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SESSION 1

Advances in Thermal Modeling and Simulation 1

🕐 9:45am - 11:05am

→ Chair: John Parry | Mentor Graphics

SESSION 2

Cooling Approaches for Devices and Packages 1

🕐 11:30am - 12:50am

→ Chair: Vadim Tsoi | Huawei Technologies Sweden AB

POSTER SESSION A

🕐 2:50pm - 4:10pm

→ Chairs:
Joan Yu | Signify
Ari Glezer | Georgia Institute of Technology

49 **Effects of Doping on the Morphology and Infrared Radiative Properties of Black Silicon**
Sreyash Sarkar[1], Ahmed A. Elsayed[1,2], Frédéric Marty[1], Jérémie Drévillon[3], Yasser M. Sabry[2], Jiancun Zhao[4], Yiting Yu[4], Elodie Richalot[1], Philippe Basset[1], Tarik Bourouina[1], Elyes Nefzaoui[1]
[1]Université Paris-Est, ESYCOM (FRE2028), CNAM, CNRS, ESIEE Paris, Université Paris-Est Marne-la-Vallée, F-77454 Marne-la-Vallée, France; [2]Electronics and Electrical Com. Depart., Faculty of Eng., Ain Shams University, Cairo, Egypt; [3]Institut Pprime, CNRS, Université de Poitiers, ISAE-ENSMA, Futuroscope Chasseneuil, France; [4]Northwestern Polytechnical University, Xi'an, China

53 **Thermal Management and Processing Optimization for 3D Multi-Layer Stacked ICs**
Melina Lofrano, Vladimir Cherman, Carine Gerets, Pieter Bex, Eric Beyne
imec, Belgium

57 **Thermal Modeling of a Power Ball Grid Array in System-In-Package Configuration**
Alberto Bocca[1], Giovanni Graziosi[2], Alberto Macii[1]
[1]Polytechnic University of Turin, Turin, Italy; [2]STMicroelectronics, Italy

61 **Electro-Thermal Investigation of SMT Resistors for Thermal-Electrical Logic Circuits by Simulation**
László Pohl, Mahmoud Darwish, János Mizsei
Budapest University of Technology and Economics, Budapest, Hungary

65 **Extraction of Equivalent Mechanical Properties for Power ICs Metallization**
Ciprian Ionuţ Florea[1,2], Cazimir Gabriel Bostan[2], Dan Ionuţ Simon[2], Vasile Ţopa[1], Marius Purcar[1]
[1]Technical University of Cluj-Napoca, Cluj-Napoca, Romania; [2]Infineon Technologies Romania & Co. SCS, Bucharest, Romania

Wednesday, September 25, 2019
🕑 2:50pm– 4:50pm

POSTER SESSION A

94 **THANOS: Eliminating Redundant States in Transient Thermal Analysis**
George Floros, Chrysostomos Chatzigeorgiou, Nestor Evmorfopoulos, George Stamoulis
University of Thessaly, Greece

99 **Influence of the Wavelength of Emitted Radiation on Thermal and Radiometry Parameters of Selected Power LEDs**
Krzysztof Górecki, Przemysław Ptak
Gdynia Maritime University, Gdynia, Poland

103 **Heat Transfer in Circuit Boards with Low-Density Area Occupancy**
Ilja Alkov, Michael Janßen, Günther Andreas Gerhold
Festo AG & Co. KG, Germany

109 **Total Area Current Distribution Analysis during UIS Test for 600 V Power Diode by Lock-In Thermography**
Luca Maresca, Michele Riccio, Giovanni Breglio, Andrea Irace
University of Naples Federico II, Naples, Italy

113 **Fully-Coupled Electrothermal Simulation of Wide-Area Reverse Conducting IGBTs**
Michele Riccio, Alessandro Borghese, Luca Maresca, Giovanni Breglio, Andrea Irace
University of Naples Federico II, Naples, Italy

