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THERMINIC²⁰¹⁵

((21st INTERNATIONAL WORKSHOP
Thermal Investigations of ICs and Systems))

SEPTEMBER 30 – OCTOBER 2, 2015 @ PARIS, FR



PROGRAMME

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PREFACE

WELCOME TO THERMINIC 2015!

This 21st edition of THERMINIC is again the main European event for academics and industry to share recent advancements in heat transfer issues in the field of microelectronics and optoelectronics. Following the workshops held in Grenoble (1995), Budapest (1996), Cannes (1997 and 1998), Rome (1999), Budapest (2000), Paris (2001), Madrid (2002), Aix-en-Provence (2003), Sophia Antipolis (2004), Belgirate (2005), Nice (2006), Budapest (2007), Rome (2008), Leuven (2009), Barcelona (2010), Paris (2011), Budapest (2012), Berlin (2013), and Greenwich (2014), Therminic 2015 will once more propose a strong technical program, with 46 oral and 22 poster presentations organized in 13 sessions. Almost 100 conference delegates from 20 countries are joining us this year.

This program has been designed as a navigator for your conference participation. It includes not just all the sessions, presentations and evening events, but also the timetable and crucial information to help make the most of your stay in Paris. Note that the days have been color-coded for easier handling.

Each day starts with a keynote by a global player from industry or academy. Bernd Gotsmann (IBM Research), Perceval Coudrain (STMicroElectronics) and Ravi Prasher (Lawrence Berkeley Lab & previously Intel) will share their insights on thermal challenges for nanoscale characterisation, for microprocessors and on small scale energy management.

Wednesday morning through to Friday morning are dedicated to technological and scientific sessions, which have been organized into 11 main thermal topics. A review on the progresses of the QuantiHeat European network will be proposed Friday afternoon along 2 sessions.

Don't forget the conference's evening program. The cocktail reception on Wednesday evening in the poster area will be an opportunity to start discussions on new potential and exciting recent projects. Then enjoy the dinner in the guided boat tour on the Seine river at THERMINIC's Thursday night.

We wish that THERMINIC 2015 will be an intense moment of knowledge sharing and exciting encounters with new or trusted colleagues. Please bring your ideas, comments and suggestions – anything at all that you feel will help us provide a better service to you.

We look forward to sharing with you a great "Indian summer" conference in Paris at THERMINIC 2015.



Sebastian Volz

Programme Chair, Chair of the Therminic Workshop Steering Committee



Bernhard Wunderle
General Chair



Chris Bailey
Vice General Chair



Sebastian Volz
Programme Chair



John Parry
Publicity Chair

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Bernhard Wunderle, TU Chemnitz, Germany

Vice General Chair:

Chris Bailey, University of Greenwich, UK

Programme Chair:

Sebastian Volz, CNRS, Ecole Centrale Paris, France

Publicity Chair:

John Parry, Mentor Graphics, UK

Steering Committee:

- C. Bailey, University of Greenwich, UK
- B. Courtois, CMP, France
- J. Janssen, NXP Semiconductors, The Netherlands
- W. Luiten, Philips Research, The Netherlands
- A. Napieralski, TU Lodz, Poland
- J. Parry, Mentor Graphics, UK
- M. Rencz, Budapest University of Technology & Economics, Hungary
- A. Rubio, U. Politècnica de Catalunya, Spain
- B. Wunderle, Chemnitz University of Technology, Germany (chair)
- A. Ziaei, Thales Research, France

Programme Commitee:

Name	Company
M. Abo Ras	Berliner Nanotest und Design GmbH, Germany
J. Ahopelto	VTT Espoo, Finland
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K. Chakrabarty	Duke University, Durham, USA
O. Chapuis	CIN2-CSIC, Barcelona, Spain

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B. Michel	Fraunhofer Institute for Electronic Nanosystems ENAS, Germany
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J. Ordóñez Miranda	PRIME CNRS Institute, Poitiers, France
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X. Perpina	Centro Nacional de Microelectrónica, Spain
T. Persoons	Purdue University, USA
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Y. Scudeller	E.Polytech. U. Nantes, France
S. Stoyanov	University of Greenwich, UK
A. Tay	NUS, Singapore
V. Tsoi	Huawei Technologies, Sweden
W. Van Driel	Philips Lighting, The Netherlands
B. Vandeveld	IMEC, Belgium
S. Volz	Ecole Centrale Paris, France
J. Yu	Philips Research, The Netherlands
T. Zahner	OSRAM, Germany

GENERAL
INFORMATION

CONFERENCE VENUE

The Conference will be held at the hotel Novotel Vaugirard, right in the center of Paris.

NOVOTEL VAUGIRARD

257 rue de Vaugirard, 75015 Paris.
www.novotel.com/de/hotel-1978-novotel-paris-vaugirard-montparnasse/index.shtml

HOW TO FIND YOUR WAY AROUND

We have booked the hotel's entire first floor for the Therminic 2015 Workshop. The plenary sessions will take place at the conference room Opera and the session overviews are designed to help you find your way around. Coffee breaks will be offered outside the main session room in the exhibition area. Catering lunch will be served in the restaurant on the first floor.

WARDROBE AND BAGGAGE CHECK

Wardrobe and baggage check are available on the ground floor, next to the registration desk.

CONFERENCE REGISTRATION

The conference registration fee includes admission to all conference sessions and the poster one. The conference package includes a download link for the electronic proceedings, a list of registered conference participants and authors, lunch and refreshments during breaks. Regular participants have free admission to the boat trip with the conference dinner. For accompanying persons extra tickets can be purchased for this event.

THE REGISTRATION DESK IS OPEN

Tuesday, September 29, 2015	06.30 pm – 08.30 pm
Wednesday, September 30, 2015	08.00 am – 06.30 pm
Thursday, October 1, 2015	08.30 am – 06.30 pm
Friday, October 2, 2015	08.30 am – 03.00 pm

DOOR REGISTRATION FEES

Regular Workshop Participation: £ 750
IEEE or Committee Member Workshop Participation: £ 690
Gala Dinner // River Seine Cruise: £ 70

PAYMENT

The registration fee must be credited towards the conference account no later than September 25, 2015. All transfer charges must be covered by the participant's bank. If payments are not received by September 25, 2015; you can pay at the conference site.

CONTACT INFORMATION AND ASSISTANCE DURING THE CONFERENCE

Don't hesitate to approach us at the registration desk if you have any questions or requests. Our aim is to help you make the most of your conference participation.

DIETARY REQUIREMENTS

The rich buffet lunch is designed to cater for a wide variety of dietary requirements and tastes. When in doubt, please consult one of the chefs serving the food, they will be able to give you detailed information.

INTERNET ACCESS

The hotel kindly provides all conference delegates with free wireless Internet access throughout the conference. Login-information is available at the registration counter.

