



# Graphene & Co Annual Meeting 2019

October 27-30

Bad Herrenalb, Black Forest, Germany

## Topics

Industrial applications

Synthesis and processing

Nanophotonics and spectroscopy

Simulations and computing

Nanoelectronics

Info: [graph-and-co19.sciencesconf.org](https://graph-and-co19.sciencesconf.org)

Venue: Haus der Kirche, Dobler Str. 51, 76332 Bad Herrenalb, Germany

(<https://goo.gl/maps/9HWNDgkJLeM2>)



## Foreword

Welcome to the 2019 annual meeting of the GDR and GDR-I 'Graphene & Co' in Bad Herrenalb, Germany. This is a special meeting in the long tradition of GDR meetings as we are meeting for the first time in Germany. The organizers are very pleased that this "Tour-de-France"-idea - starting once a while in a neighboring country – seems to be a good one, because many scientists from France, Europe and overseas have registered with exciting abstracts. As organizers, helped by the GDR, GDR-I, and scientific advisory board, we have tried to arrange a scientific program covering the latest developments in 1D and 2D nanostructures and molecular materials. We were very fortunate that excellent speakers accepted our invitations to give talks and tutorials. Importantly, many of the 43 oral presentations will be given by younger scientists. We also tried to ensure that sufficient time is allocated to present the 44 posters, which will be introduced in posterclip sessions. We are aware that the program is quite dense, but we believe that the program warrants enough time for discussions and networking. We hope for good weather for the walking city tour through Baden-Baden and a scenic bus ride. But most importantly we hope for an inspiring meeting, where new collaborations emerge and existing ones are deepened.

### Local organizing committee

Ralph KRUPKE  
Stéphane BERCIAUD  
Romain DANNEAU  
Benjamin FLAVEL

### Graphene & Co board members

Christophe VOISIN  
Annick LOISEAU  
Jean-Christophe CHARLIER  
Johann CORAUX

### International scientific advisory board (GDR-I)

Adrian BACHTOLD (Spain)  
Francesco BONACCORSO (Italy)  
Jean-Christophe CHARLIER (Belgium)  
Esko KAUPPINEN (Finland)  
Andreas KIS (Switzerland)  
Frank KOPPENS (Spain)  
Ralph KRUPKE (Germany)  
Richard MARTEL (Canada)  
Marcos PIMENTA (Brasil)  
Stephanie REICH (Germany)  
Stephan ROCHE (Spain)

### French scientific advisory board (GDR)

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Hakim AMARA  
Jean-Louis BANTIGNIES  
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Chris EWELS  
Jean-Christophe GABRIEL  
Périne LANDOIS  
Alain PENICAUD  
Marek POTEMSKI  
Etienne QUESNEL  
Abhey SHUKLA  
Laurent SIMON  
Nikos TAGMARTAKIS

## Program Graphene & Co Annual Meeting 2019 in Bad Herrenalb, Germany

### Sunday 27.10.

17:30-18:30 Arrival

18:30-20:00 Dinner

20:00-20:10 Opening Remarks

### Industrial applications (chairperson: Stéphane Berciaud)

20:10-20:40 I-285933 MATHIAS STEINER

*2D Material Based Devices And Processes For Industrial Applications*

20:40-21:10 I-279976 PAOLO BONDAVALLI

*Dynamic Spray-Gun Deposition: A New Way Of Conceiving The Lego View For 2D And 1D Nanomaterials*

21:10-21:40 I-291956 JASMIN AGHASSI

*Nanomat: Innovation By Collaboration*

### Monday 28.10.

07:30-08:30 Breakfast

### Industrial applications (chairperson: Annick Loiseau)

08:30-09:30 T-291562 FRANCESCO BONACCORSO

*2D-Materials-Based Next-Generation Energy Devices*

09:30-09:50 C-280598 JIMMY NICOLLE

*Molecular Imprinted Functionalized Graphene For New Environmental Electrochemical Sensors Dedicated To The Detection Of Polycyclic Aromatic Hydrocarbons In Water*

