

## Conference Program PCIM Europe 2021

### Monday, 3 May 2021

#### 13:15 Conference Highlights – Day 1

##### Stream 1

##### SiC Devices I

**Chairperson:** Peter Steimer, Hitachi ABB Power Grids, CH

- 13:20**            **Parallel SiC Power Modules for the Use in High Current 3 Level ANPC Inverters with High Requirements on Output Frequency and THDi**  
Martin Kroschk, Gunther Budig, André Nickel, EAAT, D
- 13:35**            **Challenges in Scaled High-Current SiC Measurements**  
Jan Fuhrmann, Felix Kayser, Hans-Günter Eckel, Hao Wang, University of Rostock, D
- 13:50**            **Fast SiC-MOSFET Switch with Gate Boosting Technology**  
Martin Sack, Martin Hochberg, Dennis Herzog, Georg Müller, Karlsruhe Institute of Technology, D
- 14:05**            **A Unified View of GaN, SiC, Silicon FETs & IGBTs and their Price-Performance Analysis**  
Shishir Rai, DiscoverEE , USA

##### Stream 2

##### Power Electronics Simulation I

**Chairperson:** Eric Favre, IMI Precision Engineering, CH

- 13:20**            **Fixed Admittance Matrix Technique for Real Time Power Electronics Simulation on Matlab/Simulink**  
Samir Salama, Simupec, D
- 13:35**            **Separation of Models for the Distributed Simulation of Electric Grids**  
Wilfried Holzke, Florian Redmann, Matthias Joost, Bernd Orlik, University of Bremen, D
- 13:50**            **Challenges of Commutation Cell Tests with Voltage Source Inverters in Power-Hardware-in-the-Loop Simulations**  
Marc René Lotz, Technical University of Braunschweig, D; Martin Könemund, Ostfalia University of Applied Sciences, D
- 14:05**            **Novel Approach to Model GaN-HEMT Capacitances using Sigmoid Functions**  
Julian Dobusch, Raffael Schwanninger, Thomas Duerbaum, Friedrich-Alexander-University Erlangen-Nuremberg, D

##### Stream 3

##### Power Modules I

**Chairperson:** Bernhard Strzalkowski, Analog Devices, D

- 13:20**            **Consideration of Oscillation Dilemma from Dual 3.3 kV and 6.5 kV High Voltage Common Package**  
Taiga Arai, Takashi Wada, Masashi Ohara, Koji Sasaki, Daisuke Kawase, Hitachi Power Semiconductor Device, J; Akira Mima, Tomoyasu Furukawa, Hitachi, J

- 13:35**      **Reduction of Parasitic Inductance and Thermal Management in a Multichip SiC Half-Bridge Module**  
Tobias Nieckula Ubostad, Andreas Giannakis, Gard Lyng Rødal, Daniel Alexander Philips, Dimosthenis Peftitsis, Norwegian University of Science and Technology, N
- 13:50**      **Faster Switching with Less Overvoltage - Limitations in Current, Parasitics and Paralleled Chips**  
Pablo Rodriguez de Mora, Mark-M. Bakran, University of Bayreuth, D
- 14:05**      **Full Bridge SiC Module for Charger Applications**  
Max-Josef Kell, Jorge Mari, Matthias Beck, Jörg Bergmann, Danfoss Silicon Power, D

**14:20 Coffee Break**

**Stream 1**

**SiC Devices II**

**Chairperson:** Peter Steimer, Hitachi ABB Power Grids, CH

- 14:30**      **Investigation of Performance of Double-Trench SiC Power MOSFETs in Forward and Reverse Quadrant Operation**  
Juefei Yang, Saeed Jahdi, Bernard Stark, Phil Mellor, University of Bristol, GB;  
Olayiwola Alatise, Jose Ortiz-Gonzalez, University of Warwick, GB
- 14:45**      **Analysis of Dynamic Transients of High Voltage Silicon and 4H-SiC NPN BJTs**  
Chengjun Shen, Saeed Jahdi, Phil Mellor, Xibo Yuan, University of Bristol, GB;  
Olayiwola Alatise, Jose Ortiz-Gonzalez, University of Warwick, GB
- 15:00**      **Analysis of a 3.3kV-Si-SiC-Topology-Hybrid-Switch for Resonant ZVS Inverter Applications**  
Michael Meissner, Klaus Hoffmann, Helmut Schmidt University, D
- 15:15**      **Analyzing Spectral Electroluminescence Sensitivities of SiC MOSFETs and their Impact on Power Device Monitoring**  
Lukas A. Ruppert, Sven Kalker, Rik W. De Doncker, RWTH Aachen University, D;  
Christoph H. van der Broeck, FEV Europe, D

