



# GRAPHENE FLAGSHIP

GRAPHENE CONNECT – ENERGY APPLICATIONS



## Programme

### Monday, 20 October

- 14:00- 14:15** Welcome. Helena Theander, deputy Work package Innovation
- 14:15 - 14:45** Popular presentation: Graphene in energy devices, state of the art.  
E. Quesnel, CEA-Liten, leader of Work Package Energy Application
- Session 1:** Energy conversion - Photovoltaics and Fuel cells  
Chair: E. Quesnel
- 14:45 - 15:15** Spotlight on Flagship activities  
Organic PV by E. Kymakis ,Technological Education Institute of Crete  
Low Pt Fuel cells by S. Alkan Gürsel, Sabanci University
- 15:15 - 15:35** Coffee
- 15:35 - 16:35** Industry Perspectives  
Solar cell production - Toby Meyer, Solaronix  
Fuel cell production - Renault Mosdale, PaxiTech
- 16:45 - 17:45** Group Discussions
1. How graphene can serve the energy conversion industry? (Addressing fuel cells and PV in general)  
Moderators: Renault Mosdale, Alkan Gürsel
  2. Beyond PV and fuels cells, what energy conversion application could also benefit from graphene (water splitting, biofuel cells, thermoelectricity ...)?  
Moderators: Francesco Bonaccorso , Amaia Zurutuza
  3. Solar cells (specifically dye solar cell and organic solar cells)  
Moderators: Toby Meyer, E. Quesnel
- 17:45 - 18:15** Plenary session – Results from group discussions.
- 18:15 - 19:00** Matchmaking
- 20:00** Dinner (optional)

## Programme

### Tuesday, 21 October

**09:00 – 09:05** Wrapping up from yesterday Chair: H. Theander

**Session 2:** Energy storage - Battery, supercapacitors, H2 storage  
Chair: Gotthard Seifert, Technical University of Dresden, Germany.

**09:05 – 09:50** Spotlight on Flagship activities:  
Batteries by D. Wei, Nokia.UKL  
Supercapacitors by P. Bondavalli, Thales France, TRT  
H2 storage by V. Tozzini, Consiglio Nazionale delle Ricerche-CNR

**09:50 – 10:30** Industry Perspective:  
Battery production – Alberto Blázquez, CIDETEC  
Graphene production – Amaia Zurutuza, Graphenea

**10:30 – 10:50** Coffee

**10:50 – 12:00** Group Discussion session 2.  
1. Batteries and supercapacitors  
Moderators: Alberto Blázquez , D. Wei  
  
2. H2 storage  
Moderators: V. Tozzini, Gotthard Seifert  
  
3. Energy distribution  
Moderators: E.Quesnel, P. Bondavalli

**12:00 – 12:30** Plenary report from discussion on session 2.

**12:30 – 13:00** Summary, Collaboration opportunity and way forward

**13:00 – 14:00** Lunch

**14:00** End of meeting



**Toby Meyer, Solaronix**

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**Propriétaire, Solaronix SA**

December 1994 – Present (19 years 10 months)  
CEO

**Doctoral student, EPFL-LPI**

December 1993 – November 1996 (3 years)

**Development of a solid-state dye solar cell**

Solaronix is a Swiss company founded in 1993 by the twin brothers Andreas & Toby Meyer. The headquarters are located in Aubonne, facing lake Geneva and the Alps.

The origins of the company belong to the pioneering discovery of a new generation of solar cells at the Swiss Federal Institute of Technology in Lausanne (EPFL). This scientific breakthrough enabled the feasibility of innovative photovoltaic devices with unparalleled features. Solaronix was the first startup company to acquire a license for the Dye Solar Cell technology from EPFL in 1994, with the aim to bring this invention to an industrial level. To do so, Solaronix' high-end scientific and technological expertise is divided into three activities: Materials, Solar Cells, and Equipment.