Coffee break and Poster Viewing
🕐 4:10pm - 4:50pm

SESSION 3

Advanced Thermal Measurement Strategies 1

🕐 4:50pm - 6:10pm

→ Chair: Gabor Farkas | Mentor Graphics MAD MicReD Division

117 **Latest Advancements towards Delamination Detection in a FCOB Assembly Using Thermal Pixel (Thixel) Array**
Akhil Kumar[1], Marcus Schulz[1], Volker Bader[2], Markus Wöhrmann[2], Jörg Bauer[2], Daniel May[3,4], Mohamad Abo Ras[1,4], Bernhard Wunderle[3]
[1]AMIC GmbH, Berlin, Germany; [2]Fraunhofer IZM, Berlin, Germany; [3]Chemnitz University of Technology, Chemnitz, Germany; [4]Berliner Nanotest und Design GmbH, Berlin, Germany

124 **Button Shear Fatigue Test: Fracture-Mechanical Interface Characterisation under Periodic Subcritical Mechanical Loading**
Mehrdad Shaygi[1], Bernhard Wunderle[1], Jörg Arnold[1], Nadine Pflügler[2], Reinhard Pufall[2]
[1]Chemnitz University of Technology, Chemnitz, Germany; [2]Infineon Technologies, Germany

136 **High-Resolution Flow Field Investigation into a Pressure Anomaly during Synthetic Jet Operation**
Rick Cressall, Kenneth Christensen, Tim Persoons
Trinity College Dublin, Dublin, Ireland

140 **Statistical Lock-In Thermography to Improve Contrast and Detectivity of ICs Thermal Maps**
Maxime Cozzi, Jean-Marc Gallière, Philippe Maurine
LIRMM, University of Montpellier, Montpellier Cedex, France

SESSIONS 4A - 4B

Thermal Management in Power Electronics

🕐 9:30am - 11:10am

→ Chair: Vincenzo d'Alessandro | University Federico II

Thursday, September 26, 2019
🕐 9:30am – 11:30am

Thermal Management of LEDs

🕐 9:30am - 11:10am

→ Chair: Marta Rencz | Budapest University of Technology & Economics

167 **Investigation of Thermomechanical Local Stress Induced in Assembled GaN LEDs**
Enrico Brugnolotto[1], Sri Krishna Bhogaraju[2], E Liu[2], Fosca Conti[1,2], Danilo Pedron[1], Raffaella Signorini[1], Gordon Elger[2]
[1]*Department of Chemical Sciences, University of Padua, Padua, Italy;* [2]*Institute of Innovative Mobility, Technische Hochschule Ingolstadt, Ingolstadt, Germany*

173 **Comparison of Model Order Reduction and Thermal Network Approaches in the Extraction of Dynamic Compact Thermal Models of LEDs**
Robin Bornoff1, Lajos Gaal[2]
[1]*Mentor Graphics, United Kingdom;* [2]*Mentor – A Siemens Business, Hungary*

180 **Multi-Domain Modelling and Simulation of White CoB LEDs**
László Pohl, Márton Németh, János Hegedűs, Gusztáv Hantos, Zsolt Kohári, András Poppe
Budapest University of Technology and Economics, Budapest, Hungary

187 **Luminaire Digital Design Flow with Delphi4LED Multi-Domain LEDs Compact Model**
Joan Yu, Patrick Zuidema, Grigory Onushkin, Genevieve Martin
Signify, The Netherlands

192 **Novel Methods for Checking the Validity of Models of Single Packaged Light Emitting Devices and Complex LED Modules in a Broad Current and Temperature Range**
Gabor Farkas[1], Andras Poppe[1,2], L. Gaal1, Robin Bornoff[1], Marta Rencz[1,2]
[1]*Mentor, a Siemens Business, Hungary/UK;* [2]*Budapest University of Technology and Economics, Hungary*

Coffee break

🕐 11:10am - 11:30am

SESSION 5

Cooling Approaches for Devices and Packages 2

🕐 11:30am - 12:50am

→ Chair: Yogendra Joshi | Georgia Instititute of Technology

200 **Design of Additively Manufactured Heatsinks for Power Electronics Thermal Management Using Adjoint Level Set Topology Optimisation**
Mani sekaran Santhanakrishnan[2], Tim Tilford[1], Chris Bailey[1], Pushparajah Rajaguru[1]
[1]*Computational Mechanics and Reliability Group, University of Greenwich, London, United Kingdom;* [2]*Cranfield University, Cranfield, United Kingdom*

