

GRAPHENE

5-10 FEBRUARY 2018, OBERGURGL, AUSTRIA



STUDY



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WELCOME

It is my great pleasure to welcome you to Obergurgl and the Graphene Flagship's fifth school on graphene and related materials, Graphene Study. The topic of this edition is **Structural Characterisation of Graphene-Based Materials** and we have an excellent scientific programme prepared for you.

Graphene production is now becoming a mature technology, with several graphene-based products already on the market, and with different production techniques routinely used, yielding materials with different properties and cost/performance. With the proliferation of graphene producers, it has become more and more important to use reliable techniques for the characterization and comparison of different types of graphene products. At the same time, a wide range of related materials are being intensively researched at a fundamental level. The characterisation of such materials also poses fundamental challenges, requiring approaches which shall be different from the ones routinely used for graphene.

For these reasons, it is important for researchers of academia and industry alike to know the potentialities and limitations of the many different techniques available to characterise graphene and related materials. This edition of Graphene Study will thus provide a strategic overview of the most common techniques and methodologies available to determine the nature, composition and behaviour of 2D nanomaterials, thin films and nanostructured composites. Attendees will learn how different techniques can be used to probe into the internal structure and properties of a 2D material or composite.

We hope you will enjoy the Graphene Study 2018 in Obergurgl, with an exceptional scientific programme, world-class lecturers, workshops, two poster sessions and ample networking activities. We believe that the school will contribute in advancing graphene science and will promote cultivation of relationships, collaborations and friendships in the community.

Have fun!

Valeria Nicolosi, Chair of Graphene Study 2018



VENUE & ACCOMMODATION

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Gaisbergweg 5
6456 Obergurgl, Austria
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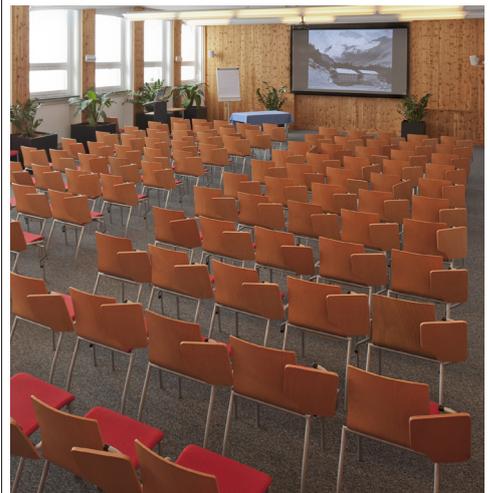
Scenic Obergurgl, nestling amidst Tirol's winter paradise with absolute snow guarantee, is also known as the "Diamond of the Alps". The stylish winter resort at the southern end of the valley has 24 mountain lifts and 110 kilometers of immaculate ski slopes – connected with the neighboring hamlet of Hochgurgl. Among the absolute must-sees during your ski vacation: Top Mountain Star panorama bar at 3,080 meters above sea level and Hohe Mut vantage mountain overlooking the upper Ötztal Valley and its abundant snow fields.

The Obergurgl University Center's history goes back to 1951, when three former customs buildings were converted for use by the Obergurgl federal Sports Center and Innsbruck University's Alpine Research Center. That marked the beginning of a focus on sports and science with international participation. Famous mountain guides, ski instructors and researchers worked here and made many major contributions to sports and science in the Alps.

All delegates of Graphene Study will stay in twin or triple bed rooms at the Obergurgl University Center.

Wi-Fi access code will be provided in the keycard pocket received when checking in.

Check-in: 15:00
Check-out: 10:00



REGISTRATION & HELPDESK

On-site registration opens on Monday 5 February 2018 at 15:30. We expect all delegates to collect their badges and conference materials on Monday afternoon.

The desk is organised in alphabetical order by last name.

What is included in the conference fee?

- Access to all scientific sessions.
- Conference material (including the programme, list of participants, and a printed certificate).
- Accommodation in twin or triple bed rooms, including breakfast and internet access.
- 5 days lunches, dinners and coffee breaks.
- All social activities (welcome reception, farewell dinner, cultural sessions, after poster party and team building activities).

If you have any questions about check in, on-site registration, arrival or accommodation details, please feel free to contact **Luciana Löberg**, event manager, Graphene Flagship.

