THERMINIC 2017

23rd INTERNATIONAL WORKSHOP
Thermal Investigations of ICs and Systems

SEPTEMBER 27-29 2017 | AMSTERDAM, THE NETHERLANDS

PROCEEDINGS

HARTELIJK WELKOM OP THERMINIC 2017!

This 23rd edition of THERMINIC is again the main European event for academics and industry to share recent advances 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), 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), Greenwich (2014), Paris (2015), and Budapest (2016) the workshop is now in Amsterdam for the very first time!

The 23rd THERMINIC Workshop will once more propose a strong technical program, with 3 keynotes, 52 oral and 17 poster presentations organized in 3 keynote sessions, 12 oral sessions and two poster introduction sessions. More than 120 conference delegates from 23 countries are joining us this year.

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

Each day starts with a keynote by a global player from industry or academia. Thomas Harder (ECPE European Center for Power Electronics), Wilbert IJzerman (Philips Lighting Research) and Clemens Lasance (Emeritus Scientist at Philips Research) will showcase current trends and discuss the role of power electronics, LED lighting systems and electronics cooling, respectively.

Wednesday morning through to Friday morning are dedicated to technolog-ical and scientific sessions, which have been organized into 13 main ther-mal topics. A review on the progresses of the QuantiHeat and Delphi4LED projects is scheduled for on Friday morning.

Do not forget the workshop's evening program. The cocktail reception on Wednesday evening in the poster area and the gala dinner on Thursday on one of Amsterdam's most famous canals are an opportunity to meet old friends, forge new relations and start discussions on new possibilities and exciting recent projects.

Apart from thanking the authors for their presentations and posters, we would like to express our gratitude to the members of the scientific com-mittee 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 2017.

We hope that THERMINIC 2017 will be an intense 3 days of knowledge sharing and exciting encounters with new connections 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 conference in Amsterdam at THERMINIC 2017.

John Janssen, Wendy Luiten & Genevieve Martin
Program Chairs

Sebastian Volz
General Chair

John Janssen
Program Chair

András Poppe
Vice General Chair

Wendy Luiten
Program Chair

John Parry
Publicity Chair

Genevieve Martin
Program Chair

Wednesday, September 27, 2017

Registration
8.00 am – 9.00 am

Welcome
9.00 am – 9.15 am

Keynote I:
Power Electronics Research in the European ECPE Network – High Power Density System Integration
Thomas Harder, ECPE European Center for Power Electronics e.V.
Chair: John Janssen, NXP Semiconductors
9.15 am – 10.00 am

→ **Session 1:**
Modelling and Simulation I
10.00 am – 11.00 am

Vendor Session
11.00 am – 11.30 am

→ **Session 2:**
Power Electronics
12.00 pm – 1.00 pm

→ **Session 3:**
Thermal Measurement I
2.10 pm – 3.30 pm

→ **Session 4:**
Model Order Reduction and Compact Models
4.00 pm – 5.20 pm

→ **Poster Introduction 1**
5.20 pm – 6.10 pm

→ **Poster Viewing Session & Cocktails**
6.10 pm – 8.15 pm

Session 1:
Modelling and Simulation I
10.00 am – 11.00 am

➔ Chair: John Janssen, NXP Semiconductors

10.00 am **Co-Design, Modelling and Simulation Challenges: From Components to Systems**
Chris Bailey[1], John Parry[2]
[1]University of Greenwich, United Kingdom;
[2]Mentor, A Siemens Business, United Kingdom

10.20 am **A Multi-Objective Genetic Algorithm Optimization of Plate-Fin Heatsinks**
Younis O. Abdelsalam, Sajad Alimohammadi, Quentin Pelletier, Tim Persoons
Trinity College, the University of Dublin, Ireland

10.40 am **Design of Experiments in Thermal Architecture**
Wendy Luiten
WLC, The Netherlands

Vendor Session
11.00 am – 11.30 am

Session 2:
Power Electronics
12.00 pm – 1.00 pm

➔ Chair: Thomas Harder, ECPE European Center for Power Electronics e.V.

