglia Ph.D. in Physics at the Humboldt University in Berlin in July 2017.
5. "MBE growth of crystalline superlattices on the base of phase change materials" by R. Wang Ph.D. in Physics at the Humboldt University in Berlin in March 2017.
6. "MBE growth of crystalline phase change materials" by K. Perumal Ph.D. in Physics at the Humboldt University in Berlin in July 2013.
7. "Switching of Epitaxial Phase Change Materials" by P. Rodenbach Ph.D. in Physics at the Humboldt University in Berlin in October 2012.
8. "Steps towards a GaN nanowire based light emitting diode and its integration with Si-MOS technology" by F. Limbach, Ph.D. in Physics at the Humboldt University in Berlin in July 2012.
9. "Untersuchungen zum geordneten Wachstum von III-Nitrid Nanodrähten" by T. Gotschke, Ph.D. in Physics at the Humboldt University in Berlin in February 2012.
10. "Growth of Undoped and Doped III-Nitride Nanowires and Their Characterization" by R.K. Debnath, Ph.D. in Electronic Engineering at the Faculty of Electrotechnique and Information technology of the RWTH Aachen in February 2009.
11. "Growth and Characterisation of Group-III-Nitride-based Nanowires for Devices" by R. Meijers, Ph.D. in Physics at the Faculty of Mathematic, Informatic and Natural Science at the RWTH Aachen in August 2007.

- **Master Thesis Supervision**

1. "Epitaxial growth and characterization of hexagonal GaTe" A. Pianetti, Master Thesis in Materials Science at the Area of Mathematic, Informatic and Natural Science at Tor Vergata University in Rome in March 2019.



2. "Epitaxial growth and annealing of Ge-rich GeSbTe alloys grown on Si(111)" F. Di Biagio, Master Thesis in Materials Science at the Area of Mathematic, Informatic and Natural Science at Tor Vergata University in Rome in October 2018.
 3. "Annealing of amorphous GeSbTe grown on Si(111)" V. Bragaglia, Master Thesis in Physics at the Area of Mathematic, Informatic and Natural Science at Tor Vergata University in Rome in December 2013.
 4. "Growth of high Al content heterostructures" by M. Musolino, Master Thesis in Physics at the Area of Mathematic, Informatic and Natural Science at Tor Vergata University in Rome in December 2011.
 5. "Selective area growth of GaN nanowires on patterned substrates" by T. Schumann, Master Thesis in Physics at the Faculty of Mathematic, Informatic and Natural Science at the RWTH Aachen in September 2010.
 6. "Doping effects on GaN and InN nanowires" by R. Caterino, Master Thesis in Material Science at the Faculty of Mathematic, Informatic and Natural Science at Tor Vergata University in Rome December 2009.
 7. "Raman scattering in self-assembled III-nitride nanowires" by E. Schäfer-Nolte, Master Thesis in Physics at the Faculty of Mathematic, Informatic and Natural Science at the RWTH Aachen in October 2009.
 8. "Molekularstrahlepitaxie von GaN-Nanodrähten und deren Charakterisierung" by T. Richter, Master Thesis in Physics at the Faculty of Mathematic, Informatic and Natural Science at the RWTH Aachen in June 2005.
 9. "Herstellung III-N-basierender Halbleiterschichten und Heterostrukturen im Hinblick auf mögliche Spinelektronik-Anwendungen" by R. Meijers, Master Thesis in Physics at the Faculty of Mathematic, Informatic and Natural Science at the RWTH Aachen in March 2004.
- **Bachelor Thesis Supervision**
 1. "Raman investigation of Ge-rich GeSbTe alloys " C. Petrucci, Bachelor Thesis in Materials Science at the Area of Mathematic, Informatic and Natural Science at Tor Vergata University in Rome in May 2020.