Please remember to log out when not using the Internet in order to avoid jammed lines.

CONFERENCE LANGUAGE AND PROCEEDINGS

The official language of all presentations is English. The electronic conference proceedings will be made available as a download link to participants before the conference.

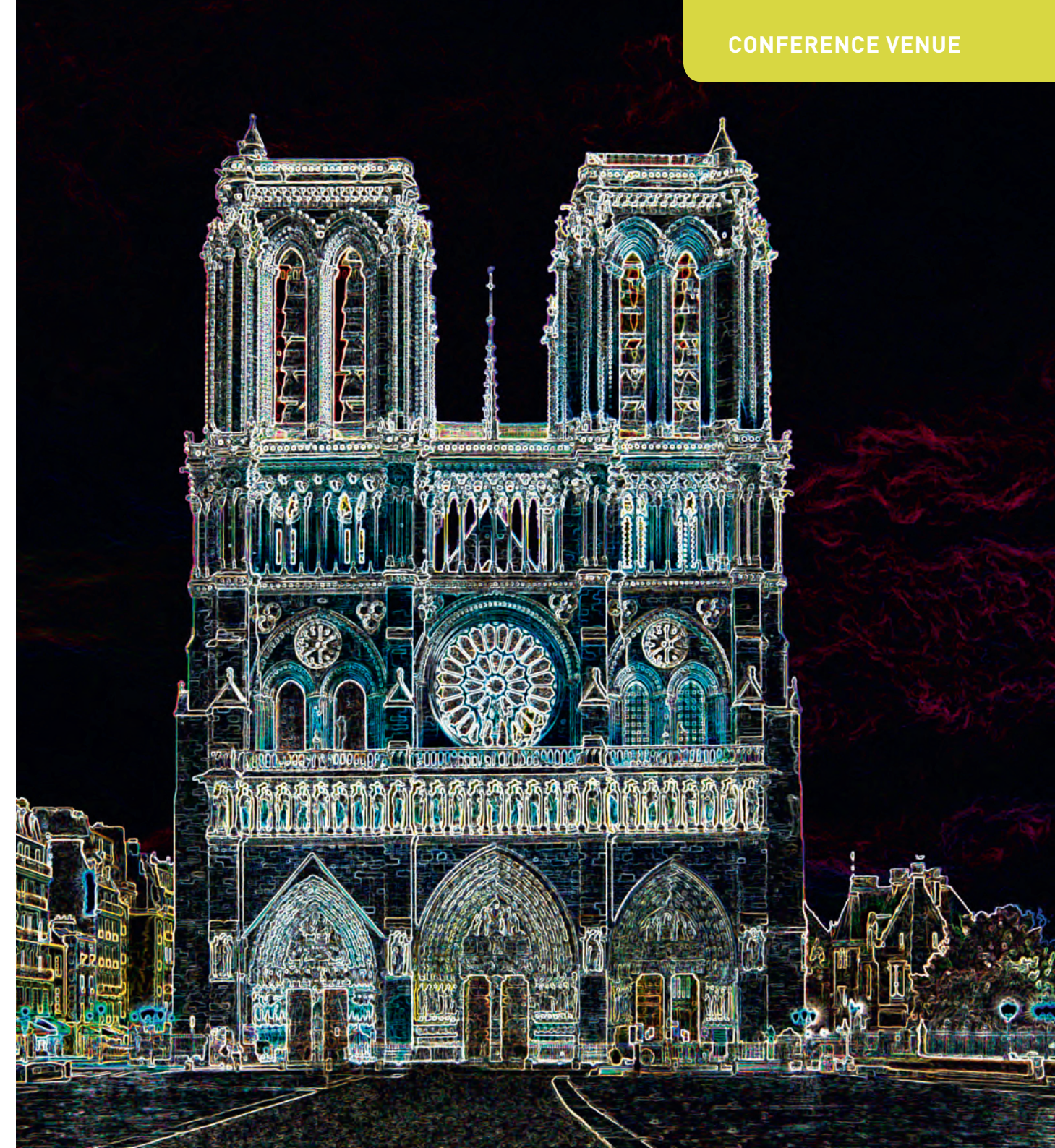
CONFERENCE VENUE

NOVOTEL VAUGIRARD

257 rue de Vaugirard
75015 Paris.
France

PUBLIC TRANSPORT

Transport links to the conference venue from train station and airports are excellent, details can be found on our website. The station nearest to the hotel is "Vaugirard" on metro line 12 (the dark green line).



VENDOR
COMPANIES

NANOTEST

Berliner Nanotest und Design GmbH is an experienced expert for thermal characterization, analysis and simulation. With services and solutions addressing the whole range from material level up to electric, electro-mechanical and thermoelectric components and systems Nanotest is a valuable partner in material and process development as well as system design and reliability concerns.

At our booth we present our standardized test stand TIMA for thermal characterization of interface materials and a new specialized test stand for high thermally conductive materials.

CONTACT:

Berliner Nanotest und Design GmbH | Mohamad Abo Ras
Volmerstraße 9B, 1. OG | 12489 Berlin, DE
Phone.: +49 (0) 30 6392 3880 | aboras@nanotest.org | www.nanotest.org

MENTOR GRAPHICS

Mentor Graphics – Mechanical Analysis leads the market in electronics thermal design software. Our team are at THERMINIC to discuss thermal design, thermal characterization and reliability requirements and are happy to answer any questions about these topics. More information on Mentor Graphics products, including FloTHERM V11, FloTHERM XT Ultra and MicReD's T3Ster and Industrial Power Tester 1500A for active power cycling of high-current devices like IGBTs and MOSFETs, is available from our booth.

CONTACT:

Mentor Graphics Corp., Mechanical Analysis | Dr John Parry, CEng, CITP
81 Bridge Road, Hampton Court, Surrey, KT8 9HH, UK
Phone: +44 (0) 20 8487 3108 | john_parry@mentor.com
www.mentor.com/mechanical

WATTDESIGN

Wattdesign will be exhibiting 6SigmaET – the leading thermal simulation tool to electronics cooling design and, thanks to its ease-of-use, overcomes many of the problems that have plagued analysis tools from the beginning. Boasting substantial automation and intelligence, 6SigmaET is already being used by a global community of design engineers. Wattdesign is the sales representative for 6SigmaET in French speaking territories. With many years' experience in electronics thermal analysis Wattdesign also provides expert support and training to their customers.

CONTACT:

wattdesign | Loic Letonnellier
30 rue Jean Rostand | 91893 ORSAY Cedex, FR
Phone: +33 1 60 13 50 35 | loic.letonnellier@wattdesign.fr | www.wattdesign.fr



SPONSORS

The organizers would like to express their thanks to the following companies for their support.