12.00 pm **A Simple Metal-Semiconductor Substructure for the Advanced Thermo-Mechanical Numerical Modeling of the of Power Integrated Circuits**
Ioan Adrian Bojita[1], Cristian Mihai Boianceanu[2], Ioan Marius Purcar[1], Cosmin-Sorin Plesa[1]
[1]Technical University of Cluj-Napoca, Romania;
[2]Infineon Technologies, Romania

12.20 pm **Thermal Characterisation of a Copper Clip Bonded IGBT Module with Double-sided Cooling**
Qingwei Zhu[1], Andrew Forsyth[1], Rebecca Todd[1], Liam Mills[2]
[1]School of Electrical and Electronic Engineering, University of Manchester, United Kingdom; [2]TT Electronics Semelab

12.40 pm **Thermal Performance Improvement of an Air-cooled GaN-based Solid State Power Amplifier**
Canberk Oztoprak[1,2], Eser Erkek[1]
[1]Aselsan A.Ş., Ankara, Turkey; [2]Middle East Technical University, Ankara, Turkey

Session 3:
Thermal Measurement I
2.10 pm – 3.30 pm

➔ Chair: Gabor Farkas, Mentor, A Siemens Business

2.10 pm **Modelling and Characterisation of a Grease Pump-Out Test Stand and its Use for Accelerated Stress Testing of Thermal Greases**
Bernhard Wunderle[1], Jens Heilmann[1], Daniel May[1], Jörg Arnold[1], Josef Hirscheider[1], Jörg Bauer[4], Ralph Schacht[2], Jürgen Vogel[5], Mohamad Abo Ras[3]
[1]TU Chemnitz, Germany; [2]BTU Cottbus, Germany; [3]Nanotest, Berlin, Germany; [4]Fraunhofer IZM, Berlin, Germany; [5]University of Applied Sciences, Zwickau, Germany

2.30 pm **Development, Design and Fabrication of a Measurement Chip for Thermal Material Characterization Based on the 3-Omega Method**
Corinna Grosse[1], Mohamad Abo Ras[1], Aapo Varpula[2], Kestutis Grigoras[2], Daniel May[1,3], Mika Prunnila[2], Bernhard Wunderle[3], Séverine Gomès[4]
[1]Berliner Nanotest und Design GmbH, Germany; [2]VTT Technical Research Centre of Finland Ltd, Finland; [3]Technische Universität Chemnitz, Germany; [4]Université de Lyon, CNRS, INSA de Lyon, CETHIL, France

2.50 pm **Microelectronics Thin Films and Boundaries Characterized by Local Electro-thermal Measurements**
Axel Pic[1,2], Sébastien Gallois-Garreignot[2], Vincent Fiori[2], P-Olivier Chapuis[1]
[1]CETHIL, CNRS - INSA Lyon, France; [2]ST Microelectronics, Crolles, France

3.10 pm **Effect of Forward Voltage Change Depending on Gate Voltage in Body Diode of SiC-MOSFET at Thermal Transient Testing for Analysing SiC Power Module Package**
Fumiki Kato[1], Hidekazu Tanisawa[1,2], Kenichi Koui[1,3], Shinji Sato[1], Toru Aoki[1,3], Yoshinori Murakami[1,4], Hiroshi Nakagawa[1], Hiroshi Yamaguchi[1], Hiroshi Sato[1]
[1]National Institute of Advanced Industrial Science and Technology, Japan; [2]Sanken Electric Co., Ltd, Japan; [3]Calsonic Kansei Corporation; [4]Nissan Motor Co Ltd, Japan