**Stream 2**

**Power Electronics Simulation II**

**Chairperson:** Eric Favre, IMI Precision Engineering, CH

- 14:30**      **Simplified Method to Analyze Drive Strengths for GaN Power Devices**  
Enis Baris Bulut, University of Trakya, TR; Mehmet Onur Gulbahce, Fatih Sultan Mehmet Vakif University, TR; Derya Ahmet Kocabas, Istanbul Technical University, TR; Serkan Dusmez, Arçelik, TR
- 14:45**      **Model Parameter Extraction Tool for the Analysis Series-Connected SiC-MOSFETs**  
Cédric Mathieu de Vienne, Besar Asllani, Bruno Lefebvre, SuperGrid Institute, F;  
Pierre Lefranc, Pierre-Olivier Jeannin, G2elab, F
- 15:00**      **Investigations on Calculation Time Reduction in Numerical Simulations for Power Electronic Applications**  
Marcel Gladen, WILO, D

- 15:15**      **A High-Speed and High-Accuracy SiC MOSFET Model for Simulating Practical Power Circuits**  
Yohei Nakamura, Naotaka Kuroda, Atsushi Yamaguchi, Ken Nakahara, ROHM, J

### Stream 3

#### Power Modules II

**Chairperson:** Bernhard Strzalkowski, Analog Devices, D

- 14:30**      **Wire Bonding Stress Analysis Under Short-Circuit Tests for SiC MOSFETs**  
Mario Pulvirenti, Daniela Cavallaro, Luciano Salvo, Angelo Giuseppe Sciacca, Marco Papasero, Alessandra Cascio, STMicroelectronics, I
- 14:45**      **Smart Package Upgrade to Improve Power Density and Lifetime in Heavy-Duty Vehicles**  
Stefan Buschhorn, Klaus Vogel, Max Jacobs, Andreas Schmal, Infineon Technologies, D
- 15:00**      **Comprehensive Analysis of the Impact of Serial and Parallel Cooling on the Thermal Performance of Power Semiconductor Modules**  
Lluís Santolaria, Milad Maleki, Athanasios Mesemanolis, Antoni Ruiz, Edoardo Ceccarelli, Hitachi ABB Power Grids, CH
- 15:15**      **Active Short Circuit Capability of Half-Bridge Power Modules Towards E-Mobility Applications**  
Antoni Ruiz, Milad Maleki, Athanasios Mesemanolis, Lluís Santolaria, Andreas Baschnagel, Hitachi ABB Power Grids, CH

### 15:30 Jump-In Discussions

### Stream 1

#### Multilevel Converter

**Chairperson:** Pavol Bauer, Delft University of Technology, NL

- 16:10**      **Evaluation of Quasi 2-level Modulation for MV Applications**  
Anatolii Tcai, Thiwanka Wijekoon, Huawei, D; Marco Liserre, Christian-Albrechts-University, D
- 16:25**      **Design and Testing of a Novel Transcranial Magnetic Stimulator with Adjustable Pulse Dynamics and High Current Capability (>2 kA) based on a Modular Cascaded H-Bridge Inverter Topology**  
Florian Schwitzgebel, Manuel Kuder, Thomas Weyh, Bundeswehr University Munich, D; Christina Meisl, Charité Universitätsmedizin Berlin, D; Anton Kersten, Chalmers University of Technology, S
- 16:40**      **A Novel Cell-By-Cell Pre-Charge Scheme for Modular Multilevel Converters**  
Ilknur Colak, Maschinenfabrik Reinhausen, D; Mohammad Abu-Ali, Technical University of Munich, D
- 16:55**      **Development and Testing of Protection Concepts for Modular Multilevel Converters using Back-to-Back Operation**  
Waqas Ali, Balduino Rabelo, Maschinenfabrik Reinhausen, D