MENTOR GRAPHICS

Mentor Graphics' electronics thermal design software FloTHERM®, FloTHERM® PCB, FloTHERM® XT Ultra and FloEFD™ help to predict airflow, temperature and heat transfer in components, boards and complete systems, found in the automotive, aerospace, consumer, computing, and telecom industries. These software solutions are complemented by T3Ster®, a range of thermal characterization hardware measuring the thermal resistances and capacitances in the heat flow path from the die junction to the ambient, identifying material properties and interfacial resistances. Options include characterization of high power applications like IGBTs, photo-thermal characterization of HB LEDs and accurate measurement of TIMs, complemented by active power cycling hardware for reliability testing.

Contact: john_parry@mentor.com | mentor.com

6SIGMAET

6SigmaET – the leading thermal simulation tool tailor made for the electronics industry. 6SigmaET brings new levels of productivity to electronics cooling design and, thanks to its ease-of-use, overcomes many of the problems that have plagued analysis tools from the beginning. Boasting substantial automation and intelligence, 6SigmaET is already being used by a global community of design engineers.

Contact: tom.gregory@6SigmaET.info | www.6sigmaet.info

NXP SEMICONDUCTORS

The electronics industry is being driven by four mega trends that are helping shape our society: Energy Efficiency, Connected Devices, Security and Health. Connecting to these trends and enabling Secure Connections for a Smarter World, NXP Semiconductors N.V. (NASDAQ: NXPI) creates solutions for the Connected Car, Cyber Security, Portable & Wearable and the Internet of Things. Through our innovations, customers across a wide variety of industries – including automotive, security, connected devices, lighting, industrial and infrastructure – are able to differentiate their products through features, cost of ownership and/or time-to-market.

Contact: j.h.j.janssen@nxp.com | nxp.com

HUAWEI TECHNOLOGIES

Huawei is a global leader of ICT solutions. Continuously innovating based on customer needs, we are committed to enhancing customer experiences and creating maximum value for telecom carriers, enterprises, and consumers. Our telecom network equipment, IT products and solutions, and smart devices are used in 170 countries and regions. Huawei ranked 285th on the Global Fortune 500 based on its revenue in 2013. In 2014, the company's revenue reached approximately USD 46.5 billion. We invest over 10% of our annual sales revenue into R&D and more than 45% of our 170,000 employees engage in R&D. Leveraging our experience and expertise in the ICT sector, we help bridge the digital divide and promote high-quality broadband connectivity for all. Huawei thermal team was founded in 2000, today consist of 120 engineers & researchers, contributing to the sustainable and green solutions that enable customers to reduce power consumption, carbon emissions, and resource costs, continuously explore higher performance and efficient cooling innovation, such as liquid cooling, enhanced natural convection, reliable forced air cooling and noise management.

Contact: vadim.tsoi@huawei.com | huawei.com



SPONSORS

The organizers would like to express their thanks to the following companies for their support.

SOCIÉTÉ FRANÇAISE DE THERMIQUE

The French Thermal Society (SFT) was created in 1961 as industrial partners and engineering schools, it was extended in 1972 to include the French academic actors. Its objectives are the development and the promotion of Thermal Sciences as sciences and their applications especially in the field of energy. It ensures the relationships between the heat transfer community and the other communities. SFT promotes and organizes heat transfer in the industry, in the educational system and in the research community. It strengthens the link between researchers and industries and represents Thermal Sciences and French heat transfer fellows at the national, European and international levels.

Contact: paul.vallette@univ-lorraine.fr | sft.asso.fr

THALES

Thales Research & Technology (TRT) is the international network of Thales corporate research laboratories. TRT is tasked with extending the influence of Thales within the scientific and technical community, providing a platform for innovation and knowledge sharing, attracting talented science graduates to expand in-house expertise. TRT operates a global network of corporate research laboratories, most of which are located on university campuses close to the company's research partners. In addition to the Palaiseau site south of Paris, TRT operates laboratories in Reading in the United Kingdom, Delft in the Netherlands, Singapore and Canada.

Contact: afshin.ziaei@thalesgroup.com | thalesgroup.com/en

NANOTHERM PROJECT

The NANOTHERM project deals with the development, integration and manufacturability of advanced interface technologies for superior thermal and thermo-mechanical design for heterogeneously integrated power systems on different platforms for different market segments in the industry. The NANOTHERM project will develop new high-performance interconnection and integration technologies for the reliable integration of different advanced thermal systems for industry demonstrators and different applications. System performance will be increased by the technology advancement, the cost of power systems will be reduced by More-than-Moore. Nanotechnology materials properties will be enhanced. The development are supported by first class modelling, simulation and characterisation techniques from materials level to systems level.

Contact: project-nanotherm.com

NANOTEST

The Berliner Nanotest und Design GmbH is a full-scale provider for thermal characterization and analysis services and solutions. Besides standard solutions, Nanotest is a specialist for development of customer-specified solutions in regard to their application field. As an actor in thermal management and reliability investigation, Nanotest is committed to national and international knowledge exchange. Therefore Nanotest participates in various German and European joint projects and presents latest developments and progresses on exhibitions and conferences on a regular basis.

Contact: [Mohamad Abo Ras](mailto:Mohamad.Abo.Ras@nanotest.org) | www.nanotest.org



THALES



KEYNOTE SPEAKERS

RAVI PRASHER

Sheetak Inc., Austin, Texas, USA

Ravi Prasher is the VP of product development of Sheetak Inc., a technology startup. Sheetak is developing solid-state thermoelectric devices based on its proprietary thermoelectric modules. Ravi was also an adjunct professor in the school of engineering at ASU from 2005 – 2013. Ravi earlier worked as one of the first program directors at Advanced Research Projects Agency – Energy (ARPA-E) in US DOE. Prior to joining DARPA-E, Ravi was the technology development manager of thermal management group at Intel. Ravi has published more than 85 archival journal papers and holds more than 30 patents. He is a fellow of ASME, a senior member of IEEE, and works on the editorial committee of multiple journals. Ravi obtained his B.Tech. from IIT Delhi and Ph.D. from Arizona State University.

BERND GOTSMAN

IBM RESEARCH, ZURICH, SWITZERLAND

Bernd Gotsmann (www.zurich.ibm.com) is a Research Staff Member in the Materials Integration & Nanoscale Devices group of the Science & Technology department at IBM Research – Zurich. Bernd Gotsmann studied Physics at the University of Muenster, Germany, and the University of York, UK. After receiving his PhD he joined IBM in 2001 as a postdoctoral fellow and became a Research Staff Member in 2006. His research is focused on nanoscale electronics with applications in thermal transport, thermoelectricity, tribology, molecular electronics and nanomechanics.

PERCEVAL COUDRAIN

STMICROELECTRONICS, FRANCE

Dr. Perceval Coudrain received a MS degree in Material Sciences in 2001 and a PhD degree from Institut Supérieur de l'Aéronautique et de l'Espace in Toulouse, France, in 2009. He worked in Taiwan in 2000 on thin film deposition for micro-batteries and infrared bolometers. He joined STMicroelectronics in 2002 as a CVD process engineer in Crolles and moved to the advanced R&D group in 2005. He worked on the early development of backside illumination and monolithic 3D integrations of CMOS Image sensors for highly miniaturized pixels. Since 2009, he is with the 3D-Interconnects Group, and based at CEA-Leti in Grenoble, focusing on TSV-based 3D integrations. His research interests include TSV-middle integration, Cu-Cu/SiO2-SiO2 direct hybrid bonding for high density interconnections and thermal management for 3D circuits. He occasionally serves as an expert for the French Research Agency and is member of the EPTC Technical Committee on Emerging Technologies. He is author or co-author of more than 50 international publications and 10 international patents.



Ravi Prasher



Bernd Gotsman



Perceval Coudrain

Wednesday, September 30, 2015

Registration

🕒 8.00 am – 9.00 am

Welcome

🕒 9.00 am – 9.10 am

Keynote I:

Thermometry of Self-heated Nanoscale Devices
Bernd Gotsman, IBM Research, Zurich, Switzerland
Chair: Sebastian Volz, CNRS

🕒 9.10 am – 9.50 am

→ Session 1: Thermal Phenomena on the Nanoscale I

🕒 9.50 am – 10.50 am

Coffee Break

🕒 10.50 am – 11.20 am

→ Session 2: Design and Simulation I

🕒 11.20 am – 12.40 pm

Lunch

🕒 12.40 am – 2.10 pm

→ Session 3: Thermal Materials I

🕒 2.10 pm – 3.30 pm

Coffee Break

🕒 3.30 pm – 4.00 pm

→ Session 4: Vendors Session

🕒 4.00 pm – 4.50 pm

→ Session 5: Poster Session

🕒 4.50 pm – 6.20 pm

Poster Session & Cocktails

🕒 6.20 pm – 8.10 pm

SESSIONS 1 – 2

Session 1:
Thermal Phenomena on the Nanoscale I

🕒 9.50 am – 10.50 am

➔ Chair: Sebastian Volz, CNRS

9.50 am **Bi2Te3 Nanowires and Nanotubes for Thermoelectric Applications**

Konstantinos Termentzidis, Shen Li, Laurent Chaput, David Lacroix
Université de Lorraine, LEMTA UMR, CNRS Faculté des Sciences et Technologies, France

10.10 am **Determination of the Phonon Mean Free Path of Dielectric Thin Films**

Jose Ordonez-Miranda, Sebastian Volz
CNRS, France

10.30 am **Measurement of the In-plane Thermal Conductivity of SiO2 Thin Films due to Surface Phonon-polaritons**

Laurent Tranchant^{1,2}, Jose Ordonez-Miranda², Taihei Matsumoto¹,
Sergei Gluchko², Thomas Antoni^{2,3}, Sebastian Volz², Koji Miyazaki¹
¹*Kyushu Institute of Technology, Japan*; ²*École Centrale Paris, France*;
³*École Centrale Paris, École Normale Supérieure de Cachan, France*

Coffee Break

🕒 10.50 am – 11.20 am

Session 2:
Design and Simulation I

🕒 11.20 am – 12.40 pm

➔ Chairs: John Janssen, NXP Semiconductors / Marcin Janicki, Lodz University

11.20 am **Matrix Reduction Tool for Creating Boundary Condition Independent Dynamic Compact Thermal Models**

Lorenzo Codecasa¹, Vincenzo d'Alessandro², Alessandro Magnani²,
Niccolò Rinaldi²
¹*Politecnico di Milano, Italy*; ²*University Federico II, Italy*

11.40 pm **The Comparison of FinFET Thermal Distributed Models**

Mariusz Zubert, Marcin Janicki, Tomasz Raszkowski,
Andrzej Napieralski
Lodz University of Technology, Poland

12.00 pm **Combined Power Delivery and Cooling for High Density, High Efficiency Microservers**

Matteo Cossale, Stephan Paredes, Ronald Luijten, Bruno Michel
IBM Research - Zurich, Switzerland

12.20 pm **Thermal-Electronic Circuits: Basics, Simulations, Experiments**

János Mizsei¹, Márton C. Bein¹, Jyrki Lappalainen², László Juhász¹
¹*Budapest University of Technology and Economics, Hungary*; ²*University of Oulu, Finland*

Lunch

🕒 12.40 pm – 2.10 pm

SESSIONS 3 – 4

Session 3:
Thermal Materials I

🕒 2.10 pm – 3.30 pm

➔ Chair: Laurent Divay, Thales R&T | Gabor Farkas, Mentor Graphics MAD

2.10 pm Thermal Conductivity of Epitaxially Grown InP on Si
Emigdio Chavez-Angel¹, Himanshu Kataria², Reza Sanatinia²,
Srinivasan Anand², Sebastian Lourdudoss², Clivia M. Sotomayor
Torres^{1,2}
¹ICN2- Catalan Institute of Nanoscience and Nanotechnology and
ICREA, Spain; ²KTH Royal Institute of Technology, Sweden

**2.30 pm An Application Specific Additive Design Methodology for the
Determination of Heatsink Geometry Topologies**
Robin Bornoff, John Parry
Mentor Graphics, United Kingdom

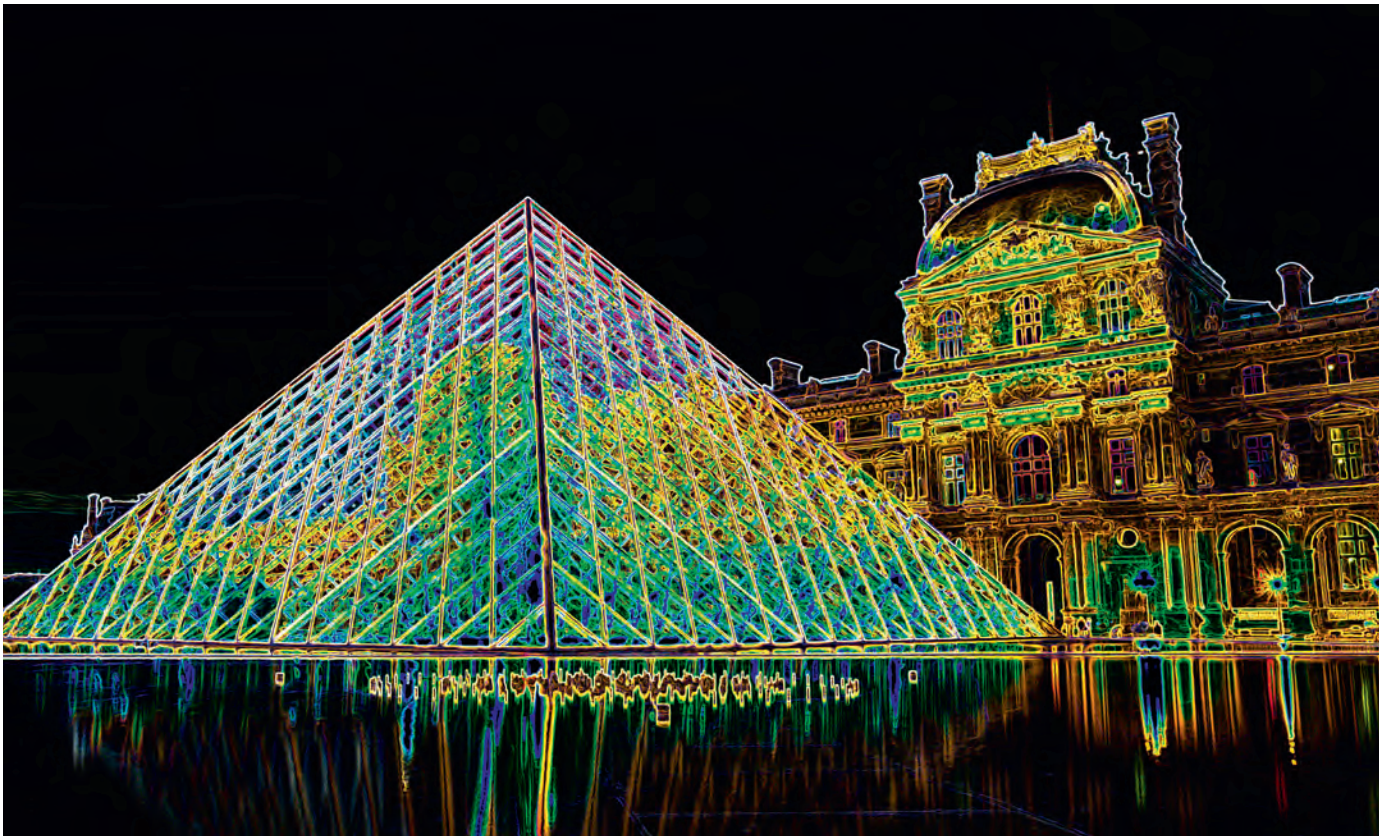
**2.50 pm Thermoelectric Characterization of Nanostructured Selenium
Doped Bismuth Telluride Obtained by a Solution Route**
Romain Bude^{1,2}, Laurent Divay¹, Renato Bisaro¹, Bernard Servet¹,
Elodie Leveugle¹, Frédéric Wyczisk¹, Dominique Carisetti¹, Afshin
Ziaei¹, Sebastian Volz²
¹Thales Research & Technology, France; ²CNRS, Ecole Centrale Paris,
France

**3.10 pm Tuning the Thermal Conductivity of Polycrystalline Films via
Multiscale Structural Defects and Oxidation**
Juliana Jaramillo-Fernandez^{1,2}, Jose Ordonez-Miranda¹, Wassim
Kassem¹, Emmanuel Ollier², Sebastian Volz¹
¹Laboratoire d'Energétique Moléculaire et Macroscopique, Combustion,
EM2C, UPR CNRS, CentraleSupélec, France; ²Laboratoire de Récupéra-
tion des Micro-énergies LRME/LITEN/DTNM/SERE, CEA, France

Coffee break
🕒 3.30 pm – 4.00 pm

Session 4:
Vendors Session
🕒 4.00 pm – 4.50 pm

➔ Chair: Vadim Tsoi, Huawei Technologies Sweden AB



POSTER SESSION

Session 5
Poster Session

🕒 4.50 pm – 6.20 pm

➔ Chair: Chair: Sebastian Volz, CNRS | Jose Ordonez-Miranda, CNRS

- 01

Size Effect on Photoluminescent Microcrystals for Temperature Sensing

Gary Degliame¹, Nathalie Trannoy¹, Jean-Pierre Jouart¹, Madjid Dia²

¹Université de Reims Champagne-Ardenne EA, France; ²Université Badji Mokhtar-Annaba, Algérie
- 02

Practical Aanalytical Steady-state Temperature Solution for Annealed Pyrolytic Graphite Heat Spreader

Eric Monier-Vinard¹, Minh-Nhat Nguyen^{1,2}, Najib Laraqi², Valentin Bissuel¹, Olivier Daniel¹

¹Thales Corporate Engineering, France; ²Université Paris Ouest, Laboratoire Thermique Interfaces Environnement, France
- 03

Characterization of Thermal Vias for 3D ICs Using FEM Analysis

Melvin Galicia, Piotr Zajac, Cezary Maj, Andrzej Napieralski

Łódź University of Technology, Poland
- 04

Enhanced Thermal Characterization Method of Microscale Heatsink Structures

Gábor Takács, Péter Gábor Szabó, György Bognár

Budapest University of Technology and Economics, Hungary
- 05

Experimental Characterization of DELPHI Compact Thermal Model for Surface-Mounted Soft Magnetic Composite Inductor

Eric Monier-Vinard¹, Valentin Bissuel¹, Najib Laraqi², Olivier Daniel¹, Didier Signing^{1,3}

¹Thales Corporate Engineering, France; ²Université Paris Ouest, France; ³Ecole Nationale Supérieure d'Electricité et de Mécanique de Nancy, France

- 06

Mathematical Simulation of Thermomechanical Stress of Erosion Resistant Gradient Coatings on the Basis of W-Ni, Mo-Ni for Electrodes of Magnetically Operated MEMS-switches

Dmitry Suvorov, Sergey Karabanov, Gennady Gololobov, Viktor Gurov, Dmitry Tarabrin, Evgeny Slivkin

Ryazan State Radio Engineering University, Russian Federation
- 07

Transient Thermal Modeling of Aluminum Electrolytic Capacitors Under Varying Mounting Boundary Conditions

Philipp Freiburger

Robert Bosch GmbH, Germany
- 08

Simulation Concept for the Comprehensive Assessment of the Transient Electro-thermal Performance for PCB ECUs in Automotive Applications

Daniel Krätschmer, Matthias Werner, Rössle Andreas

Robert Bosch GmbH Automotive Electronics Germany
- 09

Thermal Modeling for FinFET NAND Gate Circuits Using a Multi-Block Reduced-Order Model

Ming-C. Cheng, Wangkun Jia, Brian Helenbrook

Clarkson University, United States of America
- 10

CFD Analysis of Flip-Chip Mounted Devices on PCB – A Numerical and Experimental Study

Ralph Schacht^{1,4}, Jeff Punch², Enrico Merten³, Sven Rzepka⁴, Bernd Michel⁴

¹Brandenburgische Technische Universität Cottbus-Senftenberg, Germany; ²Stokes Institute at Limerick University, Ireland; ³Berliner Nanotest and Design GmbH, Berlin, Germany; ⁴Fraunhofer Institut ENAS, Chemnitz, Germany
- 11