Session 4:
Model Order Reduction and Compact Models

4.00 pm – 5.20 pm

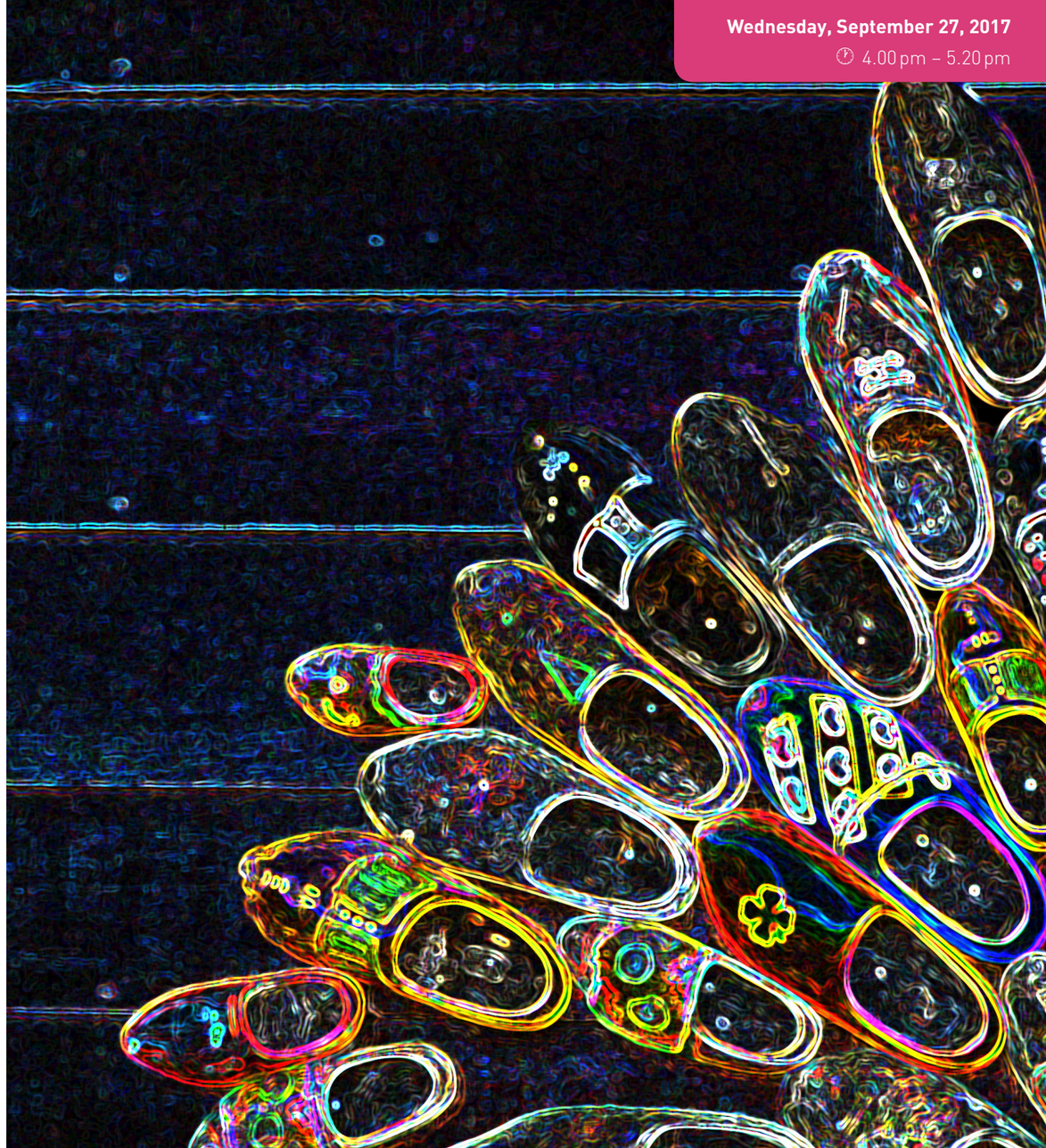
➔ Chair: John Janssen, NXP Semiconductors

4.00 pm **Connecting MOR-based Boundary Condition Independent Compact Thermal Models**
Lorenzo Codecasa[1], Robin Bornoff[2], James Dyson[2], Vincenzo d'Alessandro[3], Alessandro Magnani[3], Niccolò Rinaldi[3]
[1]Politecnico di Milano, Italy; [2]Mentor, A Siemens Business, United Kingdom; [3]Università Federico II, Italy

4.20 pm **Numerical Analysis of 3D Model Order Reduction Based on Second-Order Dual-Phase-Lag Heat Transfer Equation**
Tomasz Raszkowski, Agnieszka Samson, Mariusz Zubert, Marcin Janicki, Andrzej Napieralski
Lodz University of Technology, Poland

4.40 pm **Delphi-like Compact Thermal Models using Model Order Reduction**
Brice Rogie[1,2], Lorenzo Codecasa[3], Eric Monier-Vinard[2], Valentin Bissuel[2], Olivier Daniel[2], Dario D'amore[3], Alessandro Magnani[4], Vincenzo d'Alessando[4], Niccolò Rinaldi[4], Najib Laraqi[1]
[1]Université Paris Ouest, France; [2]Thales Global Services, France; [3]Politecnico di Milano, Italy; [4]University Federico II, Italy

5.00 pm **Novel Approach for the Extraction of Nonlinear Compact Thermal Models**
Lorenzo Codecasa[1], Vincenzo d'Alessandro[2], Alessandro Magnani[2], Niccolò Rinaldi[2]
[1]Politecnico di Milano, Italy; [2]Università Federico II, Italy



Poster Introduction 1
5.20 pm – 6.10 pm

➔ Chair: Marta Rencz, Budapest University of Technology & Economics

01 **A Study on Thermal Behaviour Prediction for Automotive Electronic Unit based on CFD**
Chang-Kyu Han[1], Hun Jung[2]
[1]LS Automotive Corp., Republic of South Korea; [2]LS Automotive Corp., Republic of South Korea

02 **A Study on the Measurement of Transient Thermal Characteristics for Multi-Layered Ceramic Substrate**
Shuhei Fukunaga, Tsuyoshi Funaki
Osaka University, Japan

03 **Electrical-Thermal-Structural Performances of Packaged Power Terminals for Wafer Baking**
Kyoung Joon Kim, Dae Seong Woo
Pukyong National University, Republic of South Korea