Luciana Löberg
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The help desk is open daily:
10:40–11:00
14:40–16:10



SCIENTIFIC PROGRAMME

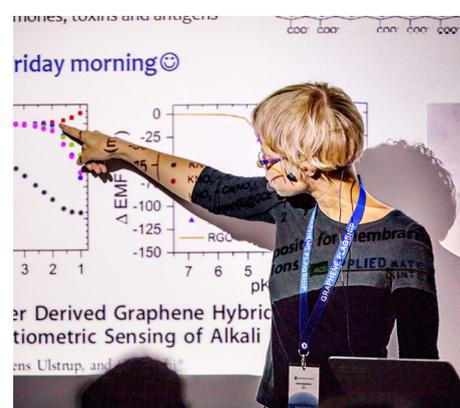
Delegates of Graphene Study 2018 - Structural Characterisation of Graphene-Based Materials - will learn how different techniques can be used to probe into the internal structure and properties of a 2D material or composite.

The course will address questions such as: What are the attributes of a given 2D material or composite? What is the structure-property correlation?

The programme will include:

- Introduction to materials characterisation
- The essential elements of the physical basis for x-ray and electron diffraction
- Imaging, optical and electron-optical microscopies - imaging at the macroscale to the nanoscale
- SEM/FIB-Tomography and 3D-Microstructure Analysis
- Introduction to (S)TEM imaging and Analysis
- Advanced electron microscopy imagin
- EELS and EDS spectroscopy
- Scanning probe techniques - physical principles and generic methodologies
- XPS spectroscopy
- X-Ray Diffraction
- Raman spectroscopy
- Mechanical

All lectures take place in the main seminar room. Delegates are invited to contribute with comments on research and tutorial lectures as 10 minutes are reserved for discussion after each lecture.



LECTURERS

Raul Arenal, University of Zaragoza

Artur Ciesielski, University of Strasbourg

Vladimir Falko, The University of Manchester

Ulrike Felt, University of Vienna

Costas Galiotis, Foundation for Research and Technology Hellas

Gareth Hughes, University of Oxford

Demie Kepaptsoglou, SuperSTEM

Jari Kinaret, Director of the Graphene Flagship

Ian Kinloch, The University of Manchester

Andrea Liscio, Consiglio Nazionale delle Ricerche

Silvia Milana, Nature Research

Vittorio Morandi, Consiglio Nazionale delle Ricerche

Hannah Nerl, Trinity College Dublin, Imperial College London

Valeria Nicolosi, Trinity College Dublin

José Ignacio Pascual, CIC Nanogune

Nicola Pugno, University of Trento, Queen Mary University of London
and Edoardo Amaldi Foundation

Quentin Ramasse, SuperSTEM

Giancarlo Soavi, University of Cambridge

Felice Torrisi, University of Cambridge

Alex Yeu Lin, University of Cambridge



Demie Kepaptsoglou, SuperSTEM



José Ignacio Pascual, CIC Nanogune



Vladimir Falko, SuperSTEM

PROGRAMME



Guidelines:	Lecture	Interactive Lecture	Workshop	Poster Session	Social Programme		
Time	Monday 05 Feb.	Tuesday 06 Feb.	Wednesday 07 Feb.	Thursday 08 Feb.	Friday 09 Feb.	Saturday 10 Feb.	Time
7.30 - 8.55		Breakfast	Breakfast	Breakfast	Breakfast	Breakfast	7.30 - 8.55
9.00 - 9.50		Vittorio Morandi Introduction to electron microscopy and electron diffraction	Raul Arenal Advanced applications of analytical microscopy, part 1	Live Demo - SuperSTEM	Andrea Liscio Quantitative chemical analysis of graphene-based materials using X-ray Photoelectron Spectroscopy	Giancarlo Soavi Pump Probe Spectroscopy	9.00 - 9.50
9.50 - 10.40		Gareth Hughes Scanning Electron Microscopy	Demie Kepaptsoglou Advanced applications of analytical microscopy, part 2	Yue Lin Thermal Measurements	Nicola Pugno Mechanics of 2d materials and related 3d composites - Part 1	Vladimir Falko Electronic and optical properties of post-transition metal chalcogenides	9.50 - 10.40
10.40 - 11.00		Coffee	Coffee	Coffee	Coffee	Concluding Remarks 10:40 - 11:00	10.40 - 11.00
11.00 - 11.50		Vittorio Morandi Advanced TEM, HRTEM and applications	Artur Ciesielski STM and AFM as tools for studying non-covalent functionalization of 2DMs	Gareth Hughes FIB, SEM and HIM: Tools for Nanotechnology	Nicola Pugno Mechanics of 2d materials and related 3d composites - Part 2		11.00 - 11.50
11.50 - 12.40	Transfer In - Innsbruck Airport 12:00 14:30 18:00 Check-in 15:00 Registration Open 15:30	Quentin Ramasse Introduction to STEM, aberration correction in the electron microscope (TEM+STEM)	José Ignacio Pascual Scanning Tunneling Microscopy and Spectroscopy of surfaces and adsorbates: going beyond the image	Ian Kinloch Mechanical properties of composites	Costas Galiotis Mechanical properties of graphene and graphene/ polymer composites	Light lunch from 11:00	11.50 - 12.40
13.00 - 14.00		Lunch	Lunch	Lunch	Lunch	Check Out 10:00 Transfer Out: 11:30 13:00	13.00 - 14.00
14.00 - 14.50		Quentin Ramasse Advanced STEM imaging	Workshop Ulrike Felt How to meet the challenges of research integrity in everyday research practice?	Group Activity (incl. after 2 pm skipass)	Workshop Silvia Milana Inside Nature Research: publication policies, editorial processes, scientific writing and publishing, part 1.		14.00 - 14.50
14.50 - 15.40		Demie Kepaptsoglou Introduction to EDXS Spectroscopy and application to 2D materials				Free time at ski slope	Coffee
15.40 - 16.10			Coffee	Coffee			15.40 - 16.10
16.10 - 17.00	Jari Kinaret and Valeria Nicolosi Welcome by director of the Graphene Flagship and the GS Chair 16:45 - 17:00	Raul Arenal Introduction to Electron Energy Loss Spectroscopy	Poster Session II 16:15 - 18:15	Dinner	Interactive Workshop Silvia Milana Inside Nature Research: publication policies, editorial processes, scientific writing and publishing, part 2.	16.10 - 17.00	
17.00 - 17.50	Artur Ciesielski Survival skills for young scientists	Valeria Nicolosi In-situ Electron Microscopy				Dinner	17.00 - 17.50
17.50 - 18.40	Felice Torrisi Raman Spectroscopy and Applications to 2D materials	Dinner				Dinner 18:15 - 19:45	17.50 - 18.40
19.00 - 21.00	Welcome Dinner	Poster Session I 19:00 - 21:00	After Poster Party Mountain Top Dinner (Hohe Mut Alm) 19:00 - 22:30	Team Building Competition Night Toboggaming 19:30 - 22:30 Transfer leaves at 19:00	Farewell Celebration Fire, Music & Glühwein in the venue ice garden from 19:45	19.00 - 21.00	
from 21.00	Cultural Session Cinema	Cultural Session Local Music at the bar				from 21.00	



WORKSHOPS

ETHICS WORKSHOP

How to meet the challenges of research integrity in every-day research practice?

Wednesday 7 February at 14:00 - 15:40 by Ulrike Felt, University of Vienna

Over the past two decades the debates around issues of research integrity have been intensified. While everybody agrees that following rules of good scientific practices is essential to the scientific enterprise, in practice this is more complex. Pressure to publish, uncertain research careers and growing demands on researchers, seems to lead to an increase and a diversification of transgression of boundaries. Debates on the low degree of reproducibility of research results, the rising number of retractions of papers, debates of the visualisation of data to “convince” others, overpromising of results despite thin empirical evidence, are but a few examples.

If we want to promote a culture in which integrity is part and parcel of what it means to do excellent research, this means to reflect the many different moments in daily, practical operations when choices are made and the danger of overstepping the line is lurking. This presentation will sketch the core-problems at stake, integrate practical reflection exercises with participants and foster broader debate on these issues.

INSIDE NATURE RESEARCH

Publication policies, editorial processes, scientific writing and publishing

Friday 9 February at 14:50 - 18:40 by Silvia Milana, Nature Research

The workshop will cover several aspects of scientific publishing, including what makes a good paper, elements of writing style, common issues in scientific writing, how to write an abstract, what key questions should be addressed in each section of a paper, data management and presentation, authorship and authors’ responsibilities, understanding peer review, the editorial process from submission to acceptance, the editorial criteria, plagiarism and other ethical issues.

The scientific programme of the Graphene Study 2018 includes two workshops aiming to broaden the perspectives of research and also provide useful tips and hands-on exercises.



Ulrike Felt, University of Vienna



Silvia Milana, Nature Research

ARE YOU PRESENTING A POSTER?

The programme of Graphene Study 2018 winter edition has two poster sessions:

Poster Session One - Tuesday 06 February, 19:00 - 21:00

Poster Session Two - Wednesday 07 February, 16:15 - 18:15

Please consider the following in case you are presenting a poster:

- The size of the poster board is 1200 mm (tall) x 900 mm (wide). The poster board can take an A0 poster in 'Portrait' layout (A0 prints measure 841mm x 1189mm). Your poster number is located at the top left-hand corner of the board. Find your poster board number in the online programme (available at a later point) and on the signs at the venue. Push pins will be available for your use.
- The way you present your poster is your choice – many people bring one poster to fit the board and some bring several mounted boards and spread them across the poster board. Do not mount a poster larger than the area allowed, it will be removed.
- Each participant will have 2 hours to discuss their poster. During the presentation, members of the committee will question participants about their presentation, touching on hypothesis, methods, results and conclusions.
- The poster should be in place during the lunch (13:00-14:00) of the day of your poster session, and removed during the coffee-break (10:40-11:00) of the next day.

Poster Award and Ceremony

Each winning poster recipient will receive a certificate, acknowledging them as poster finalists and they will be recognized at the awards ceremony held during the Farewell Dinner.

The scientific committee will identify three best posters based on:

- significance of findings.
- visual impact of the poster.
- presenter's ability to explain their work/ answer questions.



LIST OF POSTERS

Poster Session I: Tuesday 6 February, 19:00-21:00

Nr.	Name	Affiliation	Poster topic
1	Chiara Trovatello	Politecnico di Milano	Ultrafast coherent oscillations of optical phonons in single layer MoS ₂
2	Daire Tyndall	Trinity College Dublin	Nickel-Iron Layered Double Hydroxides with Enhanced Catalysis of the Oxygen Evolution Reaction
3	Stefano Ippolito	Université de Strasbourg	MoS ₂ nanosheets via electrochemical lithium-ion intercalation under ambient conditions
4	Navid Haghmoradi	Sabanci University	Photodeposition of metallic particles on reduced graphene oxide
5	Quentin Ramasse	SuperSTEM Laboratory	Single atom spectroscopy in 2D materials in the STEM
6	Piotr Ciochoń	Jagiellonian University	Graphene growth on the SiC (0001) surface annealed in silicon flux
7	Jose Ignacio Pascual	Nanogune	Hybrid Ribbons of Graphene
8	Samuel Magorrian	The University of Manchester	Effects of spin-orbit coupling on optical properties of few-layer InSe
9	Marta Mucientes	Lancaster University	Vibrational modes of graphene and Si ₃ N ₄ resonators
10	Shayan Mehraeen	Sabanci University	TiO ₂ /reduced graphene oxide nanocomposite for enhanced high rate capable Li-ion battery anode
11	Veronika Šedajová	Palacký University Olomouc	Synthesis and characterization of graphene derivatives from graphite fluoride
12	Betul Oruc	Sabanci University	Carbon nanotubes decorated with fluorophores as photothermal agents for efficient killing of antibiotic resistant bacteria
13	Oskar Ronan	Trinity College Dublin	In-situ Electrochemical TEM Observations of Si-Nanoparticles
14	Tom Vincent	National Physical Laboratory	Mapping strain and doping in graphene-boron nitride heterostructures
15	George Anagnostopoulos	FORTH/ ICE-HT	CVD graphene treatment with metal-chlorides for transparent heating devices
16	Naeimeh Rajabalizade Mojarad	Sabanci University	Graphene based electrocatalysts for polymer electrolyte membrane fuel cells
17	Ana Barra	University of Aveiro	Structural and morphological study of eco-friendly reduced graphene oxide sheets
18	Zoltán Kovács-Krausz	Budapest University of Technology and Economics	Proximity effect and spin-orbit interaction in graphene/BiTeBr heterostructures
19	Maria Rybarczyk	Gdansk University of Technology	Curved graphene layers obtained from a biopolymer precursor