09:50-10:10 C-279953 BERENGERE LEBENTAL

*Smart System Integration Of A Chemistor Array Based On Polymer-Functionalized-Carbon Nanotubes Enables Highly Selective Water Quality Monitoring*

10:10-10:30 C-280247 SEBASTIAN KRUSS

*Near Infrared Sensing And Imaging With Carbon Nanotubes*

10:30-11:00 Coffee break

### Synthesis and processing (chairperson: Stephane Campidelli )

11:00-11:30 I-281876 AKIMITSU NARITA

*Bottom-Up Molecular Synthesis Of Atomically Precise Graphene Nanoribbons And Quantum Dots*

11:30-11:50 C-280800 BORIS SENKOVSKIY

*Towards Graphene Nanoribbon Tunneling Field-Effect Transistors Via A Chemical Doping Route*

11:50-12:10 C-279558 TERESA GATTI  
*Towards Photo-Stable Graphene-Dye Cross-Linked Polymers*  
 12:10-12:30 C-280211 COLIN PAILLET  
*Growth Of InGaN On Epitaxial Graphene For Red LEDs Application*  
 12:30-13:40 Lunch

**Synthesis and processing** (chairperson: Alain Penicaud)

13:40-14:00 C-280141 SIDRA DAR  
*Voltage And Pressure Driven Ion-Transport In Angstrom Scale Channels*  
 14:00-14:20 C-279777 ULRICH NOUMBE  
*Ionic Glass Gated 2D Material Based Field Effect Transistor And Phototransistor: MoSe<sub>2</sub> Over LaF<sub>3</sub> As Case Study*  
 14:20-14:50 I- 294116 SURESH SUNDARAM  
*MOVPE Growth Large Area Layered Hexagonal Boron Nitride*  
 14:50-15:10 C-279623 BOITUMELO MATSOSO  
*Improving The Crystallinity And Growth Temperature Of hBN Nanosheets Via The BaF<sub>2</sub>-Assisted PDCS Technique For Voc Sensor Application*  
 15:10-15:30 C-279938 HAN LI  
*Separation Of Specific Single Chirality Single-Wall Carbon Nanotubes In The Large Diameter Regime*  
 15:30-15:50 Coffee break

**Nanophotonics and spectroscopy** (chairperson: Christophe Voisin)

15:50-16:10 C-279742 FELIX BERGER  
*Brightening Of Long, Polymer-Wrapped Carbon Nanotubes By Large Scale sp<sub>3</sub> Functionalization*  
 16:10-16:30 C-253200 ADNAN RIAZ  
*Electroluminescence From Carbon Nanotubes: Low Temperature, Tailored Defects And Short Channels*  
 16:30-16:50 C-279925 YANNICK CHASSAGNEUX  
*Cryogenic Super-Localization Of Excitons In Carbon Nanotubes*  
 16:50-17:10 C-286241 ANTOINE RESERBAT-PLANTEY  
*Active Control Of Single Photon Sources Using 2D Materials*  
 17:10-17:40 I-291167 JANINA MAULTZSCH  
*Optical Properties Of 2D Materials And Heterostructures*  
 17:40-18:00 C-280610 VEIT GIEGOLD  
*Electronic Temperature Dependent Suppression Of Interfering Quantum Pathways In Graphene Raman*  
 18:00-18:30 I-281711 BENJAMIN GREVIN  
*Multimodal KPFM Investigations Of 2D Van Der Waals Optoelectronic Interfaces*

18:30-20:00 Dinner  
 20:00-20:30 PosterClips A (chairperson: Benjamin Flavel)  
 20:30-22:00 **Poster session A**

## Tuesday 29.10.

07:30-08:30 Breakfast

### Nanophotonics and spectroscopy (chairperson: Richard Martel)

08:30-09:00 I-280151 ANDRAS KIS

*Exciton Manipulation In Heterostructures Of 2D Materials*

09:00-09:20 C-278486 BO HAN

*Control Of Exciton Radiative Lifetime In Van Der Waals Heterostructures*

09:20-09:50 C-280709 ETIENNE LORCHAT

*Filtering The Photoluminescence Spectra Of Atomically-Thin Semiconductors With Graphene*