04 **Hydrodynamics Behaviour Study of a DCJ System on the Thermal Cooling of Electronic Casings**
Jean-Pierre Fradin, Andreas Rumpf, Claudia Cadile, Dominique Elzo
Icam, France

05 **Cold Sprayed Boiling Enhancement Coating**
Thomas L. Lupton, Rocco Lupoi, Anthony Robinson
Trinity College Dublin, Ireland

06 **Comparison of Two Alternate Junction Temperature Setting Methods aimed for Thermal and Optical Testing of High Power LEDs**
Márton C. Bein[2], János Hegedus[1], Gusztáv Hantos[1], Lajos Gaál[2], Gábor Farkas[2], Márta Rencz[1,2], András Poppe[1,2]
[1]Mentor, A Siemens Company, Hungary; [2]Budapest University of Technology and Economics, Department of Electron Devices, Hungary

07 **Nanoscale Thermal Imaging of Active Devices by Fluorescent SThM**
Hung-Ju Lin[1], A. Assy[1], Etienne Lemaire[2], Danick Briand[2], Laurent Billot[1], Patrick Gredin[3], Michel Mortier[3], Lionel Aigouy[1]
[1]ESPCI-CNRS, France; [2]EPFL, Institute of Microengineering, LMTS, Switzerland; [3]Chimie ParisTech, CNRS, IRCP, France

08 **Time Constant Spectra Based Fitting of Thermal Model Parameters**
Tomasz Raszkowski, Agnieszka Samson, Piotr Zajac, Tomasz Torzewicz, Artur Sobczak, Marcin Janicki, Mariusz Zubert, Andrzej Napieralski
Lodz University of Technology, Poland

09 **An Investigation of Porous Structure Characteristics of Heat Pipes Made by Additive Manufacturing**
Davoud Jafari, Wessel W. Wits, Bernard J. Geurts
University of Twente, The Netherlands

Poster Viewing Session
6.10 pm – 8.15 pm

OVERVIEW

Thursday, September 28, 2017

Keynote II:
Development and Future Expectations of LED Lighting Systems
Wilbert IJzerman, Philips Lighting Research
Chair: Genevieve Martin, Philips Lighting
8.30 am – 9.15 am

→ **Session 5:**
Solid State Lighting
9.15 am – 10.15 am

→ **Session 6:**
Thermal Materials
10.50 am – 12.10 pm

→ **Poster Introduction 2**
1.30 pm – 2.20 pm

→ **Poster Viewing 2**
2.20 pm – 3.20 pm

→ **Session 7:**
Electro/Thermal
3.20 pm – 4.40 pm

→ **Session 8:**
Reliability
4.40 pm – 5.40 pm

Session 5:
Solid State Lighting
9.15 am – 10.15 am

➔ Chair: Thomas Zahner, OSRAM Opto Semiconductors GmbH

9.15 am **Thermal Resistance and Temperature Distribution in Blue and White High-Power LED Arrays**
Anton Chernyakov[1], Andrew Aladov1, Ilja Belov[2], Ivan Kalashnikov[1], Alexander Zakgeim[1]
[1]Submicron Heterostructures for Microelectronics Research and Engineering Center of RAS, Russian Federation; [2]Jönköping University, Jönköping, Sweden

9.35 am **Modulation Method for Measurement of Thermal Resistance of High-Power COB LEDs**
Vitaliy I. Smirnov[1], Viacheslav A. Sergeev[2], Andrey A. Gavrikov[2], Anton M. Shorin[2]
[1]Ulyanovsk State Technical University, Russian Federation; [2]Institute of Radioengineering and Electronics of Russian Academy of Science, Russian Federation

9.55 am **Lifetime Iso-flux Control of LED based Light Sources**
János Hegedüs, Gusztáv Hantos, András Poppe
Budapest University of Technology and Economics, Hungary

Session 6:
Thermal Materials
10.50 am – 12.10 pm

➔ Chair: Bernhard Wunderle, TU Chemnitz

10.50 am **Modification of Thermal Conductivity and Phonon Dispersion Relations by Means of Phononic Crystals**
Marianna Sledzinska[1], Alexandros El Sachat[1,2], J. Sebastian Reparaz[1], Markus R. Wagner[1], Francesc Alzina[1], Clivia M. Sotomayor Torres[1,3]
[1]Catalan Institute of Nanoscience and Nanotechnology (ICN[2]), CSIC and The Barcelona Institute of Science and Technology Campus UAB, Barcelona, Spain; [2]Universitat Autonoma de Barcelona, Barcelona, Spain; [3]ICREA - Institucio Catalana de Recerca i Estudis Avancats, Barcelona, Spain

11.10 am **Application of Amorphous Diamond Materials to Provide a Reliable, Electrically Insulating, Thermal Interface for IC Devices for Electronics Applications in Harsh Environments**
Chris H. Walker, Eden T. Winlow
Diamond Hard Surfaces Ltd, United Kingdom

11.30 am **Size Effects on the Thermal Conductivity of Nano Aerogels**
Jose Ordonez, Younes Ezzahri, Karl Joulain
CNRS, France

11.50 am **Thermal Conduction in Novel Isotropic Conductive Adhesive**
H. Kristiansen[1,2], K. Redford[1], S. Helland[3], E. Kalland[3], M. Abo Ras[4], C. Grosse[4], Bruno Hay[5], L. Ramiandrisoa[5], G. Davée[5], S. Pettersen[1,2], N. Høglund[1]; Séverine Gomès[6]
[1]Conpart AS, Norway; [2]Norwegian University of Science and Technology, Norway; [3]Mosaic Solution AS, Norway; [4]Berliner Nanotest und Design GmbH, Germany; [5]Laboratoire National de Métrologie et d'Essais (LNE), Paris, France, [6]National Center for Scientific Research (CNRS), Lyon, France

Poster Introduction 2
1.30 pm – 2.20 pm

➔ Chair: Genevieve Martin, Philips Lighting

01 **Study on the Temperature-dependent Thermal Resistance Matrix of a Multi-chip LED-Module**
Lisa Mitterhuber, Stefan Defregger[1], Julien Magnien[1], Jördis Rosc[1], Franz Schrank[2], Stefan Hörth[3], Lena Goullon[4], Matthias Hutter[4], Elke Kraker[1]
[1]Materials Center Leoben Forschungs GmbH, Leoben, Austria; [2]Tridonic Jennersdorf GmbH, Jennersdorf, Austria; [3]Häusermann GmbH, Gars am Kamp, Austria; [4]Fraunhofer-Institut für Zuverlässigkeit und Mikrointegration IZM, Berlin, Germany

02 **Electro-Thermal Co-Design Optimisation of 3D-Stacked Silicon Based LEDs Array for General Lighting**
Bertrand Chambion[1], Boris Bouillard[1], Adrien Gasse[1], Aurélie Vandeneynde[1], Nacer Ait-Mani[1], David Henry[1], Frédéric Mercier[2], Pamela Rueda[2]
[1]Cea-Leti, Minatec Campus, France; [2]Aledia SAS, France

03 **An Investigation of Component Interaction and Analysis of Its Impact on Electro-thermal Behaviour in a Power Dense Boost Converter Topology**
Mohammad Shahjalal, Hua Lu, Christopher Bailey
University of Greenwich, United Kingdom

04 **A Numerical Investigation into the Effect of Relative Humidity on Natural Convection Cooling of Electronics**
Parizad Shojaee Nasirabadi[1,2], Jesper H. Hattel[1]
[1]Technical University of Denmark, Denmark; [2]Georgia Institute of Technology, United States of America

05 **Thermal Interaction of Dissipating Devices in Power Applications**
Ferdinand Sluijs
NXP Semiconductors, The Netherlands

06 **Co-Design/Simulation of Flip-Chip Assembly for High Voltage IGBT Packages**
Chris Bailey
University of Greenwich, United Kingdom

07 **Thermal Conductivity of 2D and 3D Silicon Nanowire Meshes**
Maxime Verdier, David Lacroix, Konstantinos Termentzidis
LEMTA, UMR 7563 *CNRS and University of Lorraine, Vandœuvre-lès-Nancy, France*

08 **"TIMAwave" an Innovative Test Platform for Thermal Diffusivity Measurements of Solid Materials at High Temperature**
Mohamad Abo Ras[1], Dan Ralf Wargulski[1], Daniel May[1,2], Bernhard Wunderle[2]
[1]Berliner Nanotest und Design GmbH, Germany; [2]Technische Universität Chemnitz, Germany

Poster Viewing 2
2:20 pm – 3:20 pm

Session 7:
Electro/Thermal
3.20 pm – 4.40 pm

➔ Chair: Andrzej Napieralski, Technical University of Lodz

3.20 pm **Fast Electro-thermal Simulation of Large Area OLEDs in Natural Convection Environment**
László Pohl, Zsolt Kohári, András Poppe
Budapest University of Technology and Economics, Hungary

3.40 pm **Efficient Modelling Approach for Transient Coupled Electro-Thermal Simulation on the Example of a Chip-on-Board Application**
Ralph Schacht[1], Sven Rzepka[2]
[1]Brandenburgische Technische Universität Cottbus-Senftenberg, Germany; [2] Fraunhofer Institute ENAS, Chemnitz, Germany

4.00 pm **Adaptive Co-Simulation of Functional-Thermal Behaviour of Integrated Circuits**
Lázár Jani, András Poppe
Budapest University of Technology and Economics, Hungary