207 **SiGe HBTs Junction Temperature Decrease in Pulsed Operating Mode through an Optimized Topological Structure Coupled with a Capacitive Radiator**
Pedro Rodrigues[1], Arnaud Meyer[1], Nicolas Zerounian[2]
[1]*Thales DMS France, Elancourt Cedex, France;* [2]*Centre for Nanoscience and Nanotechnology, Université Paris-Sud, Palaiseau, France*

213 **Pin Fin Heat Sink Optimization for Natural-Convection Cooling**
Wessel W. Wits[1], Yannick Jeggels[2], Norbert Engelberts[2]
[1]*Thales Nederland B.V., Hengelo, The Netherlands;* [2]*Optimal Thermal Solutions B.V., Bussum, The Netherlands*

219 **A Techno-Economic Analysis of Current Cooling Techniques in Irish Data Centres**
Lee Gibbons[1], Tim Persoons[2], Bryan Coyne[2], Eleanor Denny[2], David Kennedy[1], Sajad Alimohammadi[1]
[1]*Technological University Dublin, Dublin, Ireland;* [2]*Trinity College Dublin, Dublin, Ireland*

POSTER SESSION B

🕐 2:00pm - 2:55pm

→ Chairs:
Wendy Luiten | WLC
John Janssen | NXP Semiconductors

Thursday, September 26, 2019
🕐 2:00pm – 3:35pm

242 **Modeling of Temperature Distribution Induced by Thermo-Mechanical Deformation of High-Power InGaN Arrays**
Anton Chernyakov[1], Andrey Aaladov[1], Alexander Zakgeim[1], Anton Ivanov[1], Ilia Belov[2], Vladimir Belov[3]
[1]*Submicron Heterostructures for Microelectronics Research and Engineering Center of RAS, Saint-Petersburg, Russian Federation;* [2]*School of Engineering, Jönköping University, Jönköping, Sweden;* [3]*Mordovian State University, Saransk, Russian Federation*

246 **A Review: New Designs of Heat Sinks for Flow Boiling Cooling**
Ali Yahyaee Nujukambari, Amir Sajjad Bahman, Jakob Hærvig, Henrik Sørensen
Aalborg University, Aalborg, Denmark

252 **Thermal Investigation of GaN Multilayer Structures**
Lisa Mitterhuber, René Hammer, Katrin Fladischer, Verena Leitgeb, Stefan Defregger, Jürgen Spitaler
Materials Center Leoben Forschung GmbH, Leoben, Austria

258 **Temperature Control of IGBTs by Thermoelectric Cooler**
Alireza Rezaniakolaei
Faculty of Engineering and Science, Aalborg University, Aalborg, Denmark

261 **Developments in the Use of Amorphous Carbon Based Coating Materials as Electrically Insulating, Thermal Interfaces for Heat Spreaders in Ruggedized Electronics Applications**
Chris H Walker
Diamond Hard Surfaces Ltd., Towcester, United Kingdom

265 **TIMiTIC: A C++ Based Compact Thermal Simulator for 3D ICs with Microchannel Cooling**
Piotr Zajac
Łódź University of Technology, Łódź, Poland

271 **Component Model Calibration Using Transient Thermal Test Methods and Multiple Measurement Setups**
Zoltán Kóródi, Szilárd Szőke
Robert Bosch Kft., Budapest, Hungary

Poster Viewing 2 and Coffee Break
🕐 2:55pm - 3:35pm

SESSION 6

Reliability

🕐 3:35pm - 4:55pm

→ Chair: Bernhard Wunderle, TU Chemnitz

SESSION 7

Advanced Thermal Measurement Strategies 2

🕐 9:30am - 11:10am

→ Chair: Robin Bornoff | Mentor Graphics

N/A

Thermal Characterization of Solid Materials by Means of Scanning Thermal Microscopy: Impact of Sample Surface Properties

Eloise Guen[1], Jan Kaur[2], Petr Klapetek[2], P. Olivier Chapuis[1], Séverine Gomès[1]
[1]*Univ Lyon, CNRS, INSA-Lyon, Université Claude Bernard Lyon* 1, *CETHIL UMR5008, F-69621, Villeurbanne, France;* [2]*Czech Metrology Institute, Brno, Czech Republic*

N/A

Nanothermometry by Means of Scanning Thermal Microscopy: Investigation of Electro-Thermal Devices with Embedded Metallic Lines

