

THERMINIC 2018

((24th INTERNATIONAL WORKSHOP
Thermal Investigations of ICs and Systems))

SEPTEMBER 26–28 2018 | STOCKHOLM, SWEDEN

PROCEEDINGS 2018



→ Welcome

→ Papers by Session

→ Posters

→ Contact

PREFACE

WELCOME TO THERMINIC 2018!

This 24th edition of THERMINIC is again the main European event for academics and industry to share recent advancements in thermal issues of electronics and microelectronics, including problems of nano-scale heat-transfer, thermal modeling and simulation issues in solid-state lighting as well as cooling issues of power electronics.

Following the workshops held in Grenoble (1995), Budapest (1996, 2000, 2007, 2012 and 2016), Cannes (1997 and 1998), Rome (1999), Paris (2001, 2011 and 2015), Madrid (2002), Aix-en-Provence (2003), Sophia Antipolis (2004), Belgirate (2005), Nice (2006), Rome (2008), Leuven (2009), Barcelona (2010), Berlin (2013), Greenwich (2014), and Amsterdam (2017) the workshop is taking place in a Scandinavian country for the first time.

The 24th THERMINIC Workshop will once again feature a strong technical program, with 48 oral and 14 poster presentations organized in 14 oral sessions and two poster introduction sessions. More than 130 conference delegates from 23 countries are joining us this year.

This program booklet has been designed as a navigator for your THERMINIC 2018 participation. It includes all the sessions, presentations and evening events to help make the most of your stay in Stockholm. Note that the days have been color-coded for easier handling.

We are delighted to welcome three distinguished representatives from science and industry as keynote speakers at THERMINIC 2018. Mudasir Ahmad (Cisco Systems), Adrian Bejan (Duke University) and Rebei Bel Fdhila (ABB Corporate) will showcase current trends and discuss the role of end-to-end modeling, electronics cooling, and thermal management in their respective fields of work.

Wednesday morning through to Friday afternoon are dedicated to technological and scientific sessions, which have been organised into 11 main thermal topics. A review on the progresses of the STREAMS project will be presented in two sessions on Wednesday afternoon, while Thursday morning is dedicated to Delphi4LED, the H2020 European project on compact modeling of LEDs.

Do not forget the workshop'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. The dinner at the Vasa Museum on Thursday night promises to be a true highlight of the Workshop.

We are picking up last year's initiative of turning THERMINIC into a "green" event, not only by reducing our workshop's environmental impact, but also by sponsoring the planting of 500 trees on the Yucatán Peninsula in Mexico to offset the participants' carbon footprint.

Our thanks go to the authors for their presentations and posters, as well as to the members of the scientific committee for soliciting and selecting the right mix of contributions. We are also very grateful to our industry sponsors and exhibitors for their support of THERMINIC 2018. Last not least, we would like to thank the teams from Chalmers University, Huawei SRC, SHT Smart High Tech AB and mcc Agentur für Kommunikation for all their help in the organisation of THERMINIC 2018.

We look forward to an inspiring three days with you at THERMINIC 2018 in Stockholm.

Johan Liu and Vadim Tsoi
Program Chairs



Andrés Poppe
General Chair



Vadim Tsoi
Program Chair



John Janssen
Vice General Chair



Johan Liu
Program Chair



John Parry
Publicity Chair

Wednesday, September 26, 2018

Welcome

🕒 9.00 am – 9.15 am

Johan Liu, Chalmers University of Technology

Vadim Tsoi, Huawei Technologies Sweden AB

Zhou Hong, President of Huawei ERI

Keynote I:

🕒 9.15 am – 10.00 am

End to End Modeling for Power Delivery, Thermal Cooling and Reliability

*Mudasir Ahmad, Distinguished Engineer/
Senior Director at Cisco Systems*

Senior Director at Cisco Systems

Chair: Johan Liu, Chalmers University of Technology

Vendor Session (see p. 12)

Chair: John Janssen, NXP Semiconductors

🕒 10.00 am – 10.45 am

Coffee Break

🕒 10.45 am – 11.20 am

Session 1:

Advances in Thermal Modeling

🕒 11.20 am – 1.00 pm

Lunch

🕒 1.00 pm – 2.10 pm

Presentation iTHERM

🕒 2.10 pm – 2.25 pm

Bernhard Wunderle, TU Chemnitz

Poster Presentations 1

🕒 2.25 pm – 3.00 pm

Coffee Break and Poster Viewing

🕒 3.00 pm – 3.50 pm

Session 2A: Advanced Thermal Management

🕒 3.50 pm – 4.50 pm

Session 2B: Special Session on the STREAMS Project I

🕒 3.50 pm – 4.50 pm

Session 3A: Reliability

🕒 4.50 pm – 5.50 pm

Session 3B: Special Session on the STREAMS Project II

🕒 4.50 pm – 5.50 pm

Poster Viewing Session & Cocktails

🕒 5.50 pm – 7.30 pm



BACK TO MENU

SESSION 1

**Session 1:
Advances in Thermal Modeling**

🕒 11.20 am – 1.00 pm

➔ *Session Chair: John Parry, Mentor, a Siemens Business***11.20 am Novel Approach to the Extraction of Delphi-like Boundary-Condition-Independent Compact Thermal Models of Planar Transformer Devices**

Valentin Bissuel¹, Lorenzo Codecasa⁴, Eric Monier-Vinard^{1,2}, Brice Rogié^{1,2}, Abel Olivier³, Arnaud Mahé³, Najib Laraq², Vincenzo d'Alessandro⁴, Christophe Gougis²

¹Thales Global Services, France; ²Université Paris Nanterre, France; ³Thales Avionics Electrical Systems, France; ⁴Politecnico di Milano, Italy

11.40 am Is Less More? Masking Detailed Thermal Model Data to Facilitate the (Co-)Design Supply Chain

John Parry¹, John Wilson², Byron Blackmore³

¹Mentor Graphics, United Kingdom; ²Mentor Graphics, USA; ³Mentor Graphics, Canada

12.00 pm Analysis of Implementation of Fractional Differential Equations to Heat Transfer Model Approximation

Tomasz Raszkowski, Mariusz Zubert, Agnieszka Samson
Lodz University of Technology, Poland

12.20 pm Full 3D Thermal Simulation of GaN HEMTs Using Ultra-Fast Self-Adaptive Computations Driven by Experimentally Determined Thermal Maps

Assaad El Helou¹, Marko J. Tadjer², Karl D. Hobart², Peter E. Raad^{1,3}

¹Southern Methodist University, USA; ²U.S. Naval Research Laboratory, USA; ³TMX Scientific, Inc., USA

12.40 pm Thermal Resistance Advanced Calculator (TRAC)

Lorenzo Codecasa¹, Salvatore Race², Vincenzo d'Alessandro², Donata Gualandris³, Arianna Morelli³, Claudio Maria Villa³

¹Politecnico di Milano, Italy; ²University Federico II, Italy; ³STMicroelectronics, Italy

Lunch:

🕒 1.00 pm – 2.10 pm

iTHERM Presentation

🕒 2.10 pm – 2.25 pm

Bernhard Wunderle, TU Chemnitz



BACK TO MENU

POSTER
INTRODUCTION 1

Poster Introduction 1

🕒 2.25 pm – 3.00 pm

→ Session Chair: Genevieve Martin, Signify (Philips Lighting)

01 Benchmarking the Application of Detached Eddy Simulation Techniques in Datacenter Server Flow Modelling using Stereoscopic Particle Image VelocimetrySajad Alimohammadi¹, Jaakko McEvoy¹, Yan Delauré², Tim Persoons¹¹University of Dublin, Trinity College, Dublin, Ireland; ²School of Mechanical & Manufacturing Engineering, Dublin City University, Dublin, Ireland**02 Thermal Design for Six Sigma of an Imaging Device with Dynamic Thermal Management**

Wendy Luiten

WLC, The Netherlands

03 A Statistical Study on the Required Sample Number of SiC SBD to Secure Estimated Junction Temperature with K FactorShuhei Fukunaga, Tsuyoshi Funaki

Osaka University, Japan

04 Thermal Management of a Ka Band Satellite Communication Module Using Finite Element Models and Thermal ImagingArian Grams¹, Brian Curran¹, Simon Kuttler¹, Jacob Reyes¹, Felix Wüst¹, Klaus-Dieter Lang²¹Fraunhofer IZM, Berlin, Germany; ²Technische Universität Berlin, Germany**05 Hybrid-Cooled Data Center Server Layout Optimization for Air-Side Heat Recovery**Assel Sakanova, Sajad Alimohammadi, Jaakko McEvoy, Tim Persoons