4.20 pm **Extension of Standard SPICE SiGe HBT Models in the Cryogenic Temperature Range**
Konstantin O. Petrosyants[1,2], Oleg V. Dvornikov[3], Nikolay N. Prokopenko[4], Maxim V. Kozhukhov[5]
[1]National Research University Higher School of Economics, Moscow, Russian Federation; [2]Institute for Design Problems in Microelectronics of RAS, Moscow, Russian Federation; [3]JSC «MNIPI», Minsk, Belarus; [4]Don State Technical University, Rostov-On-Don, Russian Federation; [5]JC 'VNIIEM Corporation', Moscow, Russian Federation

Session 8:
Reliability
4.40 pm – 5.40 pm

➔ Chair: Ari Glezer, Georgia Institute of Technology

4.40 pm **A New Analytical Approach to the Geometry of a Compressed Liquid Bump**
Co van Veen[1], Wendy Luiten[2]
[1]Mat-Tech B.V., DR Son, The Netherlands; [2]WLC, Riethoven, The Netherlands

5.00 pm **Failure Analysis of S-Parameter in N-MOSFET Devices after Thermal Life Tests**
Mohamed Ali Belaid[1], A.M. Nahhas[2], M. Masmoudi[3]
[1]LATIS-ENISo, Sousse University, Tunisia; [2]Umm Al-Qura University, Makkah, Saudi Arabia; [3]GPM-UMR CNRS, University of Rouen, France

5.20 pm **Computer Simulation of the Reliability of Wire Bonds and Ribbon Bonds in Power Electronics Modules**
Kenneth Chimezie Nwanoro, Hua Lu, Chunyan Yin, Chris Bailey
University of Greenwich, Greenwich, United Kingdom

OVERVIEW

Friday, September 29, 2017

Keynote III:
60 Years of Electronics Cooling: 1965-2025
Clemens Lasance, Emeritus Scientist at Philips Research
Chair: András Poppe, Budapest University of Technology and Economics
8.30 am – 9.15 am

Presentation iTHERM
9.15 am – 9.30 am

→ **Session 9A:**
Thermal Management

→ **Session 9B:**
European Projects on Measurement Technologies
9.30 am – 10.30 am

→ **Session 10A:**
Novel Cooling /Heatpipes/Additive Manufacturing

→ **Session 10B:**
European Projects on Modelling and Simulation
11.00 am – 12.20 pm

→ **Session 11A:**
Modelling and Simulation II

→ **Session 11B:**
European Projects on LED
12.20 pm – 1.20 pm

→ **Session 12:**
Thermal Measurement II
2.20 pm – 3.40 pm

Session 9A:
Thermal Management
9.30 am – 10.30 am

➔ Chair: Vadim Tsoi, Huawei Technologies Sweden AB

9.30 am **Thermal Modelling to Optimize Design in Mobile Charging Applications**
Ferdinand Sluijs
NXP Semiconductors, The Netherlands

9.50 am **Practical Thermal Control by Thermo-Electric Actuators**
Rob van Gils
Royal Philips,The Netherlands

10.10 am **Carbon-based Patterned Heat Spreaders for Thermal Mitigation of Wire Bonding Packages**
Jean-Philippe Colonna[1], Rafael Prieto[1,2,3], Perceval Coudrain[2], Yves Hallez[2], Didier Campos[2], Olivier Le-Briz[2], Rémi Franiatte[1], Catherine Brunet-Manquat[1], Christian Chancel[1], Venceslass Rat[1]
[1]CEA, LETI, MINATEC Campus; [2]STMicroelectronics, France; [3]CNRS G2Elab, Grenoble, France

Session 9B:
European Projects on Measurement Technologies
9.30 am – 10.30 am

➔ Chair: P.-Olivier Chapuis, CNRS - INSA Lyon

9.30 am **QUANTIHEAT Project: Main Results and Products**
P.-Olivier Chapuis[1], Séverine Gomès[2]
[1]CNRS - INSA, Lyon, France; [2]Centre d'Energétique et de Thermique de Lyon, France

9.50 am **Quantitative Measurement using Resistive SThM Micro and Nanoprobes**
Séverine Gomès, Eloïse Guen, David Renahy, P.-Olivier Chapuis
University of Lyon, CNRS, INSA-Lyon, Villeurbanne, France

10.10 pm **Scanning Thermal Microscopy: Wollaston Probe/Sample Heat Transfer Modeling**
Patricia Ai Alam, Rakibul Islam, Dheeraj Pratap, Jaona Randrianalisoa, Nathalie Trannoy
URCA/GRESPI, Reims University, France