Georges Hamaoui[1], Axel Pic[1,2], Wenyu Zhao[4], Ali Alkurdi[1], Jun Yin[3], Stéphane Gallois-Garreignot[2], Matthieu Bugnet[4], Jean-François Robillard[3], Séverine Gomès[1], P. Olivier Chapuis[1]
[1]*Univ Lyon, CNRS, INSA-Lyon, Université Claude Bernard Lyon 1, CETHIL UMR5008, France;* [2]*STMicroelectronics, Crolles, France;* [3]*Univ. Lille, CNRS, Centrale Lille, ISEN, Univ. Valenciennes, UMR 8520-IEMN, Lille, France;* [4]*Univ Lyon, MATEIS, CNRS, INSA de Lyon, Villeurbanne, France*

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Thermo-Physical Properties of 500 nm Thin, CVD Grown Tungsten Layers Investigated with Time Domain Thermoreflectance and Scanning Thermal Microscopy

Katrin Fladischer, Verena Leitgeb, Lisa Mitterhuber, Stefan Defregger
Materials Center Leoben Forschung GmbH, Leoben, Austria

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Experimental Investigation on Power Electronics Cooling by Convective Evaporation of R134a in High Aspect Ratio Copper Microchannels

Gennaro Criscuolo, Martin Ryhl Kærn, Wiebke Brix Markussen
Technical University of Denmark, Lyngby, Denmark

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9:30am – 11:30am

311 **Manufacturing and Characterization of Test Structures Dedicated for the Investigation of Heat Transfer Processes at Nanoscale**
Jedrzej Topilko[1], Artur Sobczak[1], Piotr Pietrzak[1], Piotr Zajac[1], Marcin Janicki[1], Pawel Janus[2], Mariusz Zubert[1], Andrzej Napieralski[1]
[1]*Łódź University of Technology, Łódź, Poland;* [2]*Institute of Electron Technology, Warsaw, Poland*

Coffee Break
11:10am - 11:30am

SESSION 8

Advances in Thermal Modeling and Simulation 2

🕐 11:30am - 1:10pm

→ Chair: András Poppe | Budapest University of Technology and Economics

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Thermal Resistance and Impedance Calculator (TRIC)
Lorenzo Codecasa[1], Francesca De Viti[2], Salvatore Race[2], Vincenzo d'Alessandro[2], Donata Gualandris[3], Arianna Morelli[3], Claudio Maria Villa[3]
[1]*Polytechnic University of Milan, Milan, Italy;* [2]*University of Naples Federico II, Naples, Italy;* [3]*ST Microelectronics, Agrate Brianza, Italy*

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Time Saving Averaging Algorithm for Transient Thermal Analysis over Deterministic Pulse Superposition
Maximilian Schmid, Alexander Hanß, Sri Krishna Bhogaraju, Gordon Elger
Technische Hochschule Ingolstadt, Ingolstadt, Germany

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Closing the Loop between Circuit and Thermal Simulation: A System Level Co-Simulation for Loss Related Electro-Thermal Interactions
Thomas Langbauer[1], Christian Mentin[1], Michael Rindler[1], Franz Vollmaier[1], Alexander Connaughton[1], Klaus Krischan[2]
[1]*Silicon Austria Labs, Austria;* [2]*Graz University of Technology, Graz, Austria*

N/A

Thermo-Fluidic Characterizations of Multi-Port Compact Thermal Model of BGA Electronic Package
Valentin Bissuel[1], Eric Monier-Vinard[1], Frederic Joly[2], Olivier Daniel[1], Alain Neveu[2]
[1]*Thales Global Services, Vélizy-Villacoublay, France;* [2]*Université Paris-Saclay, France*

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Application of Simulation in Improving Vibration Reliability of Steering Control Units
Chalukya Nagappa Chincholi[1], Mahdi Sadeghinia[2], Ulrich Grau[2], Andreas Fischer[2]
[1]*Robert Bosch Engineering and Business Solutions Private Limited, India;* [2]*Robert Bosch GmbH, Germany*

SESSION 9

Thermal Management in Digital Circuits, Processors, and Nanoscale Devices

🕐 2:10pm - 3:30pm

→ Chair: Andrzej Krzysztof Tomasz Napieralski | Technical University of Lodz