Trinity College Dublin, Ireland

06 Thermal Reduced Order Model for an Electronic Power ModuleHazem Ben Aissia, Jacques Jay, Shihe Xin, Ronnie Knikker

CETHIL, France

07 Numerical Study with Experimental Validation of Thermal Coupling Phenomena with Flip-Chip Assembled Test Dies on PCBTorsten Nowak, Sebastian Merbold, Christoph Egbers, Ralph Schacht

Brandenburg University of Technology, Germany

Coffee break and Poster Viewing

🕒 3.00 pm – 3.50 pm



BACK TO MENU

SESSIONS 2A - 2B

**Session 2A:
Advanced Thermal Management**

🕒 3.50 pm – 4.50 pm

➔ *Session Chair: Vadim Tsoj, Huawei Technologies Sweden AB***3.50 pm Freeform-Optimized Shapes for Natural Convection Cooling**

Wessel W. Wits^{1,2}, Davoud Jafari¹, Yannick Jeggels³, Sjoerd Van de Velde³,
Norbert Engelberts³, Daniel Jeggels³

¹University of Twente, The Netherlands; ²Thales Nederland B.V., Hengelo,
The Netherlands; ³Optimal Thermal Solutions B.V., Bussum, The Netherlands

**4.10 pm New Solution for Thermal Management of Electronic Using
ElectroHydroDynamic (EHD) Pump in Heat Pipe**

Lucas Blanc^{1,2}, Fabien Parrain², Agnès Chaillot¹, Marion Woytasik²,
Olivier Maire¹, Alain Bosseboeuf²

¹MBDA FRANCE, France; ²C2N, France

**4.30 pm Transient Thermal Storage of Excess Heat Using Eutectic BiSn as
Phase Change Material for the Thermal Management of an Electronic
Power Module: Design, Technology, Performance and Reliability
within a System Approach**

Bernhard Wunderle¹, Martin Springborn¹, Daniel May¹, Charles-Alix
Manier², Hermann Oppermann², Zoltan Sarkany³, Radoslava Mitova⁴,
Jens Heilmann¹

¹TU Chemnitz, Germany; ²Fraunhofer IZM, Germany; ³BME, Hungary;
⁴Schneider Electric, France

**Session 2B:
Special Session on the STREAMS Project I**

🕒 3.50 pm – 4.50 pm

➔ *Session Chair: Guillaume Savelli, CEA-Liten***3.50 pm H2020 European Project STREAMS: General Overview**

Jean Colonna¹, Agnes Royer¹, Guillaume Savelli², Perceval Coudrain³,
Matthias Keller⁴, Luc Fréchette⁵, Louis-Michel Collin⁵, Sophie Billat⁶,
Jérôme Barrau⁷, Yiannos Manoli⁴

¹Université Grenoble Alpes, CEA Leti, France; ²Université Grenoble Alpes, CEA
Liten, France; ³STMicroelectronics, Crolles, France; ⁴University of Freiburg,
IMTEK, Freiburg, Germany; ⁵Université de Sherbrooke, UMI-LN², Sherbrooke,
Canada; ⁶Hahn Schikard Gesellschaft, Institut für Mikro und Informationstech-
nik, Villingen-Schwenningen, Germany; ⁷Universitat de Lleida, Lleida, Spain

**4.10 pm Integrated Thermoelectric Sensors for Thermal Monitoring of
Integrated Circuits**

Guillaume Savelli¹, Jean-Philippe Colonna², Pascal Faucherand¹, Daniel
Wendler³, Yiannos Manoli³, Matthias Keller³

¹Univ. Grenoble Alpes, CEA-Liten, France; ²Univ. Grenoble Alpes, CEA-Leti,
France; ³Univ. Freiburg, IMTEK, Germany

4.30 pm Embedded Thermal Energy Harvesting – Challenges & Opportunities

Matthias Keller¹, Jacob Goeppert¹, Yiannos Manoli¹, Guillaume Savelli²,
Jean-Philippe Colonna³, Pascal Faucherand², Louis-Michel Collin^{4,5},
Luc Fréchette^{4,5}

¹University of Freiburg – IMTEK, Freiburg, Germany; ²Université Grenoble
Alpes, CEA-Liten, Grenoble, France; ³Université Grenoble Alpes, CEA-Leti,
Grenoble, France; ⁴University of Sherbrooke, Sherbrooke, Canada; ⁵CNRS,
UMI, Lyon, France; ³STMicroelectronics, Italy