Session 10A:
Novel Cooling /Heatpipes/Additive Manufacturing

11.00 pm – 12.20 pm

➔ Chair: Wessel W. Wits, University of Twente

11.00 pm **Enhancement of Forced Convection Heat Transfer Using Aeroelastically Fluttering Reeds**
Thomas Crittenden, Sourabh Jha, Ari Glezer
Georgia Institute of Technology, United States of America

11.20 pm **Experimental Spray Cooling Studies with FC-72 and FC-84 to Comprehend the Validity of Volumetric Flux Model (VFM)**
Çagri Balıkcı[1], Ilker Tarı[2]
[1]ASELSAN, Turkey; [2]Middle East Technical University, Turkey

11.40 pm **Novel Method for Fast FEM Simulation of Chips with Integrated Microchannel Cooling**
Piotr Zajac, Andrzej Napieralski
Lodz University of Technology, Poland

12.00 pm **An Experimental Study towards the Practical Application of Closed-loop Flat-plate Pulsating Heat Pipes**
Gerben Groeneveld[1], Henk Jan van Gerner[2], Wessel W. Wits[1]
[1]University of Twente, The Netherlands; [2]National Aerospace Center (NLR), The Netherlands

Session 10B:
European Projects on Modelling and Simulation

11.00 pm – 12.20 pm

➔ Chair: Robin Bornoff, Mentor, A Siemens Business

11.00 pm **Multiscale Simulation of Heat Transport in Materials Subjected to Localized Heat Sources**
Thi Thu Trang Nghiem[1,2], Nathalie Trannoy[1], P-Olivier Chapuis[2], Jaona Randrianalisoa[1]
[1]University of Reims Champagne-Ardenne, France; [2]CETHIL, Villeurbanne, Lyon-Tech; France

11.20 pm **Microfluidic Cell Cooling System for Electronics**
Gerard Laguna[1], Hassan Azarkish[2], Montse Vilarrubí[1], Manel Ibañez[1], Joan Rosell[1], Yina Betancourt[1], Josep Illa[1], Louis-Michel Collin[2], Jérôme Barrau[1], Luc Fréchette[2], Perceval Coudrain[3], Guillaume Savelli[4]
[1]Universitat de Lleida, Spain; [2]Université de Sherbrooke, Canada; [3]STMicroelectronics, France; [4]CEA - Liten, France

11.40 pm **Dynamic Compact Thermal Model Extraction for LED Packages Using Model Order Reduction Techniques**
Sangye Lungten[1], Wil H.A. Schilders[1], Joseph M.L. Maubach[1], Robin Bornoff[2], James Dyson[2], Matt Warner[2]
[1]Eindhoven University of Technology, The Netherlands; [2]Mentor, A Siemens Business, Hampton Court, UK

12.00 pm **Low Order Compact Model Development for LED Package Thermal Investigation**
Márton Németh, András Poppe
Budapest University of Technology and Economics, Hungary

Session 11A:
Modelling and Simulation II
12.20 pm – 1.20 pm

➔ Chair: John Parry, Mentor, A Siemens Business

12.20 pm **The Scope of Applicability of DPL Model to the Heat Transfer in Integrated Circuits**
Mariusz Zubert, Tomasz Raszkowski, Agnieszka Samson, Marcin Janicki, Piotr Zajac
DMCS, Lodz University of Technology, Poland

12.40 pm **Manufacturing and Characterisation of MEMS Test Nanostructures**
Grzegorz Jablonski[1], Pawel Janus[1], Piotr Pietrzak[1], Tomasz Torzewicz[1], Artur Sobczak[1], Marcin Janicki[1], Andrzej Napieralski[1], Andrzej Sierakowski[2], Anna Brzezinska[2], Piotr Prokaryn[2]
[1]Lodz University of Technology, Poland; [2]Institute of Electron Technology, Warsaw, Poland

1.00 pm **Thermal Behaviour Modeling of Enzymatic Reactions in Flow-through Microchambers**
Péter Pálovics, Márta Rencz
Budapest University of Technology and Economics, Hungary

Session 11B:
European Projects on LED
12.20 pm – 1.20 pm

➔ Chair: Genevieve Martin, Philips Lighting

12.20 pm **Assessment of Isothermal Electro-Optical-Thermal Measurement Procedures for LEDs**
Grigory A. Onushkin[1], Karel Joop Bosschaart[1], Joan Yu[1], Henk Jan van Aalderen[1], Julien Joly[2], Genevieve Marin[1], András Poppe[3]
[1]Philips Lighting, The Netherlands; [2]Philips Lighting, Miribel, France; [3]Budapest University of Technology and Economics, Hungary