Extension of SystemC with Logi-Thermal Simulation Capabilities

Lázár Jani, András Poppe

Budapest University of Technology and Economics, Hungary
- 12

Compact Thermal Modeling of LED Lamps of the Classic A Type

Andreas Kloss

OSRAM GmbH, Germany

POSTER SESSION

- 13

Pushing the Performance Envelop Through Secondary Design Enhancements in Thermally Limited Compact Notebooks

Muhammad Azhar Ali Khan, Eray Uzgoren, Ali Muhtaroglu
Middle East Technical University (Northern Cyprus Campus), Turkey
- 14

Electro Thermo Mechanical Modelling and Analysis of Press Package Diode in Power Electronic Module

P. Rajaguru, H. Lu, Chris Bailey
University of Greenwich, United Kingdom
- 15

In-situ Monitoring of Junction Temperature for Degradation Analysis of Light-emitting Diodes

Byungjin Ma, Sungsoon Choi, Kwan Hun Lee
Korea Electronics Technology Institute, Korea, Republic of South Korea
- 16

The Influence of Phosphor Layer and Sidecoating on the Thermal Performance and the Structural Function of Modern Waver Level High Power LEDs

E Liu, Alexander Hanss, Maximilian Schmid, Gordon Elger
Technische Hochschule Ingolstadt, Germany
- 17

Chemically Enhanced Carbon Nanotubes Based Thermal Interface Materials

Joffrey Daon¹, Elodie Leveugle¹, Christophe Galindo¹, Afshin Ziaei¹, Lilei Ye², Yifeng Fu², Johan Liu³, Jinbo Bai⁴
¹THALES Research & Technology, France; ²SHT Smart High Tech AB; ³Chalmers University, Sweden; ⁴LCMSSM, ECP-CNRS, France
- 18

CFD Modelling of Thermo-electric Devices for Thermal Management in Downhole Tools

Thomas Hughes, Rohitha Weerasinghe
UWE, United Kingdom

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Heat Transfer Modeling of a Dual-side Cooled Microprocessor Chip Stack Considering Micro-channels

Marie Haupt¹, Thomas Brunschwiler², Jürgen Keller¹
¹AMIC GmbH, Germany; ²IBM Research – Zurich, Switzerland
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Identification of Nonlinearities Based on Comparison of Heating and Cooling Curves

Tomasz Torzewicz, Andrzej Czerwonec, Marcin Janicki, Andrzej Napieralski
Lodz University of Technology, Poland
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Free Cooling of IT Components

Colum Patrick Lyons
Marsh Environmental IRL, Ireland
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Thermal Characterization of Silver Sintering Paste as Thermal Interface Using the 3-omega Technique and Raman Thermometry

Sebastian Reparaz¹, M Sledzinska¹, J Gomis-Bresco¹, MR Wagner¹, Ivan Nikitin², Clivia Sotomayor Torres^{1,3}
¹ICN2; ²INFINEON Technologies AG; ³Institució Catalana de Recerca i Estudis Avançats

POSTER SESSION
& COCKTAILS

Poster Session & Cocktails
🕒 6.20 pm – 8.10 pm

Wednesday, September 30, 2015

🕒 6.20 pm – 8.10 pm



Thursday, October 1, 2015

Keynote II:

Thermal Management in Compact Systems - From Wishes to Implementation

Perceval Coudrain, STMicroElectronics, Crolles

Chair: Chris Bailey, University of Greenwich

🕒 8.45 am – 9.25 am

→ Session 6: Reliability & Metrology I

🕒 9.25 am – 10.45 am

Coffee Break

🕒 10.45 am – 11.15 am

→ Session 7: Thermal Materials II

🕒 11.15 am – 12.35 pm

Lunch

🕒 12.35 pm – 1.50 pm

→ Session 8: Thermal Management Concepts

🕒 1.50 pm – 3.10 pm

Coffee Break

🕒 3.10 pm – 3.40 pm

→ Session 9: Reliability & Metrology II

🕒 3.40 pm – 4.40 pm

→ Session 10 Design and Simulation II

🕒 4.40 pm – 6.20 pm

Gala Event: Boat Trip & Conference Dinner

🕒 7.30 pm – 10.00 pm

SESSIONS 6 – 7

Session 6: Reliability & Metrology I

🕒 9.25 am – 10.45 am

➔ *Chairs: Thomas Zahner, OSRAM Opto Semiconductors GmbH /
Ralph Schacht, Brandenburgische Technische Universität Cottbus-Senftenberg*

9.25 am Thermo-Mechanical Characterization and Reliability Modelling of Sintered Silver Based Thermal Interface Materials

J. Heilmann¹, I. Nikitin², D. May¹, K. Pressel², B. Wunderle^{1,3}

¹Technische Universität Chemnitz, Germany; ²Infineon Technologies, Regensburg, Germany; ³Fraunhofer ENAS, Chemnitz, Germany

9.45 am IR Pulse Thermography as Failure Analytical Tool Applied to Die Attach Processes

D. May¹, S. Fritzsche², A. Cardoso³, R. Schacht⁴, B. Wunderle¹

¹TU Chemnitz, Germany; ²Heraeus Materials Technology, Germany; ³NANIUM S.A., Portugal; ⁴BTU Cottbus-Senftenberg, Germany

10.05 am The Influence of Voids in Solder Joints on Thermal Performance and Reliability Investigated with Transient Thermal Analysis

Alexander Hanss, E Liu, Maximilian Schmid, Gordon Elger
Technische Hochschule Ingolstadt, Germany

10.25 am Aging Tendencies of Power LEDs Under Different Stress Conditions During Thermal Reliability Testing

Gusztáv Hantos¹, János Hegedüs¹, Márta Rencz^{1,2}, András Poppe³, Sander P.M. Noijen⁴

¹Budapest University of Technology and Economics, Hungary; ²Mentor Graphics MAD, Hungary; ³BME VIKING Nonprofit Plc., Hungary; ⁴Philips Research, The Netherlands

Coffee break

🕒 10.45 am – 11.15 am

Session 7: Thermal Materials II

🕒 11.15 am – 12.35 pm

➔ *Chairs: Elodie Leveugle, THALES Research & Technology / Konstantinos Termentzidis, CNRS*

11.15 am Analysis of Advanced Materials Based on Measured Thermal Transients of Insulated Gate Devices in Broad Temperature Ranges

Gabor Farkas¹, Gergely Simon², Zoltan Sarkany¹

¹Mentor Graphics MAD MicReD Division, Hungary; ²Technical University Budapest, Hungary

11.35 am Molecular Dynamics Thermal Conductivity Computation of a Quantum Cascade Laser Diode Superlattice

Thomas Antoni¹, Sebastian Volz², Kyle Steven Horne²

¹University of North Texas, United States of America; ²Ecole Centrale Paris, France