BACK TO MENU

SESSIONS 3A - 3B

**Session 3A:
Reliability**

🕒 4.50 pm – 5.50 pm

➔ *Session Chair: Bernhard Wunderle, TU Chemnitz*

4.50 pm Comparative Die-Attach Failure Analysis by Thermoreflectance, Infrared Thermography and Scanning Acoustic Microscopy
 Dan Ralf Wargulski¹, Florian Löffler¹, Daniel May^{1,2}, Jens Heilmann², Bernhard Wunderle², Ana Borta-Boyon³, Afshin Ziaei³, Mohamad Abo Ras¹
¹Berliner Nanotest und Design GmbH, Germany; ²Technische Universität Chemnitz, Germany; ³Thales Research and Technology, France

5.10 pm Detection of Material's Degradation of Multi-Layer Systems by Thermal Transient Analysis
 Lisa Mitterhuber, Elke Kraker, Stefan Defregger
 Materials Center Leoben Forschung GmbH, Austria

5.30 pm Thermo-Mechanical Reliability of Sintered All-Cu Electrical Fine Pitch Interconnects under Isothermal Fatigue Testing Benchmarked Against Soldered and TLP-Bonded SnAg3.5 Joints
 Akhil Kumar¹, Uwe Zschenderlein¹, Mario Baum², Thomas Brunschwilder³, Daniel N. Wright⁴, Bernhard Wunderle¹
¹TU Chemnitz, Germany; ²Fraunhofer ENAS, Chemnitz, Germany; ³IBM Zurich, Switzerland; ⁴Sintef Oslo, Norway

**Session 3B:
Special Session on the STREAMS Project II**

🕒 4.50 pm – 5.50 pm

➔ *Session Chair: Jérôme Barrau, University of Lleida*

4.50 pm Thermoregulated Microvalve for Self-Adaptive Microfluidic Cooling
 Amrid Amnache¹, Louis-Michel Collin¹, Gerard Laguna², Montse Vilarrubi², Jérôme Barrau², Luc Guy Fréchette¹, Simon Hamel¹
¹UMI-LN2, Université de Sherbrooke, Canada; ²Universitat de Lleida, Lleida, Spain

5.10 pm Variable Pumping Control for Low Power Microfluidic Chip Cooling
 Sabrina Da Luz¹, Gherard Kattinger¹, Gerard Laguna², Hassan Azarkish³, Montse Vilarrubi², Louis Michel Collin³, Luc Fréchette³, Jérôme Barrau², Sophie Billat¹
¹HSG, Germany; ²University of Lleida, Spain; ³UMI-LN2, Université de Sherbrooke, Canada

5.30 pm Thermostatic Fins for Spatially and Temporally Adaptive Microfluidic Cooling
 Montse Vilarrubi¹, Gerard Laguna¹, Amrid Amnache², Louis Michel Collin², Joan Rosell¹, Manel Ibañez¹, Josep Illa¹, Luc Fréchette², Jérôme Barrau¹
¹University of Lleida, Spain; ²UMI-LN2, Université de Sherbrooke, Canada

Poster Viewing Session & Cocktails

🕒 5.50 pm – 7.30 pm

➔ *Chair: Genevieve Martin, Signify (Philips Lighting)*

Thursday, September 27, 2018

Keynote II:

🕒 8.45 am – 9.30 am

Constructal law: Electronics Cooling with Freedom and Evolution

Adrian Bejan, J.A. Jones Professor of Mechanical Engineering, Duke University, USA

Chair: Vadim Tsoi, Huawei Technologies Sweden AB

Session 4:

Special Session on the Delphi4LED Project

🕒 9.30 am – 10.50 am

Coffee Break

🕒 10.50 am – 11.40 am

Session 5:

Advanced Thermal Measurements

🕒 11.40 am – 1.00 pm

Lunch

🕒 1.00 pm – 2.10 pm

Session 6

Thermal Issues in Solid-State Lighting

🕒 2.10 pm – 3.10 pm

P2: Poster 2

🕒 3.10 pm – 3.45 pm

Poster Viewing 2

Coffee Break

🕒 3.45 pm – 4.30 pm

Session 7A

Embedded Cooling

🕒 4.30 pm – 5.30 pm

Session 7B

Advanced Thermal Management II

🕒 4.30 pm – 5.30 pm

Social Event:

Guided Tour at the Vasa Museum and Conference Dinner

🕒 6.10 pm – 10.30 pm



SESSIONS 4 – 5

Session 4:**Special Session on the Delphi4LED Project**

🕒 9.30 am – 10.50 am

→ *Chairs: Genevieve Martin, Signify (Philips Lighting)
Marta Rencz, Budapest University of Technology & Economics*

9.30 am Design Flow for the Development of Optimized LED Luminaires Using Multi-Domain Compact Model Simulations

Christophe Marty¹, Joan Yu², Genevieve Martin², Robin Bornoff³, [Andras Poppe](#)⁴, Andras Poppe⁵, Denis Fournier⁶, Emmanuel Morard⁷

¹Ingélux lighting design, France; ²Signify, Philips Lighting, The Netherlands;

³Mentor, a Siemens Business, UK; ⁴BME, Budapest, Hungary; ⁵Mentor, a Siemens Business, Hungary; ⁶Piseo, France; ⁷Eccelectro, France

9.50 am Structural Analysis and Modelling of Packaged Light Emitting Devices by Thermal Transient Measurements at Multiple Boundaries

[Gabor Farkas](#)¹, Andras Poppe^{1,2}, Lajos Gaal¹, Marta Rencz^{1,2}, G Hantos², Cs Berenyi²

¹Mentor, a Siemens Business, Hungary; ²BME, Budapest, Hungary

10.10 am Experimental Verification of Thermal Structure Function Distortion for LEDs with Silicone Domes

[Anton Alexeev](#)¹, Genevieve Martin², Grigory Onushkin², Marcel v. d. Lubbe²

¹Eindhoven University of Technology, The Netherlands; ²Philips Lighting, Eindhoven, The Netherlands

10.30 am Quantified Insights into LED Variability

[Robin Bornoff](#)¹, Thomas Mérelle², Josephine Sari³, Alessandro Di Bucchianico³, Gabor Farkas⁴

¹Mentor Graphics, UK; ²Pi-Lighting, Switzerland; ³Technical University Eindhoven, The Netherlands; ⁴Mentor, a Siemens Business, Hungary

Coffee break

🕒 10.50 am – 11.40 am

Session 5:**Advanced Thermal Measurements**

🕒 11.40 am – 1.00 pm

→ *Chair: Gabor Farkas, Mentor Graphics MAD MicReD Division*

11.40 am Nanoscale Scanning Probe Thermometry

[Fabian Könemann](#)¹, Morten Vollmann¹, Fabian Menges^{1,2}, I-Ju Chen³, Norizzawati Mohd Ghazali⁴, Tomohiro Yamaguchi⁴, Koji Ishibashi⁴, Claes Thelander³, Bernd Gotsmann¹

¹IBM Research - Zurich, 8803 Rüschlikon, Switzerland; ²Now at: University of Colorado, Boulder, USA; ³Department of Physics, Lund University, Lund, Sweden; ⁴Advanced Device Laboratory, RIKEN, Wako, Saitama, Japan

12.00 pm Raman Measurements to Evaluate the Thermomechanical Stress in GaN LED Soldered on Copper Substrate

Raffaella Signorini¹, Danilo Pedron¹, [Fosca Conti](#)¹, Alexander Hanss², Sri Krishna Bhogaraju², Gordon Elger²

¹University of Padova, Italy; ²Institute of Innovative Mobility, Technische Hochschule Ingolstadt, Germany

12.20 pm Thermal Conductivity and Phase Transition Temperature Measurements on Polymers Using Doped Silicon SThM Probe

Eloïse Guen, Pierre-Olivier Chapuis, [Séverine Gomès](#)

Univ Lyon, CNRS, INSA-Lyon, Université Claude Bernard Lyon, FRANCE

12.40 pm Precision Measurement of Thermal Diffusivity for Thin Layers by a Customised Laser Pulse Method

Benedict Völker¹, Daniel May^{1,2}, Corinna Grosse¹, Mohamad Abo Ras¹, [Bernhard Wunderle](#)², Maria Krikunova³

¹Berliner Nanotest und Design GmbH, Germany; ²Technische Universität Chemnitz, Germany; ³Technische Universität Berlin, Germany