12.40 pm **Delphi4LED: LED Measurements And Variability Analysis**
Thomas Merelle[1], Alessandro Di Bucchianico[2], Josephine K. Sari[2], Dan Breton[3]
[1]Pi lighting, Switzerland; [2]Eindhoven University of Technology, The Netherlands [3] PISEO, Vénissieux, France

1.00 pm **K-factor Calibration Issues of High Power LEDs**
Gusztav Hantos, János Hegedüs
Budapest University of Technology and Economics, Hungary

Session 12:
Thermal Measurement II
2.20 pm – 3.40 pm

➔ Chair: Mohamad Abo Ras, Berliner Nanotest und Design GmbH

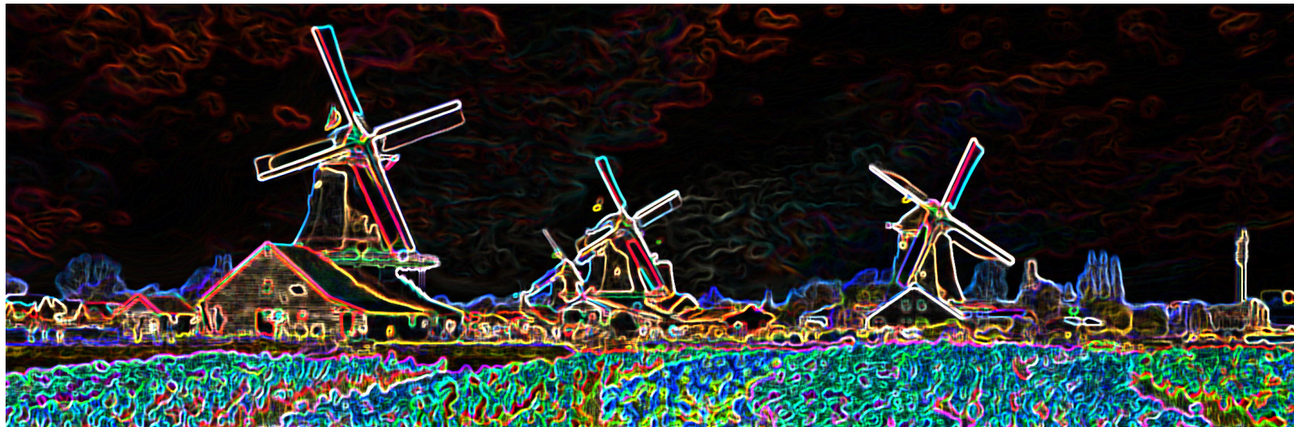
2.20 pm **In-situ Transient Testing of Thermal Interface Sheets and Metal Core Boards in Power Switch Assemblies**
Gabor Farkas[1], Juergen Zettner[3], Zoltan Sarkany[1], Marta Rencz[2]
[1]Mentor, A Siemens Business, Budapest, Hungary; [2]Budapest University of Technology and Economics, Hungary; [3]Siemens, Nürnberg, Germany

2.40 pm **Design and Realization of Characterization Demonstrator to Investigate Thermal Performance of Vertically-aligned Carbon Nanotubes TIM for Avionics and Aerospace Applications**
Mohamad Abo Ras[1], Tobias von Essen[1], Julien Fortel[2], Pranav Panchal[1], Laurent Divay[3], Ana Borta-Boyon[3], Daniel May[1,4], Christian Chandra Darmawan[5], Majid Kabiri Samani[6], Bernhard Wunderle[4], Afshin Ziaei[3]
[1]Berliner Nanotest und Design GmbH, Germany; [2]Thales Microelectronics, France; [3]Thales Research and Technology, France; [4]Technische Universität Chemnitz, Chemnitz, Germany; [5]SHT Smart High Tech AB, Sweden; [6]Chalmers University of Technology, Sweden

3.00 pm **Calibration of Transient FE Simulation: Improvement of Post-Processing and Simulation Automation**
Siddharth Saparia[1], Gordon Elger[1], E Liu[1], Thomas Zahner[2], Sebastian Besold[2], Wolfgang Kalb[2], Sanchit Tandon[2]
[1]Technische Hochschule Ingolstadt, Germany; [2]OSRAM Opto Semiconductors GmbH, Regensburg, Germany

3.20 pm **Thermopower Characterization of InSb Nanowires Using Thermoreflectance**
Ruben Chavez[1], Daniel Vakulov[1], Sasa Gazibegovic[1,3], Dustin Kendig[4], Andrew A. O. Tay[4], Ali Shakouri[2,4], Erik P. A. M. Bakkers[2]
[1]Eindhoven University of Technology, The Netherlands; [2]Birk Nanotechnology Center, Purdue University, United States of America; [3]Delft University of Technology, The Netherlands; [4]Microsanj Inc, San Jose, United States of America

Award Ceremony & Closing Remarks
3.50 pm – 4.15 pm



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