09:50-10:10 C-280015 SAROKA VASIL

*Aligning Optical Resonances Of Armchair Carbon Nanotubes And Zigzag Graphene Nanoribbons*

10:10-10:40 Coffee break

### Nanophotonics and spectroscopy (chairperson: Janina Maultzsch)

10:40-11:00 C-279433 MATTHEW HAMER

*Indirect to Direct Gap Crossover in Two-Dimensional InSe Revealed by Angle Resolved Photoemission Spectroscopy*

### Simulations and computing

11:00-11:30 I-280503 THOMAS GALVANI

*Excitons in single and few layers hexagonal Boron Nitride*

11:30-11:50 C-280608 MARVIN MÜLLER

*Electronic structure and optical properties of graphene nanoantennas*

11:50-13:20 Lunch

13:20-16:20 Excursion to Baden-Baden by Bus / Free discussions/ GDR board annual meeting

16:20-16:30 Coffee break

### Simulations and computing (chairperson: Jean-Christophe Charlier)

16:30-17:00 I-282599 AURELIEN LHERBIER

*DFT+TB Methods For Electronic Transport Properties Of Multiwall Carbon Nanotubes And Graphene Kirigami*

17:00-17:20 C-280496 MARINA AVRAMENKO

*Low-Frequency Phonon Dynamics And Related Thermal Properties Of Axially Stressed Single-Walled Carbon Nanotubes*

17:20-17:40 C-280714 JEJUNE PARK

*Grain Boundaries In Transition Metal Dichalcogenides: Electron Transport Properties*

17:40-18:00 C-279563 MARIA FYTA

*Electronic And Gas Sensing Properties Of Lateral Heterostructures: Combining Materials Or Phases*

- 18:00-18:20 C-280479 SOMEPALI VENKATESWARLU  
*Structural And Electronic Properties Of Graphene/MoS<sub>2</sub> Bilayers And Twisted MoS<sub>2</sub> Bilayers*
- 18:20-18:50 C-280163 SERGEI ROCHAL  
*Chirality Manifestation In Elastic Coupling Between The Layers Of Double-Walled Carbon Nanotubes*
- 18:50-19:10 PosterClips B (chairperson: Perine Landois)
- 19:30-22:00 Conference buffet and **Poster Session B**

### **Wednesday 30.10.**

07:30-08:30 Breakfast

#### **Nanoelectronics** (chairperson: Romain Danneau)

- 08:30-09:30 T-281854 CHRISTOPHE STAMPFER  
*Gate-Defined Quantum Point Contacts And Quantum Dots In Bilayer Graphene*
- 09:30-09:50 C-280673T MING-HAO LIU  
*Electrostatic Superlattices On Scaled Graphene Lattices*
- 09:50-10:10 C-280597 RAINER KRAFT  
*Electronic Interferometer In A Graphene Moire Superlattice*

10:10-10:40 Coffee break

#### **Nanoelectronics** (chairperson: Johann Coraux)

- 10:40-11:10 I-279382 RAPHAELLE DELAGRANGE  
*Signatures Of Van Hove Singularities Probed By The Supercurrent In A Graphene-hBN Superlattice*
- 11:10-11:30 C-278941 VIET HUNG NGUYEN  
*Strain Superlattices In Draped Graphene*
- 11:30-11:50 C-280371T DELWIN PERERA  
*Conductivity Tuning Of Polycrystalline Graphene By Mechanical Strain*
- 11:50-12:20 I-291558 BENOIT HACKENS  
*Imaging Dirac Charge Carrier Dynamics In Graphene Nanodevices*

12:20-13:20 GDR-General Assembly / Concluding Remarks

13:20-14:30 Lunch

14:30 Departure

## Poster Session A

### 1) GRAPHENE: FROM MATERIAL TO APPLICATIONS (P289249)

Périne Landois, Sébastien Nanot, Benoit Jouault, Sylvie Contreras, Sandrine Juillaguet, Hervé Peyre, Jean-Manuel Decams, Oleskiy Drachenko, Jean Leotin, Christophe Coillot

### 2) SENSING NEURON ION CHANNELS WITHIN GRAPHENE TRANSISTORS (P283021)

Cecile Delacour

### 3) CARBON NANOTUBE-BASED FIELD-EFFECT TRANSISTOR FOR WATER QUALITY MONITORING (P280362)

Gookbin CHO, Gaël Zucchi, Bérengère Lebental

### 4) ETHANOL SENSING WITH SURFACE-MOUNTED METAL-ORGANIC-FRAMEWORK FUNCTIONALIZED GRAPHENE TRANSISTORS (P280341)

Sandeep Kumar, Kai Müller, Simone Dehm, Manuel Rommel, Tobias Schlöder, Artem Fediai, Qiang Zhang, Wolfgang Wenzel, Christoph Wöll, Lars Heinke, Ralph Krupke

### 5) LARGE SCALE TRANSFER OF 2D MATERIALS FOR MICROELECTRONICS (P280186)

Lucie Le Van-Jodin, Julien David-Viffantzeff, Ivan Nikitskiy, Julie Widiez, Hanako Okuno, François Rieutord

### 6) DENSE ELECTROLYTE-GATED SINGLE-WALLED CARBON NANOTUBE NETWORKS AS ARTIFICIAL SYNAPSES (P279992)

Daniel Heimfarth, Felix Berger, Sebastian Grieger, Marcel Rother, Jana Zaumseil

### 7) CVD GROWTH OF GRAPHENE ON SIC FOR METROLOGY (P282104)

Colin Paillet, Luan Nguyen, Marc Portail, Benoit Jouault, Dominique Mailly, Wilfrid Poirier, Félicien Schopfer, Adrien Michon

### 8) DEVELOPMENT OF A GRAPHENE BASED AMMONIA AND NOX GAS SENSOR (P281540)

Vincent Malesys, Amandine Andrieux-Ledier, Pierre Lavenus, Laurent Simon

### 9) CARBON NANOTUBE-BASED SENSOR ARRAY FOR WATER CONTAMINANTS DETECTION (P296050)

Sawsen Azzouzi, Gaël Zucchi, Bérengère Lebental

### 10) MULTILAYER SP<sup>2</sup>-HYBRIDIZED BORON NITRIDE CVD GROWTH, HANDLING AND CHARACTERIZATION (P280628)

Amandine Andrieux-Ledier, Frédéric Fossard, Henri PREVOST, Annick Loiseau, Jean-Sébastien MEROT

11) LPCVD ELABORATION OF HIGH QUALITY GRAPHENE MONOLAYERS FOR GFETS APPLICATIONS (P293732)

Sabrine Toumi

12) COLLOIDAL STABILITY STUDIES AND PREPARATION OF TRANSPARENT AND CONDUCTIVE THIN FILMS WITH EAU DE GRAPHENE (P 280211)

Joao Paulo Vita Damasceno, Emmanuel Picheau, Ferdinand Hof, Aldo José Gorgatti Zarbin, Alain Penicaud

13) THE EFFECT OF ENDOHEDRAL FILLING ON FULLERENE:NANOTUBE SOLAR CELLS (P280033)

Laura Wieland, Marius Jakoby, Han Li, Jeffrey A. Fagan, Ian Howard, Benjamin S. Flavel

14) TAILORING CARBON-NANOTUBE THIN FILM ARCHITECTURES: FROM NEMATIC ORDERED FILMS TO AEROGELS (P279943)

Christian Rust, Han Li, Benjamin Scott Flavel

15) TRANSFER OF 2D MATERIALS USING THE SPALLING PROCESS (P279183)

Julien David-Viffantzeff, Lucie Le Van-Jodin, Ivan Nikitskiy, Hanako Okuno, stephane cadot, François Rieutord, Julie Widiez

16) SYNTHESIS AND OPTICAL PROPERTIES OF GRAPHENE QUANTUM DOTS (P278986)

Julien Lavie, Khaoula Khedhiri, Shen Zhao, Lucile Orcin-Chaix, Klaus Müllen, Akimitsu Narita, Loïc Rondin, Jean-Sébastien Lauret, Stéphane Campidelli

17) FERMI LEVEL SHIFT IN CARBON NANOTUBES BY DYE CONFINEMENT (P286411)