**Renaut Mosdale, PaxiTech**

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**CEO, PAXITECH SAS**

Renaut MOSDALE received his Ph.D in Electrochemistry and PEMFC from Institut National Polytechnique de Grenoble and CEA, in 1992. He, then, had a post-doctoral position in Texas A&M, College Station, TX, developing fuel cell stacks for both industrial and academic partners. In 1995 he joined PSA (Peugeot SA) to work on fuel cell design and integration in electric vehicles. In 1998, he took part in the creation of the LITEN at the CEA-Grenoble, starting and leading the electrochemical and low temperature fuel cell group. In 2003 he created PaxiTech, with the goals of developing and commercializing planar PEM fuel cells for portable electronic applications, and fuel cell components such as membrane Electrodes Assemblies or Gas Diffusion Electrodes. The company is now one of the leaders for supplying MEAs and GDEs in Europe and in Asia. PaxiTech is also involved in many R&D projects (national or European) on different components for PEMFCs or Microbial Fuel Cells or on complete fuel cell systems.

PaxiTech started delivering the first planar fuel cell modules and fuel cell systems during the last few years. A full range of fuel cell systems (from 10 to few hundred Watts) should be commercially available in the coming year.



## Amaia Zurutuza, Graphenea

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Amaia Zurutuza received her Ph.D. degree in polymer chemistry from the University of Strathclyde in 2002. From 2001 to 2003, she was a Postdoctoral Research Fellow working in two European projects with regard to molecularly imprinted polymers. In 2004, she joined Ferring Pharmaceuticals (previously Controlled Therapeutics) where she was a Senior Polymer Scientist researching new controlled drug delivery systems. Her contribution led to the granting of three patents in novel biodegradable and biostable polymers for the controlled release of active compounds. In 2010, she became the Scientific Director of Graphenea S.A., San Sebastian, Spain. At Graphenea, she leads the research and development activities on graphene-based materials. Since joining Graphenea, she has so far filed for two patents and published in Nature and Science. Through her position at Graphenea, she is working in close cooperation with different companies and research centers to examine a wide range of applications of graphene, such as: energy storage, solar cells, touch screen and display technology, sensors, optical transistors, and light harvesting devices. Her research interests include the synthesis, characterization, and potential industrial applications of graphene.



## Etienne Quesnel, CEA-Grenoble

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Dr Etienne Quesnel, is senior expert at CEA-Grenoble (France) in Material Sciences with more than 90 articles published in peer reviewed journals and international conference proceedings and 16 international patents. He has been working for more than 20 years on thin film technologies mainly for optics, microelectronics and opto-electronic applications.

Currently, inside the CEA-Liten institute (<http://www-liten.cea.fr/>) his major research focus is on nanotechnologies for renewable energy applications. As an example of past activities in that field, he developed a magnetron-based nanoaggregate technology to synthesize metallic NPs for plasmonics in solar cells, and catalysts in fuel cells as well as Ge nanocrystals (QDs) for their integration into 3rd generation solar cell devices. He has been involved in numerous National and European cooperation projects, as technical contributor and / or coordinator like in the recent FP7 SOLAMON and AGATHA projects. Since end of 2013, within the GRAPHENE FLAGSHIP, he is the coordinator of the workpackage on energy applications.



**Alberto Blázquez**  
**University of the Basque Country**

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Dr. Alberto Blázquez Martín has a Ph.D in Chemistry (2005, University of the Basque Country, UPV/EHU). He is Research Scientist and Project Manager in the Battery Unit of the Energy Department. Since 2005 he is involved in the development and electrochemical characterization of active materials, electrolytes and the full system design for lithium ion batteries, Li-S batteries, Metal-Air Batteries and PEMFC. He has participated in several scientific and R&D projects supported by national and international public entities. He is author and co-author of more than 10 SCI papers and 2 patents.



**Prof. Dr. rer. nat. habil. Gotthard Seifert**  
**TU Dresden**

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**Education**

- 1971 - 1975 Study of Chemistry/Diploma TU Dresden, Germany
- 1975 Diploma graduation, TU Dresden, Germany
- 1979 PhD graduation (summa cum laude), TU Dresden, Germany
- 1988 Habilitation in Theoretical Physics, TU Dresden, Germany

**Career**

- 1979 - 1992 Postdoctoral position at Department of Physics (Institute of Theoretical Physics), TU Dresden
- 1992 - 1998 Lecturer (Institute of Theoretical Physics, TU Dresden)
- 1995 apl. Professor (Institute of Theoretical Physics, TU Dresden)
- 1998 - 2001 University Paderborn, Theoretical Physics
- 2001 - 2012 C4-professorship (full professor) for Physical Chemistry at TU Dresden
- 2012 - present C4-professorship (full professor) for Theoretical Chemistry at TU Dresden  
Scientific Focus of Chair.