LIST OF POSTERS

Poster Session II: Wednesday 7 February, 16:15-18:15

Nr.	Name	Affiliation	Poster topic
1	Alexandre Carvalho	Universidade de Aveiro	Laser-induced graphene piezoresistive sensors
2	Mohammad Hadi Khaksaran	Sabanci University	Spontaneous nucleation and growth of graphene on copper
3	Gregor Leuthner	University of Vienna	The role of vacuum composition on irradiation damage in the electron microscope
4	Angelo Lamantia	Lancaster University	Correlation of optical and nanomechanical properties of C60-MoS2 heterostructure
5	Alexandru Ionut Chirita Mihaila	University of Vienna	The predicted influence of temperature on knock-on damage in graphene
6	Elisa Castanon	National Physical Laboratory	Optical and electrical characterisation of Graphene-MoS2 heterostructures
7	Christoph Hofer	University of Vienna	Revealing the 3D structure of graphene defects
8	Leonardo Forcieri	Lancaster University	Ultra-high resolution imaging of 2D molecular networks
9	James Fong	Lancaster University	Fabrication of 2D heterostructures using next-generation materials
10	Oleksandr Ovsianyskyi	TU Berlin	Sensitive chemiresistive H2O2 gas detection on the ppb level based on graphene decorated with Ag nanowires
11	Matteo Eleuteri	Politecnico di Torino	Chemical functionalisation at the edges of graphene-related materials to build thermal molecular junctions between nanosheets.
12	Vanesa Quintano Ramos	CNR-ISOF	Ion transport through graphene oxide membranes
13	Andrea Candini	CNR-ISOF	Graphene electrodes for devices with low-dimensional materials
14	Miika Soikkeli	VTT Technical Research Centre of Finland	CVD graphene mobility enhancement by SAMs
15	Meganne Christian	CNR	Energy storage in 3D graphene composites
16	Yury Stebunov	Moscow Institute of Physics And Technology	Graphene materials for surface plasmon resonance biosensing
17	Alessandro Kovtun	CNR	Charge transport behavior of reduced graphene oxide: understanding the mechanism from single sheet to thin film.
18	Vanja Miskovic	Université Libre de Bruxelles	Influence of graphene coatings on the wicks properties
19	Jana Brndiarova	Slovak Academy of Sciences	Detection of carbon quantum dots by graphene

SOCIAL PROGRAMME

The academic programme of the school is tailored to give ample opportunities for free discussions and networking to be held beyond the lecture hall.

Monday 19:00: Welcome dinner

The organisers of the school welcomes you to the first dinner at the restaurant of the venue (Oberurgl University Center).

Monday 21:00: Cultural cinema night

The dinner is followed by a screening of the movie "Amadeus" from 1984 about the Austrian genius Wolfgang Amadeus Mozart.

Tuesday 21:00: After Poster Party I

Relax after the first poster session while listening to music at the bar of the Oberurgl University Center.

Wednesday 19:00: After Poster Party II

Dip and share - enjoy the Tyrolean speciality, fondue, at the Hohe Mut Alm restaurant at the top of the mountain.

Thursday 14:00: Fri Skiing

An opportunity to try out the slopes of Oberurgl. Team building activity prepared by the organisers.

Thursday 19:30: Night Tobogganing

Slide down a winding, floodlit, three kilometer long natural toboggan run leading from the top of the mountain to the valley.

Friday 18:15: Dinner and Farewell Celebration

Say goodbye to Graphene Study and your new friends with fire, music and glühwein at the venue snow bar. Poster Prize ceremony will be held during dinner.



#MyGrapheneMoment

Some of our delegates already participated in the Graphene Flagship's #MyGrapheneMoment photocontest on social media. This year you'll have a chance to be part of it during the school itself. Share your Graphene Study experience and win a mystery box at the Farewell Ceremony on Friday night.

How to enter?

Upload a photo taken during Graphene Study in Obergurgl on Facebook or Instagram (or both) using the hashtags #MyGrapheneMoment and #GrapheneStudy.

How long will the contest run?

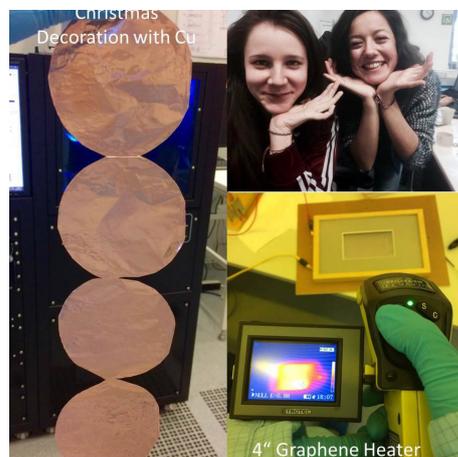
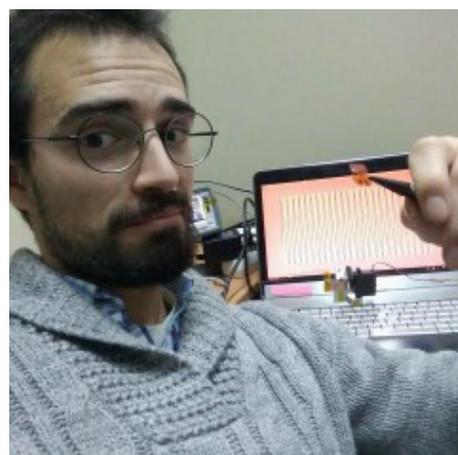
From Monday 5 February, 16:45 until Friday 9 February, 14:00.