Institutional offices and roles in Universities and/or public and private institutions with scientific and/or technology transfer aims

- [2019] **Member of the appointment committee** BANDO N. 368.38 RIC – AREA STRATEGICA MICRO-NANOELETTRONICA, SENSORISTICA, MICRO-NANOSISTEMI (IT) - CONCORSO PUBBLICO, PER TITOLI ED ESAMI, PER L'ASSUNZIONE CON CONTRATTO DI LAVORO A TEMPO PIENO E INDETERMINATO DI N. 6 UNITÀ DI PERSONALE PROFILO RICERCATORE - III LIVELLO PROFESSIONALE - PRESSO STRUTTURE DEL CONSIGLIO NAZIONALE DELLE RICERCHE. Decreto di nomina dell'11/02/2019.
- [2019] **Member of the appointment committee** for the **Paul-Drude Institute for Solid State Electronics**, Berlin (DE).
- [2018] **External member and President of the adjudication committee** for the **Ph.D. defense of Olaf Ultin** at Lund University, Lund (SW).



- [2011-2018] At the **Paul-Drude-Institute (PDI)** she writes contributions for the past present and future **scientific goals and financial annual reports** of the research areas she belongs to with her activity.
- [2018-08/2019] Elected **equal opportunity officer** of the PDI.
- [2011-2019] She performs yearly **appraisal interviews** with all her group members.
- [2017-08/2019] Elected **vice speaker of the scientists** of the PDI.
- [2017] Participation to a restricted panel to write a **new mission and strategy paper** for the **PDI** submitted to the Audit Commission in 2017.
- [2017] **Wrote a part of the Audit report** for the **PDI** submitted to the Advisory board.
- [2017] Co-author of **two written contributions** for the **PDI annual report**.
- [2017] Co-author of **two Poster presentations** for the **PDI annual advisory board meeting**.
- [2012-2017] **Helmholtz-Zentrum Berlin (HZB)** scientific selection committee for proposal of the Synchrotron Radiation Source BESSY II. Appointment over 3 years [2012-2014] – Appointment renewed for [2015-2017].
- [2017] **Advisory opinion for the enrollment of Dr. Ing. Mario Laudato** from Politecnico di Milano at Intermolecular in San José (USA).
- [2017] **External member of the adjudication committee for the Ph.D. defense of Valerio Latini and Saisameera Mitta** at the University of Rome Tor Vergata, Rome (IT).
- [2016] **External member of the adjudication committee for the Ph.D. defense of Alexander Berg** at Lund University, Lund (SW).
- [2016] **Assessment performance for Dr. Ing. A. Redaelli for Micron Technology (USA)**.
- [2016] Co-author of **one written contribution** for the **PDI annual report**.
- [2016] Co-author of **one Poster presentation** for the **PDI annual advisory board meeting**.
- [2015] **External member of the adjudication committee for the Ph.D. defense of Silvia Gabardi and Davide Rotta** at Università degli Studi di Milano Bicocca, Milano (IT).
- [2015] **Advisory opinion for the enrollment of Dr. Ing. Nicola Ciocchini** from Politecnico di Milano at Intel Corporation (USA).
- [2015] Co-author of **three written contributions** for the **PDI annual report**.
- [2015] Co-author of **three Poster presentations** for the **PDI annual advisory board meeting**.



- [2014] Apart from the annual advisory board evaluation of **PDI**, the program activities of the institute are deeply evaluated every 7 years. Within the **evaluation in 2014** R. Calarco was selected to **write** a part of the scientific activity contributions, and participated to all **preparation and strategy meetings**. Furthermore she was chosen to **present** two posters on her own scientific activities.
- [2014] Co-author of **one written contribution** for the **PDI annual report**.
- [2014] Co-author of **one Poster presentation** for the **PDI annual advisory board meeting**.
- [2013] **External member of the adjudication committee for the Ph.D. defense of Karla Hillerich** at Lund University, Lund (SW).
- [2013] **External endorsement letter for the appointment of Prof. Dr. Robert Simpson** at Singapore University of Technology and Design (SGP).
- [2012] Co-author of **two written contributions** for the **PDI annual report**.
- [2012] Co-author of **two Poster presentations** for the **PDI annual advisory board meeting**.
- [04-2011] Participated to a two days **strategy meeting for the scientific future of PDI**.
- [2011] **External adjudication referee for an appointment committee** for Lund University, Lund (SW) – Appointment of Prof. Dr. Jonas Johansson.
- [2011] Co-author of **one written contribution** for the **PDI annual report**.
- [2011] Co-author of **one Poster presentation** for the **PDI annual advisory board meeting**.
- [2010] She participated as **Coordinator of the Outreach/International Recruiting** to the writing of a **proposal for a Graduate School** dealing with Fundamentals of Future Information Technology jointly by the RWTH **Aachen University and Forschungszentrum Jülich (FZJ)** under the Jülich Aachen Research Alliance (JARA). The proposal was intended for the Excellence Initiative funded by the German federal and state governments through the DFG – German research association.
- As part of **programme-oriented funding (POF)** within the **Helmholtz Association**, the program activities of institutes at **Forschungszentrum Jülich** are every 5 years evaluated. Within **POF-1 in 2004** R. Calarco was selected to **write** a part of the activity contributions of her Institute, and participated to all **preparation and strategy meetings** usually held over a period of about seven months. Furthermore she was chosen to **participate** as young scientist in the panel headed by P. Gruenberg (Nobel prize in Physics 2007) for the **spintronic discussion**. Within **POF-2 in 2009** she contributed as well to the **written part** of the report and participated to the **strategy and preparatory meetings**. She was further on chosen to present a **Poster on her activity on nanowires** (the number of posters to be presented was very limited, and dedicated only to relevant scientific highlights).
- She was selected to write contributions for the **annual report** of the **Center of Nanoelectronic Systems for Information Technology** of the **Forschungszentrum Jülich** for the years **2005, 2006, 2007, 2009**.



- [2005] **Member of the appointment committee** for the Institute of Thin Films and Heterointerfaces 3 (ISG 3) Forschungszentrum Jülich, Jülich (DE) – Appointment of Prof. Dr. S. Tautz.

Complete list of all publications

Books

1. "Semiconductor nanowires: Materials, synthesis, characterization and applications"
Edited by: Jordi Arbiol and Qihua Xiong
Woodhead Publishing ELSEVIER ISBN 9781782422532
2015
Chapter "III-V semiconductor nanowires: nitrides" P. Dogan, C. Chèze and R. Calarco
2. "Future Trends in Microelectronics: Frontiers and Innovations"
Serge Luryi (Author), Jimmy Xu (Author), Alexander Zaslavsky (Author)
1st Edition, July 2013 ed. Wiley, 424 p ISBN: 978-1-118-44216-6
Chapter "Toward Spin Electronic Devices Based on Semiconductor Nanowires" S. Heedt, I. Wehrmann, K. Weis, H. Hardtdegen, D. Grützmacher and Th. Schäpers C. Morgan, D. E. Bürgler, R. Calarco.
3. Trends in Nanophysics Theory, Experiment and Technology
Series: Engineering Materials
Aldea, Alexandru; Bârsan, Victor (Eds.)
1st Edition., September 2010, 250 p., ISBN: 978-3-642-12069-5
Chapter "GaN and InN nanowires: growth and optoelectronic properties" T. Stoica, E. Sutter, and R. Calarco
4. Future trends in Microelectronics, From Nanophotonics to Sensors to Energy
Serge Luryi (Author), Jimmy Xu (Author), Alexander Zaslavsky (Author)
1st Edition, July 2010 ISBN: 0470551372 / 9780470551370
Chapter "Nanowires: Technology, Physics and Perspectives" D. Grützmacher, Th. Schäpers, S. Mantl, S. Feste, Q. T. Zhao, H. Hardtdegen, R. Calarco, M. Lepsa, and N. Demarina.

Press archives

1. **[11.12.2016]** EDITORS' SUGGESTION "Spin Mapping of Surface and Bulk Rashba States in Ferroelectric - GeTe(111) Films" H. J. Elmers *et al* **Phys Rev B** 94, 201403(R) 2016.
2. **[02.2016]** highlighted by Editor's picks "Evidence for spin to charge conversion in GeTe(111)" C. Rinaldi, J. C. Rojas-Sánchez, R. Wang, Y. Fu, S. Oyarzun, L. Vila, S. Bertoli, M. Asa, L. Baldrati, M. Cantoni, J-M. George, R. Calarco, A. Fert, R. Bertacco **Appl. Phys. Lett. Mat.** 4, 032501 (2016)
3. **[03.2011]** "Influence of the adatom diffusion on selective growth of GaN nanowire regular arrays" selected for Virtual Journal of Nanoscale Science & Technology Volume 23 / Issue 11.
4. **[06.12.2010]** "Probing the electron density in undoped, Si-doped, and Mg-doped InN nanowires by means of Raman scattering" Virtual Journal of Nanoscale Science & Technology.
5. **[13.06.2008]** "Acoustic charge transport in GaN nanowires" LAB TALK at www.nanotech.org
<http://nanotechweb.org/cws/article/lab/34595>.
6. **[04.2006]** "Nanowires, nanowhiskers and green LEDs" III-Vs Review 19(3) 43 (April 2006).



Patents

1. US patent number US10553792B2 Titled "TEXTURED MEMORY CELL STRUCTURES" filed on July 29th 2016 Inventors: A. Redaelli, M. Boniardi, E. Varesi, R. Calarco and J.E. Boschker, Current Assignee Micron Technology Inc. Sb_2Te_3 buffer layer or PCM memory - **rights sold to Micron Technology**
2. Nanowire Photodetector (DE 102005006026.9-33, PCT/DE2006/000071).

Submitted articles

1. "The carrier diffusion length in GaN -- a cathodoluminescence study. I: Temperature-dependent generation volume" Uwe Jahn, Vladimir M. Kaganer, Karl K. Sabelfeld, Anastasya E. Kireeva, Jonas Lähnemann, Carsten Pfüller, Caroline Chèze, Klaus Biermann, Raffaella Calarco, Oliver Brandt arXiv:2002.08713 (2020)

Refereed articles

1. "Crystallization of nano amorphized regions in thin epitaxial layer of $Ge_2Sb_2Te_5$ " Giuseppe D'Arrigo A.M. Mio, J. E. Boschker, A. Meli, S. Cecchi, E. Zallo, A. Sciuto, M. Buscema, E. Bruno, R. Calarco and E. Rimini **J. Phys. D: Appl. Phys.** in press (2020) DOI: 10.1088/1361-6463/ab71ae
2. "Disordering processes of $GeSb_2Te_4$ induced by ion irradiation" Antonio Massimiliano Mio, Stefania MS Privitera, Massimo Zimbone, Valeria Bragaglia, Stefan Jakobs, Christoph Persch, Fabrizio Arciprete, Raffaella Calarco, Matthias Wuttig, Emanuele Rimini **J. Phys. D: Appl. Phys.** 53 134001 (2020) DOI: 10.1088/1361-6463/ab642d
3. "Role of hole confinement in the recombination properties of InGaN quantum structures" M Anikeeva, M Albrecht, F Mahler, JW Tomm, L Lymperakis, C Chèze, R Calarco, J Neugebauer, T Schulz **Scientific reports** 9 (1), 1-10 (2019) DOI: 10.1038/s41598-019-45218-8
4. "Evidence for Thermal-Based Transition in Super-Lattice Phase Change Memory" Mattia Boniardi, Jos E. Boschker, Jamo Momand, Bart J. Kooi, Andrea Redaelli and Raffaella Calarco **Phys. Status Solidi RRL** 13, 1800634 (2019) DOI: 10.1002/pssr.201800634. **Cover page of the special issue**
5. "Crystallization Study of Ge-Rich $(GeTe)_m(Sb_2Te_3)_n$ Using Two-Step Annealing Process" Francesco Di Biagio, Stefano Cecchi, Fabrizio Arciprete, and Raffaella Calarco **Phys. Status Solidi RRL** 1800632 (2019) DOI:10.1002/pssr.201800632
6. "Interplay between Structural and Thermoelectric Properties in Epitaxial $Sb_{2+x}Te_3$ Alloys" Stefano Cecchi, Daniele Dragoni, Dominik Kriegner, Elisa Tisbi, Eugenio Zallo, Fabrizio Arciprete, Václav Holý, Marco Bernasconi, Raffaella Calarco **Advanced Functional Materials** 29 (2), 1805184 (2019) DOI: 10.1002/adfm.201805184
7. "InN and GaN/InN monolayers grown on ZnO {0001}" Torsten Ernst, Caroline Chèze, Raffaella Calarco **J. Appl. Phys.** 124, 115305 (2018) DOI: 10.1063/1.5041880
8. "Designing epitaxial GeSbTe alloys by tuning the phase, the composition, and the vacancy ordering" V. Bragaglia, F. Arciprete, A. M. Mio, R. Calarco **J. Appl. Phys.** 123, 215304 (2018) DOI: 10.1063/1.5024047
9. "Electrical and optical properties of epitaxial binary and ternary $GeTe-Sb_2Te_3$ alloys" J.E. Boschker, X. Lü, V. Bragaglia, R. Wang, H. T. Grahn and R. Calarco **Sci. Rep.** 8, 5889 (2018) DOI: 10.1038/s41598-018-23221-9
10. "Mapping the band structure of GeSbTe phase change alloys around the Fermi level" Jens Kellner, Gustav Bihlmayer, Marcus Liebmann, Sebastian Otto, Christian Pauly, Jos Emiel Boschker, Valeria Bragaglia, Stefano Cecchi, Rui Ning Wang, Volker L Deringer, Philipp Küppers, Priyamvada Bhaskar, Evangelos Golias, Jaime Sánchez-Barriga, Richard

Dronskowski, Thomas Fauster, Oliver Rader, Raffaella Calarco, Markus Morgenstern accepted **Nature Communication Physics** 1, 5 (2018) DOI: 10.1038/s42005-018-0005-8

11. "Ferroelectric control of the spin texture in germanium telluride" C Rinaldi, S Varotto, M Asa, J Slawinska, J Fujii, G Vinai, S Cecchi, R Calarco, I Vobornik, G Panaccione, S Picozzi, R Bertacco accepted **Nano Letters** 18, 2751-2758 (2018) DOI: 10.1021/acs.nanolett.7b04829
12. "2D or not 2D: Strain tuning in weakly coupled heterostructures" Ruining Wang, Felix Lange, Stefano Cecchi, Michael Hanke, Matthias Wuttig, Raffaella Calarco **Adv. Funct. Mat.** 28, 1705901 (2018)
<https://doi.org/10.1002/adfm.201705901>
13. "Tailoring the epitaxy of Sb₂Te₃ and GeTe chalcogenide thin films using surface passivation" Jamo Momand, Jos E. Boschker, Ruining Wang, Raffaella Calarco, Bart J. Kooi **CrystEngComm** (2017) doi: 10.1039/C7CE01825H
14. "Exploring the subsurface atomic structure of the epitaxially grown phase change material Ge₂Sb₂Te₅" J Kellner, G Bihlmayer, VL Deringer, M Liebmann, C Pauly, A Giussani, JE Boschker, R Calarco, R Dronskowski, M Morgenstern **Phys. Rev. B** 96, 245408 (2017) doi: 10.1103/PhysRevB.96.245408
15. **Invited review paper** "GeTe: a simple compound blessed with a plethora of properties" J. E. Boschker, R. Wang, R. Calarco **CrystEngComm** 19, 5324 (2017) doi: 10.1039/C7CE01040K
16. "Thermal annealing studies of GeTe-Sb₂Te₃ alloys with multiple interfaces" V. Bragaglia, A. M. Mio, R. Calarco **AIP Adv.** 7, 085113 (2017) doi: 10.1063/1.5000338
17. **Invited review paper** "Crescita epitassiale van der Waals di calcogenuri (IV-VI)_x-(V₂-VI₃)_{1-x} per dispositivi di memorie elettriche a cambiamento di fase" E. Zallo, R. Calarco **Nuovo Saggiatore**, 33, 31 (2017) ISSN 1827-6148
18. **Invited review paper** "Growth of crystalline phase change materials by physical deposition methods" Jos Emiel Boschker and R. Calarco **Adv. in Phys.: X** 2, 675 (2017) doi: 10.1080/23746149.2017.1346483
19. **Invited special issue** "A special section on Effects of strain on semiconductor heterostructures" Fabrizio Arciprete e Raffaella Calarco **Nanosci. Nanotechnol. Lett.** 9, 1064 (2017) doi: 10.1166/nnl.2017.2439
20. "Unconventional strain relaxation of Sb₂Te₃ grown on a GeTe/Sb₂Te₃/GeTe heterostructure on silicon (111)" S. Cecchi, R. N. Wang, E. Zallo, R. Calarco **Nanosci. Nanotechnol. Lett.** 9, 1114 (2017) doi: 10.1166/nnl.2017.2441
21. "Self-limited In incorporation in (In,Ga)N/GaN short-period superlattices" C. Chèze, R. Calarco **Nanosci. Nanotechnol. Lett.** 9, 1118 (2017) doi: 10.1166/nnl.2017.2442
22. "Dynamic reconfiguration of van der Waals gaps within GeTe-Sb₂Te₃ based superlattices" Jamo Momand, Ruining Wang, Jos E. Boschker, Marcel A. Verheijen, Raffaella Calarco, Bart J. Kooi **Nanoscale** 9, 88774 (2017) doi: 10.1039/C7NR01684K
23. "Formation of resonant bonding during growth of ultrathin GeTe films" Ruining Wang, Jos E. Boschker, Henning Riechert, Matthias Wuttig, Raffaella Calarco **Nature Publishing Asia Material** 9, e396 (2017) doi: 10.1038/am.2017.95
24. "Improved structural and electrical properties in native Sb₂Te₃/GeSbTe van der Waals superlattices due to intermixing mitigation" Stefano Cecchi, Eugenio Zallo, Jamo Momand, Rui Ning Wang, Bart J. Kooi, Marcel A. Verheijen, Raffaella Calarco **Appl. Phys. Lett. Mat.** 5, 026107 (2017) doi: 10.1063/1.4976828

25. "Luminous efficiency of ordered arrays of GaN nanowires with sub-wavelength diameters" Christian Hauswald, Ivano Giuntoni, Timur Flissikowski, Tobias Gotschke, Raffaella Calarco, Holger T. Grahn, Lutz Geelhaar, and Oliver Brandt **ACS Photonics** 4, 52-62 (2017) doi: 10.1021/acsp Photonics.6b00551
26. "Modulation of van der Waals and classical epitaxy induced by strain at the Si step edges in GeSbTe alloys" E. Zallo, S. Cecchi, J.E. Boschker, A.M. Mio, F. Arciprete, S. Privitera, E. Rimini and R. Calarco **Sci. Rep.** 7, 1466 (2017) doi: 10.1038/s41598-017-01502-z
27. "Role of interfaces on the stability and electrical properties of Ge₂Sb₂Te₅ crystalline structures" A. M. Mio, S. Privitera, V. Bragaglia, F. Arciprete, S. Cecchi, G. Litrico, R. Calarco, E. Rimini **Sci. Rep.** 7, 2616 (2017) doi: 10.1038/s41598-017-02710-3
28. "In/GaN(0001)-($\sqrt{3}\times\sqrt{3}$)R30° adsorbate structure as a template for embedded (In,Ga)N/GaN monolayers and short-period superlattices" C. Chèze, F. Feix, M. Anikeeva, T. Schulz, M. Albrecht, H. Riechert, O. Brandt, R. Calarco **Appl. Phys. Lett.** 110, 072104 (2017) <https://doi.org/10.1063/1.4976198>
29. "Textured Sb₂Te₃ films and GeTe-Sb₂Te₃/Sb₂Te₃ superlattices grown on conductive and insulating amorphous substrates" Jos E. Boschker, E. Tisbi, E. Placidi, Jamo Momand, Bart J. Kooi, Fabrizio Arciprete and Raffaella Calarco **AIP Advances** 7, 015106 1-8 (2017) doi: 10.1063/1.4974464
30. "Chemical and structural arrangement of the trigonal phase in GeSbTe thin films" Antonio M. Mio, Stefania Privitera, Valeria Bragaglia, Fabrizio Arciprete, Corrado Bongiorno, Raffaella Calarco, Emanuele Rimini **Nanotechnology** 28, 065706 1-7 (2017). doi:10.1088/1361-6528/28/6/065706/
31. "Epitaxial GeTe-Sb₂Te₃ probed by Single Cycle THz Pulses of Coherent Synchrotron Radiation" V. Bragaglia, A. Schnegg, R. Calarco, K. Holldack **Appl. Phys. Lett.** 109, 141903 (2016). <http://dx.doi.org/10.1063/1.4963889>
32. "Ultrafast Ge-Te bond dynamics in a phase-change superlattice" Marco Malvestuto, Antonio Caretta, Barbara Casarin, Federico Cilento, Martina Dell'Angela, Daniele Fausti, Raffaella Calarco, Bart J. Kooi, Enrico Varesi, John Robertson, and Fulvio Parmigiani **Phys. Rev. B** 94, 094310 (2016). doi: 10.1103/PhysRevB.94.094310
33. "Spin Mapping of Surface and Bulk Rashba States in Ferroelectric α -GeTe(111) Films" H. J. Elmers, R. Wallauer, M. Liebmann, J. Kellner, M. Morgenstern, R.N. Wang, J.E. Boschker, R. Calarco, J. Sanchez-Barriga, O. Rader, D. Kutnyakhov, S.V. Chernov, K. Medjanik, C. Tusche, M. Ellguth, H. Volfova, St. Borek, J. Braun, J. Minár, H. Ebert, and G. Schönhense **Phys. Rev. B** 94, 201403(R) (2016). doi: 10.1103/PhysRevB.94.201403
34. "Individual electron-hole localization in submonolayer InN quantum sheets embedded in GaN" F. Feix, T. Flissikowski, C. Chèze, R. Calarco, H. T. Grahn, and O. Brandt **Appl. Phys. Lett.** 109, 042104 (2016). doi: 10.1063/1.4960006
35. "Interband characterization and electric transport control of nanoscaled GeTe/Sb₂Te₃ superlattices" Antonio Caretta, Barbara Casarin, Paola Di Pietro, Andrea Perucchi, Stefano Lupi, Valeria Bragaglia, Raffaella Calarco, Felix R. L. Lange, Matthias Wuttig, Fulvio Parmigiani, and Marco Malvestuto **Phys. Rev. B** 94, 045319 (2016). doi: 10.1103/PhysRevB.94.045319
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Ai sensi del D. L.gvo del 30 giugno 2003, n. 196 (Codice in materia di protezione dei dati personali), informato delle finalità del trattamento dei dati e della loro registrazione su supporti informatici, nonché dei soggetti responsabili dello stesso,

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con la trasmissione di questa scheda, UNINETTUNO Università Telematica nella figura del Rettore prof. Maria Amata Garito al trattamento dei dati personali contenuti in questo modulo per esclusive finalità didattiche e di ricerca al fine di consentire lo svolgimento dell'insegnamento e delle pratiche amministrative collegate.