11.55 pm Effect of Piezo-Strain on the Thermal Conductivity of AlN and ZnO

Wassim Kassem¹, Juliana Jaramillo-Fernandez², Emmanuel Ollier², Sebastian Volz¹, Chalopin Yann¹

¹Centrale-Supelec, France; ²LITEN, CEA, Grenoble, France

12.15 pm Thermoelectric Properties Analysis of CsSnX3 Materials (X = I, Br, Cl)

Lantao Yu¹, Wassim Kassem¹, Romain Bude², Laurent Divay², Sebastian Volz¹

¹CNRS, France; ²Thales R&T, France

Lunch break

🕒 12.35 am – 1.50 pm

SESSIONS 8 – 9

Session 8: Design Methodologies and Simulation I

🕒 1.50 pm – 3.10 pm

➔ Chairs: André Gil Cardoso, NANIUM SA /
Seok Pil Jang, Korea Aerospace University

- 1.50 pm Enhanced Heat Transfer in Air Cooled Heat Sinks Using Aeroelastically Fluttering Reeds**
Pablo Hidalgo, Ari Glezer
Georgia Institute of Technology, United States of America
- 2.10 pm Thermally Enhanced FOWLP – Development of a Power-eWLB Demonstrator**
André Gil Cardoso¹, Mariana Pires¹, Raquel Pinto¹, Gusztáv Hantos²
¹NANIUM SA, Portugal; ²EET BME, Hungary
- 2.30 pm “LaTIMA” an Innovative Test Stand for Thermal and Electrical Characterization of Highly Conductive Metals, Die Attach, and Substrate Materials**
Mohamad Abo Ras^{1,2}, Daniel May³, Ralph Schacht^{2,4}, Bernd Michel², Thomas Winkler¹, Sven Rzepka², Bernhard Wunderle³
¹Berliner Nanotest und Design GmbH, Germany; ²Fraunhofer ENAS, Germany; ³Technische Universität Chemnitz, Germany; ⁴Brandenburgische Technische Universität, Cottbus-Senftenberg, Germany
- 2.50 pm Advanced Thermal Resistance Simulation of a SiGe HBT Including Backend Cooling Effect**
Alessandro Magnani¹, Grazia Sasso¹, Vincenzo d’Alessandro¹, Lorenzo Dececasa², Niccolò Rinaldi¹, Klaus Aufinger³
¹Università di Napoli Federico II, Italy; ²Politecnico di Milano, Italy; ³Infineon Technologies, Germany

Coffee break

🕒 3.10 pm – 3.40 pm

Session 9: Reliability & Metrology II

🕒 3.40 pm – 4.40 pm

➔ Chairs: Daniel May, TU Chemnitz / Gordon P. Elger, Technische Hochschule Ingolstadt

- 3.40 pm Thermal Analysis of 3D Integrated Ultra-fast Image Sensor With Digital Frame Storage**
Rémi Bonnard¹, Maroua Garci², Jean Baptiste Kammerer², Wilfried Uhring²
¹DACLE, CEA Leti, France; ²ICube Laboratory CNRS / Université de Strasbourg, France
- 4.00 pm Precision Determination of Thermorefectance Coefficients for Localised Thermometry**
Robert Schlag¹, Mohamad Abo Ras^{1,3}, Victoria Arlt¹, Daniel May², Thomas Winkler¹, Bernhard Wunderle^{2,3}
¹Berliner Nanotest und Design GmbH, Germany; ²Technische Universität Chemnitz, Germany; ³Fraunhofer ENAS, Germany
- 4.20 pm Effect of the Trench Depth on the Linear Mode Capability of Trench Technology MOSFETs**
Szilard Jamborhazi¹, Márta Rencz²
¹TRW Automotive, Germany; ²Budapest University of Technology and Economics, Hungary

SESSIONS 10

Session 10:
Design and Simulation II

🕒 4.40 pm – 6.20 pm

➔ Chairs: Ming-C. Cheng, Clarkson University /
Lorenzo Codecasa, Politecnico di Milano

4.40 pm **Why Matrix Reduction is Better than Objective Function Based Optimization in Compact Thermal Model Creation**

John Janssen¹, Lorenzo Codecasa²
¹NXP Semiconductors, The Netherlands; ²Politecnico di Milano, Italy

5.00 pm **Structure Preserving Approach to Parametric Dynamic Compact Thermal Models of Nonlinear Heat Conduction**

Lorenzo Codecasa¹, Vincenzo d'Alessandro², Alessandro Magnani², Niccolò Rinaldi²
¹Politecnico di Milano, Italy; ²University Federico II, Italy

5.20 pm **Investigation into the Thermal Effects of Thinning Stacked Dies in Three-Dimensional Integrated Circuits**

Samson Melamed, Naoya Watanabe, Shunsuke Nemoto, Katsuya Kikuchi, Masahiro Aoyagi
National Institute of Advanced Industrial Science and Technology, Japan

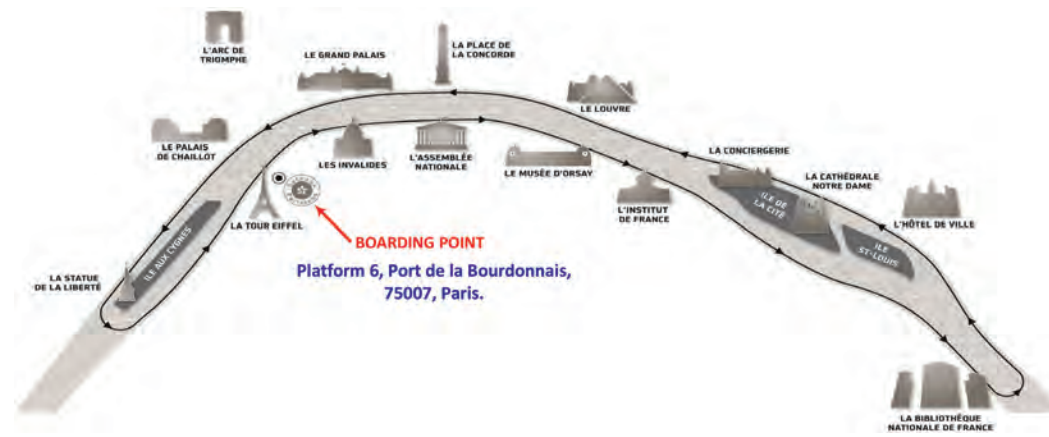
5.40 pm **Transient Thermal Management by Using Double-sided Assembling, Thermo-electric Cooling and Phase-change Based Thermal Buffer Structures: Design, Technology and Application**