Who will win?

The photo that has the most likes at Friday 9 February at 14:00 will be rewarded with a mystery box during the Farewell Celebration. If you have posted the same photo on both Facebook and Instagram and Facebook, the likes in both mediums shall be counted.

Have fun!

#MyGrapheneMoment
#GrapheneStudy



LIST OF DELEGATES

1. Annika Catherine Ackermann, University of Stuttgart, Germany
2. George Anagnostopoulos, FORTH/ ICE-HT, Greece
3. Jesus Barco Montero, Trinity College Dublin, Ireland
4. Ana Barra, University of Aveiro, Portugal
5. Alex Boschi, ISOF Institute of Organic Synthesis and Photoreactivity, Italy
6. Walker Camacho, Tetra Pak Packaging Solutions, Sweden
7. Andrea Candini, ISOF-CNR, Italy
8. Alexandre Carvalho, Universidade de Aveiro, Portugal
9. Elisa Castanon, National Physical Laboratory, United Kingdom
10. Alexandru Ionut Chirita Mihaila, University of Vienna, Austria
11. Meganne Christian, Italian Nation Research Council, Italy
12. Piotr Ciochoń, Jagiellonian University, Poland
13. Matteo Eleuteri, Politecnico di Torino, Italy
14. James Fong, Lancaster University, United Kingdom
15. Leonardo Forcieri, Lancaster University, United Kingdom
16. Navid Haghmoradi, Sabanci University, Turkey
17. Christoph Hofer, University of Vienna, Austria
18. Heena Inani, University of Vienna, Austria
19. Stefano Ippolito, Université de Strasbourg, France
20. Mohammad Hadi Khaksaran, Sabanci University, Turkey
21. Mariia Kim, Aalto University, Finland
22. Georgios Konstantopoulos, National Technical University of Athens, Greece
23. Zoltán Kovács-Krausz, Budapest University of Technology and Economics, Hungary
24. Dorota Kowalczyk, University of Lodz, Poland
25. Alessandro Kovtun, Italian Nation Research Council, Italy
26. Angelo Lamantia, Lancaster University, United Kingdom
27. Gregor Leuthner, University of Vienna, Austria
28. Iaroslav Lutsyk, University of Lodz, Poland
29. Samuel Magorrian, The University of Manchester, United Kingdom
30. Shayan Mehraeen, Sabanci University, Turkey
31. Vanja Miskovic, Université Libre de Bruxelles, Belgium
32. Włodzimierz Mista, Institute of Low Temperature & Structure Research, Poland
33. Marta Mucientes, Lancaster University, United Kingdom
34. Betül Oruc, Sabanci University, Turkey
35. Oleksandr Ovsianytskyi, TU Berlin, Germany
36. Vanesa Quintano Ramos, CNR-ISOF, Italy
37. Janam Rai, Tribhuvan University, Nepal
38. Naeimeh Rajabalizade Mojarrad, Sabanci University, Turkey
39. Oskar Ronan, Trinity College Dublin, Ireland
40. Maria Rybarczyk, Gdansk University of Technology, Poland
41. Veronika Šedajová, Palacký University Olomouc, Czech Republic
42. Miika Soikkeli, VTT Technical Research Centre, Finland
43. Dahnán Spurling, Trinity College Dublin, Ireland
44. Yury Stebunov, Moscow Institute of Physics and Technology, Russian Federation
45. Chiara Trovatiello, Politecnico di Milano, Italy
46. Daire Tyndall, Trinity College Dublin, Ireland
47. Holger Wahl, Wahl Werkzeugbau, Germany
48. Ruud Van Der Weele, E. H. Worlée & Co Bv, Netherlands
49. Tom Vincent, National Physical Laboratory, United Kingdom
50. Georg Zagler, University of Vienna, Austria
51. Jana Brndiarova

The team of the Graphene Flagship is happy to support you during Graphene Study 2018. Feel free to contact us:

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Share your
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#MyGrapheneMoment
experience
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GRAPHENE FLAGSHIP



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