### Stream 2

## **Converter Design Optimization**

**Chairperson:** Marcelo Lobo Heldwein, Federal University of Santa Catarina, BR

- 16:10**            **Design of Sensors for Real-Time Active Electromagnetic-Emission Control in SiC Traction Inverters**  
Jochen Henn, Carsten Fronczek, Rik W. De Doncker, ISEA RWTH Aachen University, D
- 16:25**            **Distributed Control for the Current Balancing of a Multiphase Converter using a Single Voltage Sensor**  
Marc Cousineau, Thierry Meynard LAPLACE, F; Victor Flores Mendes, Seleme Isaac Seleme Jr., Federal University of Minas Gerais, BR; Joao Lucas Da Silva, Federal University of Itajubá, BR
- 16:40**            **Comparing Preisach and Jiles Atherton based Models for Ability of Loss Prediction**  
Matthias Köppen, Jörn Schliewe, Stefan Scheffler, Stefan Weber, TDK Electronics, D
- 16:55**            **Tubular Electronics – Next Step in System Integration**  
Paul Gierth, Lars Rebenklau, Fraunhofer Institute IKTS, D

## **Stream 3**

### **Power Modules III**

**Chairperson:** Marc Hiller, Karlsruhe Institute of Technology, D

- 16:25**            **Assembly Technologies for Highly Integrated Sandwich Type Power Modules with WBG Semiconductors**  
Ulrich Keßler, Martin Rittner, Tine Konjedic, Robert Bosch, D
- 16:40**            **Development of the Laser Beam Based High-Current Contacting Technology and an Integrated Lead Frame Stack Structure**  
Woo-Sik Chung, Johanna Helm, Alexander Olowinsky, Fraunhofer Institute ILT, D; Markus Bast, Jan Philipp Gördes, Ronald Eisele, University of Applied Sciences Kiel, D; Martin Becker, Frank Osterwald, Danfoss Silicon Power, D; Christian Schellenberg, Klaus Wilke, Siemens, D
- 16:55**            **Application and Verification of Effective Heat Spreading Angles on a Multi-Layer Thermal Design**  
Robin Weiß, Sebastian Rode, Normann Schwingal, Tobias Barth, Steffen Bernet, Technical University of Dresden, D

**17:10 End Day 1**

**Tuesday, 4 May 2021**

**09:00 Conference Highlights – Day 2**

**Stream 1**

**SiC Devices and Applications**

**Chairperson:** Ulrike Grossner, ETH Zurich, CH

- 09:05            An Alternative Approach to Parasitic Turn On Detection**  
Jorge Mari, Max-Josef Kell, Fabio Carastro, Danfoss Silicon Power, D
- 09:20            Understanding the Turn-off Behavior of SiC MOSFET Body Diodes in Fast Switching Applications**  
Paul Sochor, Andreas Hürner, Michael Hell, Rudolf Elpelt, Infineon Technologies, D
- 09:35            Influence of the Threshold-Voltage Hysteresis on the Switching Properties of SiC MOSFETs**  
Andreas Hürner, Paul Sochor, Rudolf Elpelt, Maximilian Wolfgang Feil, Infineon Technologies D
- 09:50            Comparison of Three Methods [Gate Bias Reduction, Series Ballast Resistor and BaSiC(EMM) to Improve Short Circuit Capability of 1.2 kV SiC Power MOSFETs**  
Ajit Kanale, Jayant Baliga, North Carolina State University, USA

**Stream 2**

**Special Session: Materials Development for Power Electronics**

**Chairperson:** Frank Osterwald, Danfoss Silicon Power, D

- 09:05            The Long Journey from Crystal Growth to Power Devices, the Role of Material Development for III-Nitride Semiconductors**  
Elke Meißner, Sven Besendörfer, Sepideh Faraji, Fraunhofer Institute IISB, D; Eldad Bahat-Treidel, Joachim Würfl, Ferdinand-Braun-Institute Berlin, D
- 09:20            Challenges of New Packaging Solutions for Power Modules**  
Ronald Eisele, University of Applied Sciences Kiel, D; Anton Miric, Heraeus Materials Technology, D; Markus Scheibel, Heraeus Deutschland, D
- 09:35            New Aspects in the Understanding of High Voltage Aluminium Electrolytic Capacitors**  
Thomas Ebel, Steffen Buhrkal-Donau, William Greenbank, Vladimir Bordo, Kiril Bordo, University of Southern Denmark, DK
- 09:50            Current State and Development Trends of Insulation Systems in BEV Traction Motors Steered by Electric Powertrain Innovation**  
Kraun Bae, Robert Plikat, Christiane Besch, Zdeno Neuschl, Volkswagen, D; Martino Bailoni, Benjamin Gaussens, Dupont de Nemours, CH; Alexander Litinsky, Frank Saborowski, Axalta Coating Systems, A; Michael Kurrat, Technical University of Braunschweig, D