Martin Springborn¹, Bernhard Wunderle¹, Daniel May¹, Raul Mrossko², Charles-Alix Manier³, Mohamad Abo Ras⁴, Herman Oppermann³, Tobias Xhonneux⁵, Tristan Caroff⁶, Radoslava Mitova⁷
¹TU Chemnitz, Germany; ²AMIC GmbH, Germany; ³Fraunhofer IZM, Germany; ⁴Berliner Nanotest & Design GmbH, Germany; ⁵TAIPRO Engineering, Belgium; ⁶CEA Liten, France; ⁷Schneider Electric, France

6.00 pm **Reduced Order Modeling of Thermal Effects in Droplet Microreactors**

Márton Németh, András Poppe
Budapest University of Technology and Economics, Hungary

SOCIAL EVENT



Gala Event: Boat Trip & Conference Dinner

🕒 7.30 pm – 10.00 pm

The gala dinner of the conference will take place on the cruise boat Saphir, which will be touring the river Seine during dinner time. The special decoration of this cruise boat with sizeable windows will allow us to admire amazing views of touristic sites along the riverside, as shown on the route map, above. The tour will take about two hours and will be followed by a dancing party on the cruise parked in front of the Eiffel tower. All attendees and their accompanying persons are very welcome to board the cruise and enjoy this unforgettable dinner.

Ship boarding time	7:30 pm - 8:00 pm
Ship departure time	8:00 pm
Return	22:00 pm
Address	Platform 6, port de la bourdonnais, 75007 Paris



Friday, October 2, 2015

Keynote III:

Thermal Transport in Nanostructured Materials and Devices

Ravi Prasher, Sheetak Inc., Austin, Texas, USA

Chair: Bernhard Wunderle, TU Chemnitz

🕒 9.00 am – 9.40 am

→ Session 11: Thermal Phenomena on the Nanoscale I

🕒 9.40 am – 11.00 am

Coffee Break

🕒 11.00 am – 11.30 pm

→ Session 12: QuantiHeat I

🕒 11.30 am – 12.50 pm

Lunch

🕒 12.50 pm – 2.20 pm

→ Session 13: QuantiHeat II

🕒 2.20 pm – 3.40 pm

Closing Remarks

🕒 3.40 pm – 3.50 pm



SESSION 11
SESSION 12

Session 11:
Thermal Phenomena on the Nanoscale II

🕒 9.40 am – 11.00 am

➔ Chairs: Ali Assy, CETHIL, CNRS / Petr Klapetek, Czech Metrology Institute

- 9.40 am** **Electrical-heater Determination of Thermal Conductivities and Conductances: Regimes and Imperfections**

Wassim Jaber¹, Céline Chevalier², P-Olivier Chapuis¹

¹CETHIL - CNRS - INSA Lyon, France; ²UMI LN2 - CNRS and University of Sherbrooke
- 10.00 am** **Enhanced Heat Spreader Based on Few-layer Graphene on Functionalized Substrate**

Haoxue Han^{1,2}, Yong Zhang^{3,4}, Yifeng Fu⁵, Johan Liu^{3,4}, Sebastian Volz^{1,2}

¹CNRS, Laboratoire d’Energetique Moleculaire et Macroscopique, Combustion (EM2C), France; ²Ecole Centrale Paris, France; ³SMIT Center, Shanghai University, China; ⁴Chalmers University of Technology, Sweden; ⁵SHT Smart High Tech AB, Gothenburg, Sweden
- 10.20 am** **Thermal Energy Transport in a Surface Phonon-Polariton Crystal**

Jose Ordonez-Miranda¹, Laurent Tranchant¹, Sergei Gluchko¹, Thomas Antoni^{1,2}, Sebastian Volz¹

¹CNRS, Laboratoire EM2C, France; ²CNRS, Laboratoire de Photonique Quantique et Moléculaire, France
- 10.40 am** **Dynamical Behavior of a Far-field Radiative Thermal Transistor**

Karl Joulain, Younès Ezzahri, Jérémie Drevillon, Hugo Prod’homme

Institut Pprime, University of Poitiers, France

Coffee Break

🕒 11.00 am – 11.30 am

Special Session 12
QuantiHeat I

🕒 11.30 am – 12.50 pm

➔ Chairs: Séverine Gomès, CETHIL Lyon / Nathalie Trannoy, URCA / Reims University

- 11.30 am** **QUANTIHEAT Project: Identity, Objectives and First Period Results**

Séverine Gomès^{1,2}

¹Université de Lyon, CNRS, INSA de Lyon, CETHIL, France; ²QUANTIHEAT Consortium
- 11.50 am** **Towards a Quantitative Methodology for Measuring Micro and Nanoscale Transition Properties for Heat Transfer Modelling in Thermal Devices and Materials**

A Dawson, A. S. Maxwell

National Physical Laboratory, UK
- 12.10 pm** **Micromachined Temperature Calibration Tool for Contact Scanning Thermal Microscope Probes**

Alexia Bontempi¹, Tran Phong Nguyen¹, Etienne Lemaire², Laurent Thiery¹, Damien Teyssieux¹, Sebastien Euphrasie¹, Danick Briand², Pascal Vairac¹

¹FEMTO-ST, France; ²EPFL, Suisse
- 12.30 pm** **Simultaneous Imaging of Nanoscopic Joule and Peltier Effects by Scanning Probe Thermometry**

Fabian Menges^{1,2}, Philipp Mensch¹, Siegfried Karg¹, Heinz Schmid¹, Andreas Stemmer², Heike Riel¹, Bernd Gotsmann¹

¹IBM Research GmbH, Switzerland; ²Nanotechnology Group, ETH Zurich, Switzerland

Lunch Break

🕒 12.50 pm – 2.20 pm

SESSION 13
CLOSING REMARKS

Special Session 13:
QuantiHeat II

🕒 2.20 pm – 3.40 pm

➔ Chair: Fabian Menges, IBM Research GmbH | Laurent Thiery, FEMTO-ST

2.20 pm **Monte Carlo Simulation of Phonon Transport Across Si – Si and SiO2 – Si Interfaces**

Valentin Jean, Jaona RANDRIANALISOA, Nathalie Trannoy
Reims University, France

2.40 pm **Compensation of Topography Artefacts in Scanning Thermal Microscopy**

Petr Klapetek, Jan Martinek, Radek Šlesinger
Czech Metrology Institute, Czech Republic

3.00 pm **Heat Transfer Mechanisms Quantified at Submicron Scales in Scanning Thermal Microscopy**

Ali Assy, Stephane Lefèvre, Séverine Gomès
CETHIL, CNRS, France

3.20 pm **A Combined SThM/SEM Instrument for the Investigation of Influent Parameters in Nano-scale Thermal Contact**

David Renahy, Ali Assy, Séverine Gomès
Centre d'Energétique et de Thermique de Lyon, France

Closing and Best Paper & Best Poster Award

🕒 3.40 pm – 3.50 pm



CONTACT



CONFERENCE CHAIR

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