Lunch

🕒 1.00 pm – 2.10 pm



SESSION 6

**Session 6:
Thermal Issues in Solid-State Lighting**

🕒 2.10 pm – 3.10 pm

→ Chair: *András Poppe, Budapest University of Technology and Economics***2.10 pm Transient Thermal Analysis as In-Situ Method in Accelerated Stress Tests to Assess Package Integrity of LEDs***Gordon Patrick Rudolf Elger, Maximilian Schmid, Alexander Hanss
Technische Hochschule Ingolstadt, Germany***2.30 pm Improving Accuracy of Temperature Mapping of High-Power AlInGaN LED Chips***Anton Chernyakov, Andrey Aladov, Anton Ivanov, Aleksander Zakgeim
Submicron Heterostructures for Microelectronics Research and
Engineering Center of RAS, Russian Federation***2.50 pm Enhanced Heat Transfer in Heat Sink Channels using Autonomously Fluttering Reeds***Sourabh Jha, Ari Glezer
Georgia Institute of Technology, United States of America*



BACK TO MENU

POSTER
INTRODUCTION 2

Poster Introduction 2

🕒 3.10 pm – 3.45 pm

→ *Session Chair: Lorenzo Codecasa, Politecnico di Milano***01 Influence of LED Operating Point and Cooling Conditions on Compact Thermal Model Element Values**Tomasz Torzewicz¹, Przemysław Ptak², Krzysztof Górecki², [Marcin Janicki](#)¹¹Lodz University of Technology, Poland; ²Gdynia Maritime University, Poland**02 Modelling and Characterization of a Microhotplate**[Anderson Pires Singulani](#), Gregor Toschkoff, Martin Sagmeister, Sara Carniello*ams AG, Austria***03 Modeling and Simulation Thermal Expansion Phenomena in MEMS Gyroscope**[Jacek Nazdrowicz](#), Michal Szermer, Adam Stawinski, Andrzej Napieralski*Lodz University of Technology, Poland***04 Natural Convection for Car Environment Conditions**Cristina Mihaela Dragan^{1,2}¹Politehnica University Timișoara, Romania; ²Continental Automotive, Timișoara, Romania**05 Modelling and Thermal Analysis of Advanced Insulating Layer for Electronic Applications**

Steffen Klarmann

*Valeo Sensors and Switches, Germany***06 Heat and Electric Power Management of Residential Buildings Integrated to High Temperature Fuel Cell and Renewable Energy Systems**

Amin Hajizadeh

*Aalborg University, Denmark***07 A Study on Thermal Behaviour Prediction for Automotive Electric Relay Based on CFD**[Chang-Kyu Han](#), Hun Jung*LS Automotive Corp., Republic of South Korea*

Coffee break and Poster Viewing

🕒 3.45 pm – 4.30 pm



BACK TO MENU

SESSIONS 7A – 7B

**Session 7A:
Embedded Cooling**

🕒 4.30 pm – 5.30 pm

→ Chair: Andrew Tay, Singapore University of Technology and Design

4.30 pm High Heat Flux Removal using Optimized Microchannel Heat Sink

Lei Zhang, Ben Jones, Federico Buja, Vladimir Cherman, Herman Oprins, Philippe Soussan
imec, Belgium

4.50 pm Thermal Modeling and Experimental Validation of Heat Sink Design for Passive Cooling of BEOL IC Structures

Assaad El Helou¹, Peter E. Raad^{1,2}, Dhishan Kande³, Archana Venugopal³
¹*Southern Methodist University, United States of America*; ²*TMX Scientific, Inc., United States of America*; ³*Texas Instruments Incorporated, United States of America*

5.10 pm Theoretical Study of Miniaturization of a Silicon Vapor Chamber for Compact Microelectronics

Quentin Struss^{1,2,3,4}, Perceval Coudrain¹, Jean-Philippe Colonna², Abdelkader Souifi^{3,4}, Christian Gontrand⁴, Luc G. Fréchet³
¹*STMicroelectronics, France*; ²*CEA-LETI, France*; ³*UMI-LN², Université de Sherbrooke, Canada*; ⁴*INL-INSA, France*

**Session 7B:
Advanced Thermal Management II**

🕒 4.30 pm – 5.30 pm

→ Chair: Chris Bailey, University of Greenwich

4.30 pm Experimental Performance of a 3D-Printed Hybrid Flat Heat Pipe-Thermosyphon for Cooling of Power Electronics