Fields of research interests are in the areas of Quantum Chemistry, Cluster Physics & Chemistry, Computational Materials Research, Nanostructures



**Selmiye Alkan Gürsel**  
**Polymer Science at Sabancı University**

Dr. Selmiye Alkan Gürsel, is an Associate Professor of Polymer Science at Sabancı University, as well as Faculty Member at Sabancı University Faculty of Engineering and Natural Sciences. Dr. Gürsel received her BSc, MSc and PhD degrees in Chemistry from Middle East Technical University. She spent a year during her PhD at University of Florida as a visiting scholar and worked with Prof. Dr. John Reynolds on electrochromic polymers. Then, she worked as a post-doctoral scientist at Paul Scherrer Institute in Switzerland on fuel cells. Her research interests include polymer electrolyte membrane fuel cells, proton-exchange membranes, graphene, lithium ion batteries, artificial muscles and conducting polymers. She has more than 50 articles published in peer reviewed journals, a book chapter and 2 international patents. Dr. Gürsel was awarded by L'Oreal Young Woman in Science Scholarship 2010, METU Prof. Dr. Mustafa N. PARLAR Eğitim ve Araştırma Vakfı Research Incentive Award 2012, Science Academy -Young Academics Prize Scholarships (BAGEP) 2013. Dr. Gürsel is in the editorial board of *Frontiers in Energy Research-Energy Storage* journal.



**Dr. Di Wei**  
**Nokia**

Dr. Di Wei received the B.Sc. degree from University of Science and Technology of China, and the M.Sc. and Ph.D. degrees (with distinctions) from the Process Chemistry Centre of Finland c/o Abo Akademi University. He has visited Leibniz Institute of Solid State Physics, Dresden and the FMF (Materials Research Centre), Albert-Ludwigs Universität Freiburg, Germany, with the aid of DAAD Scholarship during Ph.D. studies. In 2007, he joined University of Cambridge as the post-doctoral research fellow. Since February 2008, he has been a senior research scientist at NOKIA R&D UK at Cambridge. He has authored over 20 patents, 40 peer-reviewed journal publications, 40 conference proceedings and chapters for 4 books on the topic of nanotechnology and electrochemical applications. His research interests include energy solutions, sensors, organic electronics etc. He has been involved in R&D, technology transfer and high-tech business for more than 6 years.



**Francesco Bonaccorso**  
**Istituto Italiano di Tecnologia**

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Francesco Bonaccorso gained a PhD from the Department of Physics, University of Messina in Italy after working at the Italian National Research Council, the Engineering Department of Cambridge University (UK) and the Department of Physics and Astronomy of Vanderbilt University (USA). In June 2009 he was awarded a Royal Society Newton International Fellowship at the Engineering Department of Cambridge University, and elected to a Research Fellowship at Hughes Hall, Cambridge. He is currently Researcher at the Istituto Italiano di Tecnologia, Graphene Labs. He was responsible in defining the ten years scientific and technological roadmap for the graphene flagship programme. His research interests encompass solution processing of carbon nanomaterials (such as graphene, nanotubes and nanodiamonds) and inorganic layered materials, their spectroscopic characterization, incorporation into polymer composites and application in solar cells, lithium-ion batteries, light emitting devices and ultrafast lasers.