### Stream 3

#### Energy Storage Systems

**Chairperson:** Silvio Colombi, ABB Industrial Solutions, CH

- 09:05**            **Electro-Thermal Battery Model for Automotive Applications**  
Yasser Ghoulam, Tedjani Mesbahi, Sylvain Durand, Christophe Lallement, INSA Strassbourg, F
- 09:20**            **Infini-Cell: Bus Bar for Battery Cell Interconnection**  
Thomas Fouet, Pierric Gueguen, Mersen, F
- 09:35**            **Series Connection of 10 kA Switches with MOSFETs in Avalanche Mode for Short Circuit of Lithium-Ion Batteries Abusive Tests**  
Daniel Chatroux, Julien Chauvin, CEA, F
- 09:50**            **Utilization Increase of Stationary Energy Storage Systems Through the Use of Multiple Application Possibilities for Economic Integration for Industrial Electricity Customers**  
Lukas Böhning, Ulf Schwalbe, Timo Möller, University of Applied Sciences Fulda, D

### Stream 4

#### High Frequency Switched Mode Power Supplies

**Chairperson:** Peter Wallmeier, Delta Energy Systems, D

- 09:05**            **Self-Oscillating Very High Frequency Inverter for Gate Driver Power Supply**  
Andreas Kieninger, Eckart Hoene, Fraunhofer Institute IZM, D
- 09:20**            **High Power Gan Module Using 3D-Printed Liquid Coolers for Hard-Switching at Megahertz**  
Björn Pelle Weiler, Bas Vermulst, Erik Lemmen, Korneel Wijnands, Technical University of Eindhoven, N
- 09:35**            **Modulation Scheme for a ZVS Clamp-Switch Operated Three-Level Flying Capacitor Buck Converter**  
Burkhard Ulrich, Baden-Wuerttemberg Cooperative State University Stuttgart, D
- 09:50**            **Bi-Directional 1/16th Brick Converter Using Monolithic GaN Power Stage**  
Michael de Rooij, Yuanzhe Zhang, Efficient Power Conversion, USA; Andreas Reiter, Microchip Technology, D

**10:05 Coffee Break**

### Stream 1

#### GaN Devices

**Chairperson:** Josef Lutz, Chemnitz University of Technology, D

- 10:20**            **Design of Low-Resistance and Area-Efficient GaN-HEMTs for Low-Voltage Power Applications**  
Richard Reiner, Fouad Benkhelifa, Stefan Moench, Michael Basler, Patrick Waltereit, Micheal Mikulla, Rüdiger Quay, Oliver Ambacher, Fraunhofer Institute IAF, D
- 10:35**            **A Three-Phase GaN-on-Si Inverter IC for Low-Voltage Motor Drives**  
Stefan Moench, Richard Reiner, Fouad Benkhelifa, Michael Basler, Patrick Waltereit, Rüdiger Quay, Fraunhofer Institute IAF, D

- 10:50**      **A High Precision Dynamic Characterization Bench with a Current Collapse Measurement Circuit for GaN HEMT Operating at 175°C**  
Van Sang Nguyen, Jeremy Martin, Stephane Catellani, Charlotte Gillot, René Escoffier, Anthony Bier, CEA, F

**Stream 2**

**High Power Converters**

**Chairperson:** Marco Liserre, Christian-Albrechts-University of Kiel, D

- 10:20**      **New Multi-Level Multiplexed Power Converter Topology for Medium-Voltage Power Drives**  
Vinicius Kremer, Alain Lacarroy, Schneider Electric, F; Thierry Meynard, LAPLACE University of Toulouse, F
- 10:35**      **Study of Insulating Properties for HV Power Modules**  
Tingting Wang, Bing Luo, Yongsheng Xu, China Southern Power Grid Research Institute, CHN; Fang Qi, Liang Yao, Liang Zeng, Coresing Semiconductor Technology, CHN
- 10:50**      **Virtual Capacitor Concept for Effective Real-Time MMC Simulations**  
Stefan Milovanovic, Drazen Dujic, Power Electronics Laboratory, EPFL, CH; Min Luo, Plexim, CH