Wessel W. Wits, Davoud Jafari
University of Twente, P.O. Box 217, 7500 AE Enschede, Netherlands

4.50 pm Compact Thermal Modelling for Fast Simulating Consequences of Pump Defect: Application to Power Module with Double Efficient Cooling

Anaïs Cassou¹, Patrick Tounsi¹, Jean-Pierre Fradin²
¹*CNRS LAAS, France*; ²*Icam, site de Toulouse, France*

5.10 pm A Close Look on Voids in Solder Joints

Katrin Fladischer, Elke Kraker, Lisa Mitterhuber, Julien Magnien, Daniel Ginter, Jördis Rosc
Materials Center Leoben Forschung GmbH, Austria

[BACK TO MENU](#)

Friday, September 28, 2018

Keynote III:

🕒 8.45 am – 9.30 am

Thermal Management in Power Engineering @ ABB: Trend in the Emerging Simulation Technologies

Rebei Bel Fdhila, Fellow, ABB Sweden

Chair: Vadim Tsoi, Huawei Technologies Sweden AB

Session 8:

Thermal Modelling and Simulation for Power Electronics

🕒 9.30 am – 10.30 am

Coffee Break

🕒 10.30 am – 11.10 am

Session 9:

Thermal and Electro-Thermal Modelling & Model Validation

🕒 11.10 am – 12.10 am

Session 10:

New Thermal Materials and Nanoscale Heat-Transfer

🕒 12.10 am – 01.30 pm

Lunch

🕒 1.30 pm – 2.30 pm

Session 11:

Thermal Design

🕒 2.30 pm – 3.50 pm

Coffee Break

🕒 3.50 pm – 4.00 pm

Award Ceremony & Closing Remarks

🕒 4.00 pm – 4.20 pm



BACK TO MENU

SESSION 8 – 9

Session 8:**Thermal Modelling and Simulation for Power Electronics**

🕒 9.30 am – 10.30 am

➔ *Session Chair: Wendy Luiten, WLC***9.30 am Numerical Simulation of the Junction Temperature, the Coolant Flow Rate and the Reliability of an IGBT Module***Kenneth Chimezie Nwanoro, Hua Lu, Chunyan Yin, Chris Bailey
University of Greenwich, United Kingdom***9.50 am Non-uniform Temperature Distribution Implications on Thermal Analysis Accuracy of Si IGBTs and SiC MOSFETs***Mohsen Akbari¹, Amir Sjjad Bahman¹, Paula Diaz Reigosa¹, Lorenzo Ceccarelli¹, Francesco Iannuzzo¹, Mohammad Tavakoli Bina²
¹Aalborg University; ²K.N. Toosi University of Technology***10.10 am Modelling Influence of Temperature on the Switching Process of IGBTs***Paweł Górecki, Krzysztof Górecki
Gdynia Maritime University, Poland***Coffee Break**

🕒 10.30 am – 11.10 am

Session 9:**Thermal and Electro-Thermal Modelling & Model Validation**

🕒 11.10 am – 12.10 am

➔ *Session Chair: Andrzej Napieralski, Technical University of Lodz***11.10 am Experimental Characterization of MOR-based and Delphi-like BCI DCTMs***Eric Monier-Vinard^{1,2}, Lorenzo Codecasa³, Brice Rogié^{1,2}, Valentin Bissuel¹, Najib Laraqi², Vincenzo d'Alessandro³, Olivier Daniel¹
¹Thales Gobel Services, France; ²Université Paris Nanterre, France; ³Politecnico di Milano, Italy***11.30 am Compact Device Models for BiCMOS VLSIs Simulation in the Extended Temperature Range (from -200°C to +300°C)***Konstantin O. Petrosyants
National Research University Higher School of Economics, Russian Federation***11.50 am Multiscale Coupled Electro-Thermal Simulations of Electron Devices***Ky Merrill, Marco Saraniti
Arizona State University, United States of America*



SESSION 10

**Session 10:
New Thermal Materials and Nanoscale Heat-Transfer**

🕒 12.10 pm – 1.30 pm

➔ *Session Chair: Lilei Ye, SHT Smart High Tech AB***12.10 pm Vertically Aligned Graphene-Based Thermal Interface Material with High Thermal Conductivity**

Nan Wang¹, Shujing Chen², Amos Nkansah¹, Lilei Ye¹, Johan Liu³, Qianlong Wang⁴, Xitao Wang¹, Miaoxiang Chen⁵