Laurent Alvarez, Romain Chambard, Raymond Aznar, Bruno Jousset, Stéphane Campidelli, Takeshi Saito, Yuta Sato, Kazu Suenaga, Jean-Sébastien Lauret, Jean-Louis Bantignies

18) CONFINEMENT OF DYES INTO CARBON AND BORON NITRIDE NANOTUBES: AGGREGATION MECHANISMS AND OPTICAL PROPERTIES (P284846)

Charlotte Allard, Rafaela Nascimento, Frédéric Fossard, Léonard Schue, Emmanuel Flahaut, Annick Loiseau, Patrick Desjardins, Richard Martel, Etienne Gauffrès

19) HIGHLY SENSITIVE CARBON NANOTUBE AND GRAPHENE-BASED PHOTODETECTORS FABRICATED VIA FEMTOSECOND LASER PATTERNING (P280752)

Aleksei Emelianov, Dmitry Kireev, Ivan Bobrinetskiy

20) PROBING DYNAMICAL STRAIN IN GRAPHENE ELECTROMECHANICAL RESONATORS (P280710)

Xin Zhang, Kevin Makles, Léo Colombier, Dominik Metten, Hicham Majjad, Pierre Verlot, Stéphane Berciaud

21) OPTICAL MICROSCOPY OF TRANSIENT STATES IN 2D MATERIALS (P280702)

Achim Hartschuh, Lucas Lange, Richard Ciesielski, Charles Vernier

22) LOCAL PHOTOCURRENT CHARACTERIZATION OF GRAPHENE/SILICON HETEROJUNCTION BY AFM-BASED METHODS (P280509)

Jaroslava Řáhová, Alvaro Rodríguez, Alex Vetushka, Daria Miliáieva, Bohuslav Rezek, Martin Ledinský, Antonín Fejfar, Otakar Frank

**Poster Session B**

23) DOPING-DEPENDENT ENERGY TRANSFER FROM CONJUGATED POLYELECTROLYTES TO (6,5) SINGLE-WALLED CARBON NANOTUBES (P280414)

Merve Balci, Felix Berger, Patrick Klein, Markus Mühlinghaus, Nicolas Zorn, Simon Settele, Sybille Allard, Ullrich Scherf, Jana Zaumseil

24) EXCITON-POLARITON RELAXATION IN SINGLE-WALLED CARBON NANOTUBE NETWORKS

Jan Luettgens (P280387)

25) EXFOLIATED NEAR-INFRARED FLUORESCENT CALCIUM COPPER SILICATE NANOSHEETS FOR BIOIMAGING (P280349)

Gabriele Selvaggio, Helen Preiß, Alexey Chizhik, Robert Nißler, Florian A. Mann, Zhiyi Lv, Tabea A. Oswald, Alexander Spreinat, Luise Erpenbeck, Jörg Großhans, Juan Pablo Giraldo, Sebastian Kruss

26) OPTICAL PROPERTIES OF GRAPHENE QUANTUM DOTS (P280340)

Jean-Sébastien Lauret

27) PROBING ENHANCED LIGHT-MATTER INTERACTION IN GRAPHENE ON PLASMONIC-PHOTONIC CRYSTALS BY RAMAN SPECTROSCOPY (P280288)

Naga Anirudh Peyyety, Aimi Abass, Adnan Riaz, Simone Dehm, Carsten ROCKSTUHL, Aravind Vijayaraghavan, Martin Kalbac, Ralph Krupke

28) POWER DEPENDENT PHOTOCURRENT RESPONSE OF CARBON NANOTUBE PN-JUNCTIONS (P280175)

Pranaav Balaji Selvasundaram, Ihteaz. M Hossain, Simone Dehm, Frank Hennrich, Manfred Kappes, Yuan Chen, Ralph Krupke

29) TELECOM BAND SINGLE PHOTON SOURCE FROM CARBON NANOTUBE IN FIBERED MICRO-CAVITY (P279942)

Antoine Borel

30) INFRARED LUMINESCENCE AND ABSORPTION OF BULK BLACK PHOSPHORUS AT LOW TEMPERATURE (P279848)

Etienne Carre, Alain Lusson, Ingrid STENGER, Etienne Gaufrès, Annick Loiseau, Julien Barjon

31) CHARGE MODULATION SPECTROSCOPY OF SEMICONDUCTING SWCNT NETWORKS (P279482)

Nicolas Frederic Zorn, Francesca Scuratti, Felix Berger, Andrea Perinot, Mario Caironi, Jana Zaumseil

32) LATTICE MODELS TO STUDY CHIRALITY SELECTIVE GROWTH OF SWNTS (P288553)

Christophe BICHARA, Daniel Foerster

33) MICROSTRUCTURE ANALYSIS OF NON-GRAPHITIC CARBON (P283691)

Oliver Oßwald

34) CLASSIFICATION OF HRTEM IMAGES OF CARBON NANOTUBES USING A DEEP LEARNING APPROACH (P282336)

Georg Daniel Förster, Alice Castan, Hakim Amara, Christophe Bichara

35) MULTI-SCALE MODELLING OF NANO-SENSORS BASED ON CARBON NANOTUBES (CNTS) AND CONJUGATED POLYMERS FOR WATER QUALITY MONITORING (P280224)

Robert Benda, Eric Cancès, Bérengère Lebental

36) QUANTUM TRANSPORT IN TRANSITION METAL DICHALCOGENIDES LATERAL HETEROJUNCTIONS (P280008)

Samuel Dechamps

37) EFFICIENT N-DOPING OF SWCNT NETWORK TRANSISTORS (P280642)

Jan Gotthardt, Severin Schneider, Maximilian Brohmann, Lena Steuer, Eric Sauter, Michael Zharnikov, Hans-Jörg Himmel, Jana Zaumseil

38) ELECTRON COHERENCE TRANSFER AND EDGE STATES IN MAGNETIC GRAPHENE NANORIBBONS (P280581)

Michael Slota, Ashok Keerthi, William K. Myers, Evgeny Tret'yakov, Martin Baumgarten, Arzhang Ardavan, Hatef Sadeghi, Colin J. Lambert, Akimitsu Narita, Klaus Müllen, Lapo Bogani

39) MULTI-TERMINAL SNS JUNCTIONS IN BILAYER GRAPHENE WEAK LINKS (P280474)

Devang Parmar, Rainer Kraft, Preeti Pandey, Ralph Krupke, Romain Danneau

40) ELECTRICAL CHARACTERIZATION OF H-BN FOR ITS USE IN ELECTRONIC TRANSPORT DEVICES (P280451)

Aurélié PIERRET, Holger Graef, David Mele, Yangdi Li, Takashi Taniguchi, José Palomo, Kenji Watanabe, Michael Rosticher, Bérengère Toury, Philippe Steyer, Amandine Andrieux, Vincent Garnier, Catherine Journet, Annick Loiseau, Bernard Plaçais

41) CONDUCTANCE QUANTIZATION IN BILAYER GRAPHENE QUANTUM WIRES (P280381)

Vanessa Gall, Igor Gornyi

42) N-TYPE SINGLE-WALLED CARBON NANOTUBE FIELD-EFFECT TRANSISTORS – A COMPARISON OF DOPANT SYSTEMS (P280368)

Severin Schneider, Jan Gotthardt, Roxana Lorenz, Yuo Zhang, Stephen Barlow, Seth Marder, Hans-Joerg Himmel, Jana Zaumseil

43) TRANSPORT PROPERTIES OF MULTITERMINAL GRAPHENE BASED JOSEPHSON JUNCTIONS (P280283)

Preeti Pandey, Romain Danneau, Ralph Krupke, Detlef Beckmann

44) ELECTROSTATICALLY CONFINED NANOSTRUCTURES IN GAPPED BILAYER GRAPHENE (P279357)

Angelika Knothe, Vladimir Fal'ko

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Tutorial: 50min + 10min discussion

Invited: 25min + 5min discussion

Contributed: 17min + 3min discussion

PosterClips: 1min

Postersize: 140cm wide, 120cm high → A0 portrait or landscape can be presented

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