**Paolo Bondavalli**  
**Thales Research and Technology**

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Dr. Paolo Bondavalli, Msc, PhD, Hdr is the Head of Nano-material team at Thales Research and Technology (CNRS/Thales, UMR137) and he is a member of the Nanocarb Lab. (joint team Ecole Polytechnique/Thales). His research has principally dealt with carbon nanotubes gas sensors and silicon nanowires for biological detection. In the last two years, he is the first author of several scientific papers (see refs in project) dealing with CNTFET based sensors, supercapacitors and of 6 patents dealing with gas sensors, thermal management through CNTs, nanomaterials deposition, supercapacitors and memristor-like structures. Presently his work is focused on the development of new materials (e.g. graphene, cnts, nanowires) for the new generation of electronics devices and for energy storage applications and memristor. Dr Bondavalli has received his Hdr in 2011, at Paris-Sud on a work on “devices based on random network of carbon nanotubes”. He is EU expert, and Vice-Chairman, for Marie Curie Fellowships (EIF, IIF, OIF, CIG, IRSES), NMP and ICT panel, for the French National Research Agency (ANR), EDA, Eureka and reviewer for IOP, ACS, IEEE, ECS, Elsevier, EPJ B, Bentham, Taylor & Francis... During the last five years, he has participated, also as coordinator, in several EU projects (concerning MEMS, MOEMS, CNTs, graphene, spintronics) and ANR projects. He is involved in the Graphene Flagship initiative (Energy and High-frequency WPs).





## Emmanuel Kymakis, T.E.I

Emmanuel Kymakis is an Associate Professor at the Electrical Engineering Department of the Technological Educational Institute (T.E.I) of Crete, where he heads the Nanomaterials and Organic Electronics group of the Center of Advanced Materials & Photonics. He received the B.Eng. (First Class Honors) degree in Electrical Engineering & Electronics from Liverpool University in 1999 and the Ph.D. degree in Electrical Engineering from Cambridge University in 2003. He and Prof. Gehan Amaratunga are the inventors of the polymer-nanotube solar cell. Before joining TEI of Crete, he was a technical consultant offering engineering and consultancy services in the field of photovoltaic and solar thermal power plants for various Greek and international investors and private companies. His technological interests are in the synthesis and solution processing of novel carbon nanomaterials and their incorporation into organic electronic devices. His research topics presently include investigation of the opto-electronic properties of graphene, carbon nanotubes, layered crystals and inorganic-organic hybrids for the development of low cost next generation flexible photovoltaic devices, compatible with roll-to-roll large area manufacturing methods. He has over 50 SCI publications with over 2800 citations on these topics and has given 30 invited lectures. He has been selected as an honorary lecturer in the UConn, and was a recipient of an Isaac Newton and an EPSRC studentship during his PhD studies in Cambridge. Prof. Kymakis is the Greek national representative in two COST actions (MP1307: Stable Next-Generation Photovoltaics; MP1202: Rational design of hybrid organic-inorganic interfaces) and a member of the EU Graphene Flagship Consortium. He was recently named by RSC as a 2014 ChemComm Emerging Investigator and has won the Excellence Award for young scientists by the Greek General Secretariat of Research & Technology.

## Valentina Tozzini

### Education

- 1993: Laurea (Master Degree) in Physics, Università di Pisa, Italy
- 1993: Diploma di Licenza in Fisica, Scuola Normale Superiore, Pisa
- 1997: PhD in Physics, Scuola Normale Superiore
- 1999: Medical Physics Specialization, Università di Pisa

### Career

- 1997 - 1999: Post-Doc fellowship (INFM-SNS, Pisa)
- 1999 - 2000: Visiting researcher at the University of Nijmegen (NL)
- 2000 - 2003: Scientist at NEST-INFM, SNS, Pisa
- 2003 - 2004: Visiting Scholar at the University of California - San Diego
- 2003 - 2009: Scientist at NEST-CNR-INFM, SNS, Pisa
- 2010 - present: Scientist at NEST-CNR-Istituto Nanoscienze, SNS, Pisa

### Teaching

- 2009-present: Joint professor of Biophysics for the Degree in Medical Physics, University of Pisa
- 2007-2012: Lessons within the courses of Molecular Biophysics, Introduction to the condensed matter physics for biologists and Computational structural biology for PhD students at SNS
- 2008: Lessons at the CTBP Summer School Coarse Grained Physical Modeling of Biological Systems;
- 2006-2007: Course for the PhD in Applied Physics at the University of Pisa