¹SHT Smart High Tech AB, Sweden; ²Shanghai University; ³Chalmers University of Technology, Sweden; ⁴Shenzhen Shen Rui Graphene Co Ltd, China; ⁵King Abdullah University of Science and Technology (KAUST), Saudi Arabia

12.30 pm Assessment of Different Methodologies for The Estimation of DPL Heat Equation Parameter Values for Dynamic Thermal Simulations of Nanoscale Electronic Structures

Marcin Janicki, Mariusz Zubert, Piotr Zajac, Tomasz Raszkowski, Jędrzej Topilko, Piotr Pietrzak, Grzegorz Jablonski, Agnieszka Samson, Andrzej Napieralski

Lodz University of Technology, Poland

12.50 pm Rheology Investigations of Highly Loaded Thermally Conductive Silicone Composites

Pierre Leon Descamps, Darren Hansen, Andres Becerra

Dow Silicones Belgium SPRL, Belgium

1.10 pm Thermomechanical Reliability Study of Polymer Bonded Carbon Nanotube Based Thermal Interface Materials

Andreas Nylander¹, Christian Chandra Darmawan², Ana Borta Boyon³, Laurent Divay³, Majid Kabiri Samani¹, Mohamad Abo Ras⁴, Julien Fortel⁵, Yifeng Fu¹, Lilei Ye², Afshin Ziaei³, Johan Liu¹

¹Department of Microtechnology and Nanoscience, Chalmers University of Technology, Göteborg, Sweden; ²SHT Smart High Tech AB, Göteborg, Sweden; ³Thales Research & Technology, France; ⁴Berliner Nanotest und Design GmbH, Berlin, Germany; ⁵Thales DMS France

Lunch

🕒 1.30 pm – 2.30 pm



BACK TO MENU

SESSION 11
CLOSING REMARKS**Session 11:**
Thermal Design

🕒 2.30 pm – 3.50 pm

➔ *Session Chair: Sajad Alimohammadi, Trinity College, the University of Dublin***2.30 pm Length Scales in Thermal Design**

Wendy Luiten

*WLC, The Netherlands***2.50 pm Improving Thermal Contact Conductance from Electronics Board to Rack Infrastructure**Wessel W. Wits, [Jeroen Terpstra](#)*Thales Nederland B.V., Hengelo, The Netherlands***3.10 pm Thermal and Life Analysis for USB PD Chip with Integrated Load Switches**[Siamak Delshadpour](#), J.H.J. Janssen, Abhijeet Kulkarni*NXP Semiconductors, The Netherlands***3.30 pm Inverse Reduced Order Model for Temperature Monitoring in an Aerospace Electronic Power Module**[Hazem Ben Aissia](#), Jacques Jay, Shihe Xin, Ronnie Knikker*CETHIL, France***Coffee break**

🕒 3:50 pm – 4.00 pm

Award Ceremony & Closing Remarks

Chair: Vadim Tsoi, Huawei Technologies Sweden AB

🕒 4.00 pm – 4.20 pm

←
BACK TO MENU

CONTACT



CONFERENCE PROGRAM CHAIRS

Vadim Tsoi, Huawei Technologies Sweden AB
vadim.tsoi@huawei.com

Johan Liu, Chalmers University of Technology
johan.liu@chalmers.se

LOCAL ORGANIZING COMMITTEE

Vadim Tsoi, Huawei Technologies Sweden AB
Yang Zhao, Huawei Technologies Sweden AB
Johan Liu, Chalmers University of Technology
Andreas Nylander, Chalmers University of Technology
Lilei Ye, SHT Smart High Tech AB

PCO / CONFERENCE OFFICE

mcc Agentur für Kommunikation GmbH, Berlin/DE
+49 (0)30. 61 288 611
www.mcc-events.de

CONFERENCE WEBSITE

www.therminic2018.eu

The electronic conference proceedings will be available
from IEEE Xplore with the ISBN 978-1-5386-6759-0

Picture Credits

Cover: iStockphoto/RudyBalasko
@lindmanphotography.com [10], Christofer Dracke [40], iStockphoto/Leonardo Patrizi [11],
iStockphoto/Hans Christiansson [13], iStockphoto/adisa [51].

Concept, design, editing: mcc Agentur für Kommunikation GmbH

SPONSORED BY:

