Opening

Peter Fuchs, Graz 2023 Local Organiser

Monday April 17 2023  08:45

Welcome speech
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<tr>
<th>Time</th>
<th>Event</th>
<th>Speaker(s)</th>
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<tr>
<td>09:00</td>
<td>Polymeric materials for reliable microelectronics: application-specific characterization and simulation approaches; Peter Fuchs, Polymer Competence Center Leoben GmbH</td>
<td></td>
</tr>
<tr>
<td>09:30</td>
<td>System engineering of optical sensors - managing complexity by simulation; Markus Sonnemann, ams-Osram</td>
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</tr>
<tr>
<td>10:00</td>
<td>Advanced substrates for advanced packaging - The need for virtual toolset in electronic system development; Hannes Voraberger, VP Corporate R&amp;D, AT&amp;S</td>
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<tr>
<td>10:30</td>
<td>Coffee break</td>
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<tr>
<td>11:00</td>
<td>Award Ceremony - Sven Rzepka, Kouchi Zhang</td>
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### Technical Keynotes — Session 1

**Chaired by Kouchi Zhang, Willem van Driel**

**Monday April 17 2023 11:15**

<table>
<thead>
<tr>
<th>Time</th>
<th>Duration</th>
<th>Title</th>
<th>Speaker(s)</th>
<th>Institution</th>
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<tr>
<td>11:15</td>
<td>30mn</td>
<td>A 15-year journey of research on electromigration</td>
<td>Xuejun Fan, Lamar University, Beaumont, Texas, USA</td>
<td>Lamar University, Beaumont, Texas, USA</td>
</tr>
<tr>
<td>11:45</td>
<td>30mn</td>
<td>AI and Feature-Vector Based Damage Monitoring and Remaining Useful-Life Assessment for Electronics Assemblies in Mechanical Shock and Vibration</td>
<td>Pradeep Lall, Tony Thomas, Auburn University, Auburn, AL, USA</td>
<td>Auburn University, Auburn, AL, USA</td>
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<tr>
<td>12:30</td>
<td></td>
<td>Lunch</td>
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</tbody>
</table>
### Session 2 — AI and Machine Learning in Multi-Physics

**13:30** Monday April 17 2023  
Chair: Bernhard Wunderle, Adwait Inamdar

<table>
<thead>
<tr>
<th>Time</th>
<th>Title</th>
<th>Speaker(s)</th>
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<tbody>
<tr>
<td><strong>13:30</strong></td>
<td>Using Grid Search Methods and Parallel Computing to Reduce AI Training Time for Reliability Lifetime Prediction of Wafer-Level Packaging</td>
<td>Chih-Yi, Chang, Kuo-Ning, Chiang, Chih-Hsuan, Lee, <em>Department of Power Mechanical Engineering, National Tsing Hua University, Hsinchu, Taiwan</em></td>
</tr>
<tr>
<td><strong>13:50</strong></td>
<td>AI surrogate models for error analysis in optical systems</td>
<td>Peter Meszmer, Neha Mundada, Majid Tavakolibasti, Bernhard Wunderle, <em>Chemnitz University of Technology, Faculty for electrical engineering and information technologies, Chair materials and reliability of microsystems, 09107 Chemnitz, Germany</em></td>
</tr>
<tr>
<td><strong>14:10</strong></td>
<td>A Reliability Assessment Approach for A LIF Neurons Based Spiking Neural Network Circuit</td>
<td>Bo Sun, Jingying Li, Xiaoyan Xie, <em>Guangdong University of Technology</em></td>
</tr>
</tbody>
</table>
| **14:30** | Probabilistic and physics-informed machine learning for predictive maintenance | Phan-Anh Vu, Emanuel Aldea, Mounira Bouarroudj, Sylvie Le Hégarat-Mascle  
1. GIPSA-Lab, Grenoble Alpes University  
2. SATIE Laboratory, Paris-Saclay University  
3. SATIE Laboratory, Paris EST Créteil University |
## Material modelling techniques — Session 3

Chaired by Dag Anderson, Dong Hu

### 13:30

<table>
<thead>
<tr>
<th>Impact of Viscoelastic Properties on Package Warpage Prediction</th>
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<tr>
<td><strong>13:30</strong></td>
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<tr>
<td><strong>20mn</strong></td>
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<tr>
<td>Daniela Spini, Marco Rovitto, <em>STMicroelectronics, Agrate Brianza, Italy</em></td>
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</tbody>
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### 13:50

<table>
<thead>
<tr>
<th>Prediction of thermo-mechanical properties of PCB conductive layers using convolutional neural networks</th>
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<tbody>
<tr>
<td><strong>13:50</strong></td>
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<tr>
<td><strong>20mn</strong></td>
</tr>
<tr>
<td>Mariia Shevchuk¹, Christian Schipfer¹, Matthias Haselmann¹, Qi Tao², Peter Fuchs¹</td>
</tr>
<tr>
<td>¹ <em>Polymer Competence Center Leoben (PCCL), Leoben, Austria</em></td>
</tr>
<tr>
<td>² <em>Austria Technologie &amp; Systemtechnik, Leoben, Austria</em></td>
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</tbody>
</table>

### 14:10

<table>
<thead>
<tr>
<th>Modelling Creep Behaviour in Sintered Silver using User-Programmable Features in ANSYS</th>
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<tr>
<td><strong>14:10</strong></td>
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<tr>
<td><strong>20mn</strong></td>
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<tr>
<td>Freerik Forndran¹, Jens Heilmann², Martin Metzler¹, Markus Leicht¹, Bernhard Wunderle²</td>
</tr>
<tr>
<td>¹ <em>Vitesco Technologies Germany GmbH</em></td>
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<tr>
<td>² <em>Chemnitz University of Technology</em></td>
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### 14:30

<table>
<thead>
<tr>
<th>Fatigue behavior of Au, Cu and PCC fine wire bond connections for power LED applications</th>
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<tr>
<td><strong>14:30</strong></td>
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<tr>
<td><strong>20mn</strong></td>
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<tr>
<td>Bernhard Czerny, Sebastian Schuh, <em>University of applied sciences Burgenland</em></td>
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</tbody>
</table>
Session 4 — Thermal Characterization

15:00 Monday April 17 2023  
Chaired by Marcin Janicki, Elke Kraker

Microstructure Analysis Based on 3D reconstruction Model and Transient Thermal Impedance Measurement of Resin-added Hybrid Ag Sintering Material for High power RF device
Xiao Hu 1, Henry Martin 2, René Poelma 3, JianLin Huang 4, Hans van Rijckevels 4, Huib Scholten 4, Edsger Smits 5, Willem van Driel 3, GuoQi Zhang 3
1 Delft University of Technology, Department of Microelectronics, Delft, The Netherlands; Ampleon B.V., Nijmegen, The Netherlands.
2 Delft University of Technology, Department of Microelectronics, Delft, The Netherlands; Chip Integration Technology Center (CITC), Nijmegen, The Netherlands.
3 Delft University of Technology, Department of Microelectronics, Delft, The Netherlands.
4 Ampleon B.V., Nijmegen, The Netherlands.
5 Chip Integration Technology Center (CITC), Nijmegen, The Netherlands.

Failure Analysis of Sintered Layers in Power Modules Using Laser Lock-in Thermography
Sara Panahandeh 1, Daniel May 1, Daniel May 2, Corinna Grosse-Kockert 1, Bernhard Wunderle 1, Mohamad Abo Ras 1
1 Berliner Nanotest und Design GmbH, Berlin, Germany
2 Technische Universität Chemnitz, Chemnitz, Germany

Validation of the thermal path with one phase liquid cooling for HPC in harsh environment
Tobias Grün 1, Daniel May 1, Hubert Straub 2, Gromala Przemyslaw Jakub 2, Willem Verleysen 3, Bernhard Wunderle 1
1 Technische Universität Chemnitz, Germany
2 Robert Bosch GmbH, Reutlingen, Germany
3 Materialise, Leuven, Belgium

Thermal management of vertical GaN transistors
Lisa Mitterhuber 1, Verena Leitgeb 1, Markus Krainz 1, Robert Strauss 1, Thomas Kaden 2, EldadBahat Treidel 3, Frank Brunner 3, Christian Huber 2, Elke Kraker 1
1 Materials Center Leoben Forschung GmbH, Roseggerstr. 12, 8700 Leoben, Austria
2 Robert Bosch GmbH, Robert-Bosch-Campus 1, 717272 Renningen, Germany
3 Ferdinand-Braun-Institut gGmbH, Gustav-Kirchhoff-Strasse 4,12489 Berlin, Germany
Life time simulations — Session 5

Chaired by XueJun Fan, Ilko Schmadlak

Monday April 17 2023 15:00

15:00 20mn
Characterization and simulation of delamination on package-level considering sub-critical interfacial fracture-parameters under cyclic loading.
Rudolf Kniely, ams OSRAM Group, Chemnitz University of Technology
Jens Heilmann, Chemnitz University of Technology
Fabian Huber, ams OSRAM Group
Bernhard Wunderle, Chemnitz University of Technology, Fraunhofer ENAS

15:20 20mn
Impact of mechanical material modeling on the solder joint fatigue analysis of a leadless package mounted at different positions inside a generic cast aluminum ECU
Martin Niessner 1, Attila Gyarmati 2, Herbert Guettler 2
1 Infineon Technologies AG, Neubiberg, Germany
2 MicroConsult Engineering GmbH, Bernstadt, Germany

15:40 20mn
FEA-based Layout Optimization of E1.S Solid-State Drive to Improve Thermal Cycling Reliability
Eunho Oh, Junghoon Kim, Yusuf Cinar, Woosung Kim, Byungil Lee, Myungryul Jang, Namho Song, Sungki Lee, Jonggyu Park, Solution Development Team, Memory Business, Samsung Electronics

16:00 20mn
Influence of the Bond Foot Angle on Active Power Cycling Lifetime of Wire Bonds
Marcel Sippel 1, Yi Fong Tan 1, Ralf Schmidt 2, Pietro Botazzoli 2, Mario Sprenger 1, Jörg Franke 1
1 Institute for Factory Automation and Production Systems (FAPS), Friedrich-Alexander-Universität Erlangen-Nürnberg, Germany
2 Siemens AG, Erlangen, Germany

16:20 Coffee break
### Session 6 — AI and Machine learning techniques for thermo-mechanical reliability

**16:45** Monday April 17 2023  
Chair: Jeroen Zaal, Karsten Meier

<table>
<thead>
<tr>
<th>Time</th>
<th>Title</th>
<th>Presenters</th>
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</table>
| 16:45 | Enrichment of the reliability regression models by the transfer AI modeling technology | Cadmus Yuan ¹, Jing Yu Wang ², Cheng En Lee ², Kuo-Ning Chiang ²  
  ¹ Feng Chia University  
  ² National Tsing Hua University |
| 17:05 | Application of AI-enabled Simulation in Power Package Development      | Haibo Fan, Nexperia Hong Kong  
  Peilun Yao, Hong Kong University of Science and Technology, Hong Kong  
  Haibin Chen, The Hong Kong University of Science and Technology (Guangzhou), Guangzhou, Guangdong Province, P.R. China |
| 17:25 | Thermo-Mechanical Super-Element of a Packaged-Chip Model for the Reintegration of Reduced State-Space Models into Finite Element Analysis Tools | Chisom Bernard Umunnakwe ¹, I. Zawra ¹, E. B. Rudnyi ², M. Niessner ³, T. Bechtold ¹  
  ¹ Jade University of Applied Sciences, Wilhelmshaven, Germany  
  ² Cadfem GmbH, Munich Germany  
  ³ Infineon Technologies AG, Neubiberg, Germany |
| 17:45 | Influence of Finite Element Supported Data Augmentation on Deep Learning Algorithm for Defect Detection using Infrared Thermography | Kaushal Arun Pareek, Chemnitz University of Technology, Germany |
Computational Efficient Techniques for Multi-Physics — Session 7

Chaired by Martin Niessner, Tamara Bechtold

Monday April 17 2023 16:45

16:45
20mn

Model order reduction for nonlinear modal analysis of MEMS devices: theory and recent advancements

Andrea Opreni, Engineering MEMS Design, Robert Bosch GmbH, Tübinger Straße 123, 72703 Reutlingen, Germany
Peter Degenfeld-Schonburg, Corporate Research, Robert Bosch GmbH, Robert Bosch Campus 1, 71272 Renningen, Germany

17:05
20mn

PCBA reliability simulation in the cloud

Harald Ziegelwanger, Elastic-Simulations GmbH

17:25
20mn

Matrix Interpolation-Based Parametric Model Order Reduction of Electromagnetic Systems with Translational Movement

Arwed Schütz, Tamara Bechtold, Jade University of Applied Sciences, Wilhelmshaven, Germany

17:45
20mn

Analytical Solution for Moisture Diffusion with Initial Non-Uniform Moisture Concentration used in Bake Time Study in Electronics Packaging

Mukunda Khanal, Jiang Zhou, Xuejun Fan, Department of Mechanical Engineering, Lamar University Beaumont, TX USA

19:00
Dinner downtown Am Schlossberg
Session 8 — Posters Interactive Session

08:30 Tuesday April 18 2023

Chair: Sven Rzepka, Véronique Rochus

PID 1


Z. Shu, K. N. Chiang, Advanced Microsystem Packaging and Nano-Mechanics Research Lab + Dept. of Power Mechanical Engineering, National Tsing Hua University, Hsinchu, Taiwan, R.O.C

PID 3

Improved nanoindentation methods for polymer based multilayer film cross-section

Petra Christöfl 1, Joseph E. Jakes 2, Jutta Geier 1, Gerald Pinter 3, Gernot Oreski 1, Don Stone 4, Christian Teichert 5
1 Polymer Competence Center Leoben GmbH, Leoben, Austria
2 USDA Forest Service, Forest Product Laboratory, Madison, Unites States
3 Montanuniversitaet Leoben- Materials Science and Testing of Polymers, Leoben, Austria
4 University of Wisconsin-Madison, Madison, United States
5 Montanuniversitaet Leoben-Chair of Physics, Dept. Physics, Mechanics, and Electrical Engineering, Leoben, Austria

PID 4

Power Semiconductor Die Passivation Layer Stress Mechanism Investigation and Optimization by Numerical Analysis

Zhou Zhou 1, Haibo Fan 1, Adam Brown 2
1 Nexperia Hong Kong
2 Nexperia UK

PID 5

The Effect of Geometric and Material Uncertainty on Debonding Warpage in Fan-Out Panel Level Packaging

H. L. Chen, K. N. Chiang, Advanced Microsystem Packaging and Nano-Mechanics Research Lab + Dept. of Power Mechanical Engineering, National Tsing Hua University, Hsinchu, Taiwan, R.O.C

PID 6

FEM simulation of influence of different polymeric module materials and layouts on thermomechanical deformations in strings of shingled solar cells

Margit Lang 1, Gernot Oreski 1, Eric Helfer 1, Peter Fuchs 1, Andreas Halm 2, Markus Klenk 3
1 Polymer Competence Center Leoben GmbH, Leoben, Austria
2 International Solar Energy Research Center Konstanz, Konstanz, Germany
3 Zurich University of Applied Science, Zurich, Switzerland
**Finite Element-Based Monitoring of Solder Degradation in Discrete SiC MOSFETs**

Borja Kilian ¹, Jonas Glechauf ¹, Youssef Maniar ¹, Olaf Wittler ², Martin Schneider-Ramelow ³

¹ Robert Bosch GmbH, Corporate Sector Research and Advance Engineering, Renningen, Germany
² Fraunhofer IZM, Department Environmental and Reliability Engineering, Berlin, Germany
³ Technical University Berlin, Faculty IV - Electrical Engineering and Computer Science, Berlin, Germany

**Investigating the Occurrence of Bifurcation in Large Metalized Wafers using ANSYS Layered Shell Elements**

Vincenzo Vinciguerra ¹, Mohamed Boutaleb ², Giuseppe Luigi Malgioglio ¹, Antonio Landi ¹, Fabrice Roqueta ², Marco Renna ¹

¹ STMicroelectronics, ADG R
² ADG-DFD, STMicroelectronics Tours, 10 rue Thalès de Milet 37071 Tours Cedex 2, France

**Influence of the quality of material models on warpage and lifetime prediction by finite element simulation**

Julia Zündel, Markus Weninger, Thomas Krivec, Markus Frewein, Sebastian Waschnig, AT

**Simulating and optimizing the induction heating temperature field of horizontal 6 inches 4H-SiC epitaxial CVD reactor**

Zhuorui Tang ¹, Jing Tian ¹, Chaobin Mao ², Nan Zhang ², Jiyu Huang ², Jiajie Fan ¹, Guoqi Zhang ³

¹ Fudan University
² Jihua Laboratory
³ Delft University of Technology

**Hydrolysis mechanism analysis of (Ca, Sr)AlSiN₃:Eu²⁺ red phosphor aged under both pressure cooker test and 85°C&85%RH test: kinetics modelling and first-principle calculation**

Minzhen Wen ¹, Baotong Guo ¹, Shanghuan Chen ², Xiao Hu ³, Xuejun Fan ⁴, Guoqi Zhang ³, Jiajie Fan ¹

¹ Fudan University
² Hohai University
³ Delft University of Technology
⁴ Lamar University
Deformation analysis of QFN packages for validation of thermo-mechanical finite element simulations

Chinmay Nawghane 1, Thomas Moncond’huy 2, Bart Vandevelde 1, Pierre Vernhes 2, Rodolfo Cruz 2
1 Imec, Leuven, Belgium
2 Insidix, Seyssins, France

Thermomechanical and electrical material characterization for a DLP printing process simulation of electrically conductive parts

Andreas Thalhamer 1, Elisabeth Rossegger 1, Siegfried Hasil 1, Katja Hrbinič 1, Viktoria Feigl 1, Martin Pfost 2, Peter Fuchs 1
1 Polymer Competence Center Leoben GmbH (PCCL), Leoben, Austria
2 TU Dortmund University, Chair of Energy Conversion, Dortmund, Germany

Determination of the Equivalent Thickness of a Taiko Wafer using ANSYS Finite Elements Analysis

Correspondant: Vincenzo Vinciguerra, STMicroelectronics

A 3-axis capacitive nonlinear MEMS energy harvester simulation: unidirectivity no more?

Bogdan Vysotskyi, Veronique Rochus, IMEC, Kapeldreef 75, 3001 Leuven, Belgium

Frame detachment simulation of PV modules under mechanical load

Daniel Christopher Joseph, Anna Saperas López, Pascal Romer, Andreas J. Beinert, Fraunhofer Institute for Solar Energy Systems ISE, Freiburg, Germany

Predictive thermo-mechanical models for the quantification of electro-mechanical interactions during production and field-life

J.J.M. Zaal 1, C. He 1, J.A.M. Claes 1, J. van Herk 1, A.O. Adojutelegan 1, X. Cheng 2
1 NXP Semiconductors, Nijmegen, the Netherlands
2 NXP Semiconductors, Chandler, USA

Evaluation of thermomechanical behavior of electronic devices through the use of a reduced order modelling approach

Markus Weninger 1, Julia Zündel 1, Markus Frewein 1, Thomas Krivec 1, Sebastian Waschnig 1, Peter Fuchs 2, Christian Obst 3
1 AT&S Austria Technologie & Systemtechnik Aktiengesellschaft, Austria
2 Polymer Competence Center Leoben, Austria
3 Prime Aerostructures, Austria
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<td>46</td>
<td>Investigation of copper corrosion mechanisms in thin layers using small-scale test structures and simulation</td>
<td>Correspondant: Hasan Sadat Nabi, TU Wien</td>
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<td>49</td>
<td>A simulation-based design approach for optimized performance of Cu-Mo-Cu clips in high-power semiconductor modules</td>
<td>Matt Packwood, Xiang Li, Muhammad Morshed, Harley Neal, Yangang Wang, Dynex Semiconductor Ltd., Lincoln, United Kingdom</td>
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<tr>
<td>50</td>
<td>Determination of Lemaitre Damage Parameters for Al H11 Wire Material</td>
<td>Simon Kuttler, Technical University of Berlin, Berlin, Germany, Bilen Emek Abali, Uppsala University, Uppsala, Sweden, Olaf Wittler, Fraunhofer IZM, Berlin, Germany</td>
</tr>
<tr>
<td>56</td>
<td>Characterization of polysilicon strength at stoppers through on-chip testing</td>
<td>Tiago Vicentini Ferreira do Valle, Aldo Ghisi, Biagio De Masi, Stefano Mariani, Francesco Rizzini, Gabriele Gattere, Carlo Valzasina</td>
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<td>57</td>
<td>Models of Bifurcation and Gravity Induced Deflection in Wide Band Gap 4H-SiC Semiconductor Wafers</td>
<td>Vincenzo Vinciguerra, Giuseppe Luigi Malgioglio, Antonio Landi, Marco Renna, STMicroelectronics, ADG R</td>
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<tr>
<td>61</td>
<td>TC Reliability Enhancement Technology for SSD with Low Temperature Solder Paste Material</td>
<td>Junghoon Kim, Yong Jung, Eunho Oh, Yusuf Cinar, Jongwook Jeong, Sungki Lee, Jonggyu Park, Solution Development Team, Samsung Electronics</td>
</tr>
<tr>
<td>65</td>
<td>Characterization and simulation of four bending test to estimate resin-copper adhesion</td>
<td>Alessandro Sitta, Giuseppe Mauromicale, Marco Alfio Torrisi, Gaetano Sequenzia, Giuseppe D'Arrigo, Michele Calabretta</td>
</tr>
</tbody>
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EuroSimE 2023 Graz
Fully-Coupled Transient Modeling of Highly Miniaturized Electrostatic Pull-In Driven Micropumps

Wolfgang Hözl, Martin Seidl, Gabriele Schrag, Technical University of Munich, Munich, Germany

Simulation methods for LED multi-domain models parameter extraction

Reem Al-zubaidi, Department of Electron Devices, Faculty of Electrical Engineering and Informatics, Budapest University of Technology and Economics, Budapest, Hungary

Analyzing the Impact of Die Positions inside the Power Module on the Reliability of Solder Layers for different power cycling scenarios

Bhanu Pratap Singh ¹, Shirong Li ¹, Khaled Redwan Choudhury ², Staffan Norrga ¹, Hans-Peter Nee ¹
¹ KTH Royal Institute of Technology, Stockholm, Sweden
² University of Warwick, Coventry, UK

Manufacturing of an In-Package Relative Humidity Sensor for Epoxy Molding Compound Packages

Romina Sattari, Henk van Zeijl, Guoqi Zhang, Delft University of Technology

Computational Simulation on Micro-cantilever Bending test of Sintered Cu for Power Electronic Devices

Leiming Du ¹, Dong Hu ¹, René Poelma ², Willem Van Driel ³, Kouchi Zhang ¹
¹ EEMCS Faculty, Delft University of Technology, Delft, the Netherlands
² Nexperia, Nijmegen, the Netherlands
³ Signify, Eindhoven, the Netherlands

Application of Finite Element Simulation for Training an AI Algorithm to Detect Wire Bond Lift-Off in Power Modules

H. Huai, N. Chidanandappa, J. Wilde, Albert-Ludwigs-University Freiburg, Department for Microsystems Technology, Freiburg, Germany

Simulation of Roll-to-Roll UV Nano Imprint Lithography

Correspondant: Johannes Götz, JOANNEUM RESEARCH Forschungsgesellschaft mbH

Stress Recovery in the Reduced Space for Parametric Reduced Models in Microelectronics

Ibrahim Zawra ¹, C. B. Umunnakwe ¹, M. van Soestbergen ², E. B. Rudnyi ³, T. Bechtold ¹
¹ Jade University of Applied Sciences, Wilhelmshaven, Germany
² NXP Semiconductors, Nijmegen, Netherlands
³ Cadfem GmbH, Munich, Germany
Effect of Thermomigration on Electromigration in SWEAT Structures

Zhen Cui¹, Xuejun Fan², Guoqi Zhang¹
¹Department of Microelectronics, Delft University of Technology, Delft, Netherlands
²Department of Mechanical Engineering, Lamar University, Beaumont, TX USA

FE-Analysis of deformation state during a four-point bending experiment on soldered MLCCs

Shiva Goud Anthati, Vlad Serea, Erik Wiss, Steffen Wiese, Saarland University, Chair of Microintegration and Reliability

Thermal Stresses in a Bi-Layer Assembly in Electronics Packaging

Mathews T Vellukunnel, Mukunda Khanal, Xuejun Fan, Department of Mechanical Engineering, Lamar University Beaumont TX, USA

Anand model calibration for SAC305 solder joints based on the evolution of the shear stress and strain hysteresis loops for different thermal cycling conditions

Jean-Baptiste Libot¹, Zoé Bussière¹, Lara Mahfouz¹, Joël Alexis², Olivier Dalverny²
¹Safran, France
²INP Toulouse - ENIT, France

Comparison of finite elements approaches for Si wafer buckling calculation

Camille Sautot¹, Jean-Charles Craveur², Mohamed Boutaleb³, Fabrice Roqueta³
¹ISMANS-CESI, Le Mans, France; CNRS LAUM - UMR 6613, Le Mans, France
²ISMANS-CESI, Le Mans, France
³ADG-DFD, STMicroelectronics Tours, Tours, France

10:00 Coffee time
# Session 9 — Thermal Modelling

**11:00** Tuesday April 18 2023  
Chaired by Cadmus Yuan, Lisa Stencel

<table>
<thead>
<tr>
<th>Time</th>
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<th>Speaker(s)</th>
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| 11:00 | Ab-initio derived force field potential for the accurate simulation of thermal transport in AlN  
**20mn** | Simon Fernbach, Elke Kraker, Natalia Bedoya-Martínez, Microelectronics Materials Center Leoben Leoben, Austria |
| 11:20 | Frequency Analysis of Dual-Phase-Lag Heat Transfer Model               | Artur Sobczak, Grzegorz Jabłoński, Marcin Janicki, Łódź University of Technology, Poland |
| 11:40 | Efficient Simulation of the Effect of Solder Voids and Tilting on the Cooling of Power Semiconductors | Nils Jahn, Martin Pfost, TU Dortmund University, Dortmund, Germany         |
| 12:00 | Trigger specific failure in LED system by power and duty cycle patterns life time testing | Julien Magnien, Lisa Mitterhuber, Katrin Fladischer, Jördis Rosc, Elke Kraker, Materials Center Leoben Forschung GmbH, Roseggerstraße 12, 8700 Leoben, Austria |

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Full Programme EuroSimE 2023 Graz, Monday to Wednesday

16 EuroSimE 2023 Graz
# Advanced Material Characterisation — Session 10

**Chaired by Peter Fuchs, Xiao Hu**

**Tuesday April 18 2023 11:00**

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<thead>
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<th>Title</th>
<th>Authors</th>
<th>Affiliations</th>
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<tbody>
<tr>
<td>11:00</td>
<td><strong>Leadframe-Epoxy Moulding Compound Adhesion: A Micromechanics-driven Investigation</strong></td>
<td>Alessandro Della Porta¹, Stefano Mariani², Marco Rovitto¹, Luca Andena², Samuele Zalaffi¹</td>
<td>¹ STMicroelectronics, Agrate Brianza, Italy, ² Politecnico di Milano, Milano, Italy</td>
</tr>
<tr>
<td>11:20</td>
<td><strong>MEMS Cantilever for High-Cycle Fatigue Testing of thin Metal Films</strong></td>
<td>N. Jöhrmann¹, C. Stöckel², B. Wunderle¹</td>
<td>¹ TU Chemnitz, Germany, ² Fraunhofer ENAS, Chemnitz, Germany</td>
</tr>
<tr>
<td>11:40</td>
<td><strong>Degradation of silicone-based sealing materials used in microelectronics</strong></td>
<td>Maryam Yazdan Mehr¹, Pejman Hajipour², H.van Zeijl¹, W.D. van Driel³, Thierry Cooremans⁴,</td>
<td>¹ Faculty EEMCS, Delft University of Technology, Delft, The Netherlands,</td>
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<tr>
<td></td>
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<td>Francois De Buyl⁴, G.Q. Zhang¹</td>
<td>² Chemical and Materials Engineering, University of Alberta, Edmonton, Canada</td>
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<td></td>
<td></td>
<td></td>
<td>³ Faculty EEMCS, Delft University of Technology, Delft, The Netherlands; Signify,</td>
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<td>Eindhoven, The Netherlands</td>
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<td>⁴ Dow Silicones Belgium sprl, Seneffe, Belgium</td>
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<td>12:00</td>
<td><strong>Simulation of Cu bulge-out by cyclic Cu surface diffusion FEM in Cu/SiCN hybrid bonding</strong></td>
<td>Yan Wen Tsau¹, Joke De Messemaker², Mario Gonzalez², Marc Seefeldt³, Eric Beyne², Ingrid De Wolf¹</td>
<td>¹ imec/KU Leuven, ² imec, ³ KU Leuven</td>
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<tr>
<td>12:30</td>
<td><strong>Lunch</strong></td>
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</table>
**Session 11 — Simulation of advanced packaging technologies**

**13:30 Tuesday April 18 2023**  
Chaired by Alberto Corigliano, Rudolf Kniely

<table>
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<tr>
<th>Time</th>
<th>Title</th>
<th>Authors</th>
<th>Institutions</th>
</tr>
</thead>
</table>
| 13:30 | Numerical simulation of Crosstalk Effects in PMUT Arrays             | Omer Mohamed Osman Abdalla, Gianluca Massimino, Cristina D’Argenzio,    | 1 Department of Civil and Environmental Engineering, Politecnico di Milano, Milan, Italy  
       |                                                                       | Matteo Colosio, Marco Soldo, Fabio Quaglia, Alberto Corigliano          | 2 STMicroelectronics, Cornaredo, Italy                                       |
| 14:10 | Towards System-level Simulation of an Electromagnetic Energy Harvester Model via Equivalent Circuit Extraction from ANSYS Maxwell 3D | Chengdong Yuan, Dennis Hohlfeld, Tamara Bechtold                       | 1 Department of Engineering, Jade University of Applied Sciences, Wilhelmshaven Germany  
       |                                                                       |                                                                        | 2 Institute for Electronic Appliances and Circuits, University of Rostock, Rostock, Germany |
| 14:30 | Optimal design of piezoelectric MEMS for vibration monitoring system with nanoionics zero-energy memory elements | Alexey Shaporin, Chris Stöckel, Marcel Melzer, Falk Schaller, Roman Forke, Sven Zimmermann, Harald Kuhn, Falk Schaller, Roman Forke, Sven Zimmermann, Harald Kuhn | 1 Fraunhofer Institute for Electronic Nano Systems, Chemnitz, Germany  
       |                                                                       |                                                                        | 2 Fraunhofer Institute for Electronic Nano Systems, Chemnitz, Germany and Center for Microtechnology, Chemnitz University of Technology, Chemnitz, Germany  
       |                                                                       |                                                                        | 3 Center for Microtechnology, Chemnitz University of Technology, Chemnitz, Germany  
       |                                                                       |                                                                        | 4 Fraunhofer Institute for Electronic Nano Systems, Chemnitz, Germany |
MEMS Simulations — Session 12

Chaired by Jiajie Fan, Julia Zündel  
Tuesday April 18 2023 13:30

13:30 20mn
An advanced finite element model of the Cu pillar solder reflow assembly

Cao, Zhibo 1, Pekkolay, Baran 2, Okur, Aslihan 2, Heusdens, Bruno 3, Carta, Corrado 4, Kaynak, Mehmet 1
1 IHP – Leibniz-Institut für innovative Mikroelektronik, Frankfurt (Oder), Germany
2 Sabanci University, Istanbul, Turkey
3 TAIPRO Engineering, Lambermont, Belgium
4 IHP – Leibniz-Institut für innovative Mikroelektronik, Frankfurt (Oder), Germany; Technische Universität Berlin, Berlin, Germany

13:50 20mn
FEM Modelling of Ag-Sinter Joints with Respect of Porosity and Sinter Pressure

Mike Roellig 1, Robert Schwerz 1, Joerg Meyer 2, Karsten Meier 2
1 Fraunhofer Institute for Ceramic Technologies and Systems IKTS, Dresden, Germany
2 Electronics Packaging Laboratory, Technische Universitaet Dresden, Dresden, Germany

14:10 20mn
Modification of Prony Series Coefficients to Account for Thermo-Oxidative Ageing Effects within Numerical Simulations

Marius van Dijk 1, Olaf Wittler 1, Stefan Wagner 1, Martin Schneider-Ramelow 2
1 Fraunhofer IZM, Berlin, Germany
2 TU Berlin, Berlin, Germany

14:30 20mn
Reactive Die Bonding on LTCC Substrates – Analysis by CFD Simulation

Erik Wiss 1, Adam Yuile 1, Alexander Schulz 2, Jens Müller 2, Steffen Wiese 1
1 Saarland University, Chair of Microintegration and Reliability
2 TU Ilmenau, Electronics Technology Group
Session 13 — Wafer level technology simulations

15:00 Tuesday April 18 2023

Chaired by Lynn Davis, Olaf Wittler

15:00


Prashant Kumar Singh, Kashi Vishwanath Machani, Dirk Breuer, Michael Hecker, Karsten Meier, Frank Kuechenmeister, Marcel Wieland, Karlheinz Bock

1 GlobalFoundries Dresden Module One LLC
2 Technische Universität Dresden, Institute of Electronic Packaging Technology, 01062 Dresden, Germany

15:20

Packaging Induced Stresses in Embedded and Molded GaN Power Electronics Components

Saeed Akbari, Jonas Holmberg, Dag Andersson, Madhav Mishra, Klas Brinkfeldt, RISE Research Institutes of Sweden

15:40


Andreas Stegmaier, Ole Hölck, Marius van Dijk, Hans Walter, Olaf Wittler, Martin Schneider-Ramelow

1 Fraunhofer Institute for Reliability and Microintegration IZM
2 Research Center of Microperipheric Technologies, Technische Universität Berlin

16:00

A Continuously Updated Package-Degradation Model reflecting Thermomechanical Changes at Different Thermo-Oxidative Stages of Moulding Compound

Adwait Inamdar, Michiel van Soestbergen, Amar Mavinkurve, Willem van Driel, GuoQi Zhang

1 Delft University of Technology, Delft, The Netherlands
2 NXP Semiconductors, Nijmegen, The Netherlands
3 Signify, Eindhoven, The Netherlands
## Design and Modelling for Heterogeneous Integration — Session 14

**Chaired by Rainer Dudek, Michiel van Soestbergen**

**Tuesday April 18 2023 15:00**

<table>
<thead>
<tr>
<th>Time</th>
<th>Session Details</th>
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<tbody>
<tr>
<td>15:00</td>
<td><strong>Transient Thermal 2D FEM Analysis of SiC Mosfet in Short-Circuit Operation Including Solidus - Liquidus Phase Transition of the Aluminum Source Electrode</strong>&lt;br&gt; E. Sarraute, Th. Cazimajou, F. Richardeau, LAPLACE, Université de Toulouse, CNRS, INPT, UPS, Toulouse, France</td>
</tr>
<tr>
<td>15:20</td>
<td><strong>Multi-scale electro-thermo-mechanical simulation of a SiC MOSFET transistor during short-circuit</strong>&lt;br&gt; Florent Loche-Moinet, Loic Theolier, Eric Woirgard, Laboratoire de l’Intégration du Matériaux au Système, Bordeaux</td>
</tr>
<tr>
<td>15:40</td>
<td><strong>Two-Phase Flow Simulation of Capillary Underfilling as a Design Tool for Heterogeneous Integration</strong>&lt;br&gt; Lisa Christin Stencel, Jörg Strogies, Rüdiger Knofe, Bernd Müller, Carsten Borwieck, Matthias Heimann, Siemens AG, T ICE ELM-DE, 13629 Berlin, Germany</td>
</tr>
<tr>
<td>16:00</td>
<td><strong>Warpage of transfer-molded automotive power modules - experimental characterization, numerical simulation and optimization</strong>&lt;br&gt; Sprenger, Mario¹, Krämer, Martin², Tolyschew, Eduard², Steinau, Martin², Renner, Dietrich², Ottinger, Bettina¹, Goth, Christian², Franke, Jörg³&lt;br&gt;¹ Vitesco Technologies, Nuremberg, Germany; Institute for Factory Automation and Production Systems (FAPS), Friedrich-Alexander-Universität Erlangen-Nürnberg, Erlangen, Germany&lt;br&gt;² Vitesco Technologies, Nuremberg, Germany&lt;br&gt;³ Institute for Factory Automation and Production Systems (FAPS), Friedrich-Alexander-Universität Erlangen-Nürnberg, Erlangen, Germany</td>
</tr>
<tr>
<td>16:20</td>
<td><strong>Coffee break</strong></td>
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</table>
**Session 15 — Mixed modelling and simulation**

16:45 Tuesday April 18 2023  
Chaired by Peter Meszmer, Youssef Maniar

<table>
<thead>
<tr>
<th>Time</th>
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<th>Authors</th>
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<tbody>
<tr>
<td>16:45</td>
<td>Improving the Vibration Reliability of SAC Flip-Chip Interconnects Using Underfill</td>
<td>Robert Höhne, Karsten Meier, Michael Reim, Marco Lehmann, Karl-Heinz Bock, Institute of Electronic Packaging Technology Technische Universität Dresden, Germany</td>
</tr>
<tr>
<td>17:05</td>
<td>Size Scaling of Brittle Strength using Multi-Mode Weibull Distribution</td>
<td>S. Ananiev, G.M. Reuther, N. Del Vecchio, P. Altieri-Weimar, Infineon Technologies AG, Germany</td>
</tr>
<tr>
<td>17:25</td>
<td>Undoped and Doped Solder Performance under High Strain Rates and Wide Operating Temperatures after Prolonged Storage</td>
<td>Pradeep Lall, Vishal Mehta, Vikas Yadav, Mrinmoy Saha, Jeff Suhling, Auburn University, Auburn, AL, USA</td>
</tr>
</tbody>
</table>
### Supportless 5-Axis 3D-Printing and Conformal Slicing: A Simulation-based Approach

**16:45**

20mn

Lakshmi Srinivas G, Michalec Pawel, Laux Marius, Lisa Marie Faller, *ADMiRE Research Center, School of Engineering and IT, Carinthia University of Applied Sciences, Villach, Austria.*

### Effect of Undercut due to Isotropic Etch while Releasing on the Performance of TPoS Resonators

**17:05**

20mn

Bijay J, Bhadri Narayanan K N, Abhijit Sarkar, Amitava DasGupta, Deleep R Nair, *Department of Electrical Engineering, Indian Institute of Technology Madras, Chennai 600036, India*

### Modeling of in-plane distortions and overlay errors encountered during 3-D NAND flash device fabrication

**17:25**

20mn

Oguzhan Orkut Okudur, Mario Gonzalez, Geert Van den bosch, Maarten Rosmeulen, *imec, Leuven, Belgium*

### Simulation of Temperature Driven Microflows Using a Lattice Boltzmann Method in Slip and Moderate Transition Regimes

**17:45**

20mn

Anas Selmi, Sahil Bhapkar, Cristian Nagel, Adrian Kummerländer, Mathias J. Krause

1 Robert Bosch GmbH, Reutlingen, Germany

2 Karlsruhe Institute of Technology, Karlsruhe, Germany
Exhibitors and sponsors session

18:10  Tuesday April 18 2023  Chaired by Przemyslaw Gromala, Martin Niessner

18:10  CADFEM - Steffen Peters / René Fuger
18:18  Dantec Dynamics - Roland Wahler
18:26  Infineon - Martin Niessner (Sponsor)
18:34  Nanotest - Marcus Schulz / Andrea Heuser
18:42  PCCL - Peter Fuchs / Margit Lang
18:50  Prime - Andreas Szadeczky / Alexander Buchner
18:58  Quanscient - Alexandre Halbach / Juha Riippi
19:06  Siemens - Matthias Heimann (Sponsor)
19:14  Silicon Alps - Gernot Eder (Sponsor)

19:30  Cocktail dinner party at venue
### Mixed Session — Session 17

**Chaired by Pradeep Lall, Abhijit Dasgupta**

**Wednesday April 19 2023 09:00**

<table>
<thead>
<tr>
<th>Time</th>
<th>Title</th>
<th>Speakers</th>
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<tbody>
<tr>
<td>09:00</td>
<td>Molecular dynamics simulation on tensile mechanical properties of sintered nanocopper particles used in power electronics die-attachment</td>
<td>Cheng Qian(^1), Dong Hu(^2), Xu Liu(^1), Xuejun Fan(^3), Guoqi Zhang(^2), Jiajie Fan(^1)</td>
</tr>
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<td>(^1) Fudan University, Shangai, China; (^2) Delft University of Technology, the Netherlands; (^3) Lamar University, USA</td>
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<tr>
<td>09:20</td>
<td>Metamaterials and MEMS (MetaMEMS): a promising trend in Microsystems technology</td>
<td>Raffaele Ardito, Claudia Comi, Valentina Zega, Alberto Corigliano, Department of Civil and Environmental Engineering, Politecnico di Milano, Italy</td>
</tr>
<tr>
<td>09:40</td>
<td>Metal-based Direct Multi-jet Impingement Cooling Solution for Autonomous Driving High-Performance Vehicle Computer (HPVC)</td>
<td>Reza Moloudi(^1), Tobias Grün(^2), Willem Verleysen(^3), Bart Vandevelde(^1), Silke G.C. Cleuren(^3), Daniel May(^2), Bernhard Wunderle(^2)</td>
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<td>(^1) IMEC, Leuven, Belgium; (^2) TU Chemnitz, Germany; (^3) Materialise, Leuven, Belgium</td>
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</tbody>
</table>
Awards ceremony

10:00  Wednesday April 19 2023  Chaired by Sven Rzepka

10:00  Best and outstanding papers and posters

10:15  Coffee break
**Thermal Behavior — Session 18**

**Wednesday April 19 2023 10:45**

<table>
<thead>
<tr>
<th>Time</th>
<th>Title</th>
<th>Speaker(s)</th>
<th>Affiliation(s)</th>
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<tbody>
<tr>
<td>10:45</td>
<td>Design of power modules using containers filled with phase change</td>
<td>Rabih Khazaka, Yvan Avenas, Rachelle Hanna, Stephane Azzopardi</td>
<td>1 Safran Tech, Electrical-Electronic Systems Research Group, Châteaufort, France 2 Univ. Grenoble Alpes, CNRS, Grenoble INP, G2Elab, Grenoble, France</td>
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<td></td>
<td>materials as device top interconnection for power peak management</td>
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<td>11:05</td>
<td>Multiphysics System Simulation of Electronic Components Including</td>
<td>Rene Fuger, CADFEM (Austria) GmbH, Vienna</td>
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<td>Reduced Order Modelling - Demonstrated on a Laser Diode Package</td>
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<tr>
<td>11:25</td>
<td>Over-current Capability of SiC Devices for Short Power and Heat Pulses</td>
<td>Shubhangi Bhadoria, Hans-Peter Nee, KTH Royal Institute of Technology,</td>
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<td>Stockholm, Sweden</td>
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Session 19 — Solder joint strain characterisation

10:45 Wednesday April 19 2023

Chaired by Lisa Mitterhuber, Binh Nguyen

10:45 20mn

Analytical and experimental studies on the damage evolution of SAC solder alloys

S. Glane 1, A. Morozov 1, W.H. Müller 1, T. Hauck 2, G.R. Mazumder 3, M.A. Haq 3, J. Suhling 3
1 Berlin Institute of Technology, Berlin, Germany
2 NXP Semiconductors, München, Germany
3 Auburn University, Auburn, USA

11:05 20mn

Strain Measurements and Thermo-Mechanical Simulation of SnAgCu vs. low melting point alloy (LMPA-Q) solder joints

Bart Vandevelde 1, Riet Labie 1, Ralph Lauwaert 2, Rainer Dudek 3, Przemyslaw Gromala 4, Michael Eichorst 5
1 imec
2 Interflux Electronics
3 Fraunhofer ENAS
4 Robert Bosch
5 CWM

11:25 20mn

Microstructure dependent modelling of SAC305 Solder Joints under Cyclic Viscoplastic Creep

Aniket Bharamgonda 1, Abhijit Dasgupta 2, Abhishek Deshpande 2, Torsten Hauck 3, Yaxiong Chen 3
1 University of Maryland, College Park, MD, USA-20740
2 University of Maryland, College Park, MD, USA-20740
3 NXP Semiconductors

12:00 Lunch
A Probability Soft-Error Model for a 28-nm SRAM-based FPGA under Neutron Radiation Exposure

Gia Bao Thieu 1, Johannes Schmechel 1, Kirsten Weide-Zaage 2, Katharina Schmidt 3, Dorian Hagenah 3, Guillermo Payá-Vayá 1
1 Chair for Chip Design for Embedded Computing, Technische Universität Braunschweig, Braunschweig, Germany
2 RESRI Group, Institute of Microelectronic Systems (IMS), Leibniz Universität Hannover, Hannover, Germany
3 Bundeswehr Research Institute for Protective Technologies and CBRN Protection (WIS), Munster, Germany

Neuron-Electrode Interface with Hodgkin-Huxley Model in Ansys

Ulrike Fitzer 1, Dennis Hohlfeld 2, Tamara Bechtold 1
1 Jade University of Applied Sciences, Wilhelmshaven, Germany and University of Rostock, Rostock, Germany
2 University of Rostock, Rostock, Germany

Presentation is canceled. Paper available in proceedings and Xplore

Humidity Sensing for free—advanced thermoacoustic signal models in miniaturized photoacoustic gas sensors

Simon Essing 1, Mauriz Trautmann 2, David Tumpold 2, Gabriele Schrag 1
1 Chair of Physics of Electrotechnology, Technical University of Munich, Germany
2 Infineon Technologies AG, Neubiberg, Germany
Session 21 — Power electronics

13:00 Wednesday April 19 2023  Chaired by Marcus Schulz, Vincenzo Vinciguerra

13:00 Non-intrusive electro-thermo-mechanical reduced model for diagnosis and prognostic on IGBT power modules
Louis Schuler 1, Ludovic Chamoin 2, Zoubir Khatir 3, Mounira Bouarroudj 4, Merouane Ouhab 1
1 Mitsubishi Electric R&D Centre Europe
2 Université Paris-Saclay, CentraleSupélec, ENS Paris-Saclay, CNRS, LMPS - Laboratoire de Mécanique Paris-Saclay, France
3 Université Gustave Eiffel, SATIE, France
4 Université Paris EST Créteil, SATIE, CNRS, ENS Paris-Saclay, France

13:20 Lifetime modeling of copper metallization for SiC power electronics
Daniel Losbichler 1, Markus Klingler 1, Steffen Orso 1, Bernhard Wunderle 2
1 Robert Bosch GmbH
2 Chemnitz University of Technology

13:40 Reduction of empiricism in the solder joint reliability assessment of QFN packages by using thermo-mechanical simulations
M. van Soestbergen 1, R. Roucou 1, M. Rebosolan 2, J.J.M Zaal 1
1 NXP Semiconductors, Nijmegen, Netherlands
2 Delft University of Technology, Delft, Netherlands

14:00 Failure Prediction and Analysis of an IGBT Module for Industrial Applications Subjected to Passive and Power Cycling
Rainer Dudek 1, Alexander Otto 1, Ralf Döring 1, Anu Mathew 1, Xing Liu 2, Sven Rzepka 1
1 Fraunhofer ENAS, Dept. Micro Materials Center
2 Chemnitz University of Technology, Professorship of Power Electronics

14:20 Coffee break
### Heterogeneous Integration Roadmap

**Wednesday April 19, 2023  14:35**

<table>
<thead>
<tr>
<th>Time</th>
<th>Session Title</th>
<th>Speaker(s)</th>
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<tbody>
<tr>
<td>14:35</td>
<td>Heterogeneous Integration Paving the way for Microelectronics Resurgence; XueJun Fan, Abhijit Dasgupta</td>
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<tr>
<td>14:50</td>
<td>Intelligent Reliability along the Value Chain; Klaus Pressel, Willem van Driel</td>
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<tr>
<td>15:05</td>
<td>State of the Art and Future Trends for Reliability Assessment of Silicon Carbide Power Modules - results from the IPCEI ME; Alessandro Sitta (STMicroelectronics)</td>
<td></td>
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<tr>
<td>15:25</td>
<td>Discussion, Next Steps and Closure</td>
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**Session 22 — Simulation of emerging technologies**

**14:35** Wednesday April 19 2023  
Chaired by Jonas Gleichauf, Aldo Ghisi

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<tr>
<th>Time</th>
<th>Title</th>
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<tbody>
<tr>
<td><strong>14:35</strong></td>
<td>Thermomechanical Modelling of Photovoltaic Modules</td>
<td>Andreas J. Beinert, Pascal Romer, Fraunhofer Institute for Solar Energy Systems ISE, Freiburg, Germany</td>
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<td>20mn</td>
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<tr>
<td><strong>14:55</strong></td>
<td>Multi-Physical Numerical Modelling of Hybrid Flexible Sensor</td>
<td>Correspondant: ZhuangJian Liu, INSTITUTE OF HIGH PERFORMANCE COMPUTING, Astar</td>
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<td>20mn</td>
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<tr>
<td><strong>15:15</strong></td>
<td>UV LEDs: Performance and Reliability for Commercial InGaN and AlGaN LED Products</td>
<td>Lynn Davis, Kelley Rountree, Roger Pope, Karmann Riter, Clint Clayton, Andrew Dart, Michelle McCombs, Abdal Wallace, RTI International</td>
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<td>20mn</td>
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<td><strong>15:35</strong></td>
<td>Closure</td>
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