**Stream 3**

**Sintering Technology**

**Chairperson:** Anton Z. Miric, Heraeus, D

- 10:20**      **Examining Ag-Ag Direct Bonding on Chemically Coated DBC Substrates as a Pasteless Die-Attach Approach**  
Felix Häußler, Jörg Franke, Jakob Schöttner, Johanna Schubert, Martin Muckelbauer, Erdmann Spiecker, Friedrich-Alexander-University Erlangen-Nuremberg, D
- 10:35**      **Copper Sintering Pastes for Die Bonding**  
Hideo Nakako, Toshiaki Tanaka, Michiko Natori, Dai Ishikawa, Yoshinori Ejiri, Showa Denko Materials, J
- 10:50**      **Bonding Properties of Cu Sinter Paste for Pressureless Sintering Process**  
Shinichi Yamauchi, Satoshi Konno, Takashi Hattori, Kei Anai, Mitsui Mining & Smelting, J



**Stream 4**

**High Frequency Power Converters**

**Chairperson:** Drazen Dujic, Power Electronics Laboratory, EPFL, CH

- 10:20**      **Transient Behavior of an 800 kHz 9-level Single-Phase Flying Capacitor GaN Multilevel Inverter**  
Raphael Hartwig, Alexander Hensler, Siemens, D; Thomas Ellinger, Technical University of Ilmenau, D
- 10:35**      **Three-Channel Interleaved Totem Pole PFC in Triangular Current Mode (TCM) with STM32G474 Microcontroller**  
Marco Torrìsi, Sebastiano Messina, STMicroelectronics, I
- 10:50**      **Lossless Hard-Commutated Operation of SJ MOSFETs and Application to CCM Totem-Pole Bridgeless PFC**  
Rafael Antonio Garcia Mora, Matteo-Alessandro Kutschak, David Meneses, Manuel Escudero, Infineon Technologies, A

**11:05 Coffee Break**

**11:20**

**Stream 5**

**Keynote: Next-Generation SiC/GaN Three-Phase Variable-Speed Drive Inverter Concepts**

Johann Walter Kolar, ETH Zürich, CH

**Chairperson:** Leo Lorenz, ECPE, D

**12:00 Lunch Break Stream 1**

**SiC Devices III**

**Chairperson:** Serge Bontemps, Microchip Technology, F

**13:00 A Flexible Test Setup for Long-Term Dynamic Characterization of SiC MOSFETs under Soft- and Hard-Switching Conditions**

Daniel Philipps, Dimosthenis Peftitsis, Norwegian University of Science and Technology, N

**13:15 Parallel Operation of SiC MOSFETs**

Yuequan Hu, Jianwen Shao, Wolfspeed, A Cree Company, USA

**13:30 SiC Power Device Evolution: Characteristics Analysis and Performance Comparison of Gen2 and Gen3**

Anselmo Gianluca Liberti, Maurizio Melito, Domenico Paternostro, STMicroelectronics, I

**13:45 A Novel Trench SiC-MOSFETs Fabricated by Multiple-Ion-Implantation into Tilted Trench Side Walls (MIT2-MOS)**

Katsutoshi Sugawara, Yutaka Fukui, Rina Tanaka, Kohei Adachi, Yasuhiro Kagawa, Shingo Tomohisa, Naruhisa Miura, Eisuke Suekawa, Yoshiaki Terasaki, Mitsubishi Electric Corporation, J

**Stream 2**

**Smart Energy Distribution I**

**Chairperson:** Philipp C. Kjaer, Vestas Wind Systems, DK

**13:00 Experimental Evaluation of a Decentral Multi-Terminal DC Grid Controller with Needs-Based Power Flow**

Steffen Menzel, René Reimann, Wilfried Holzke, Holger Raffel, Bernd Orlik, University of Bremen, D

**13:15 Simulating the Black Start of an Isolated Grid with Previously Stored Wind Energy**

Antonio Mielach, Florian Redmann, Bernd Orlik, Holger Raffel, University of Bremen, D

**13:30 Evaluation of a Control Strategy for Meshed Offshore DC Grids in Floating-point and Fixed-point Arithmetic**

René Reimann, Steffen Menzel, Wilfried Holzke, Holger Raffel, Bernd Orlik, University of Bremen, D



**13:45 Simulation and Verification of Solid-State Breakers for Low Voltage Applications**  
Ara Bissal, Andreas Stiedl, Roland Hümpfner, Jiang Zhengdong, Huawei, D;  
Shuai Wang, Fugao Zhao, Huawei, CHN

### Stream 3

#### DC-DC Converter I

**Chairperson:** Klaus F. Hoffmann, Helmut-Schmidt-University, D

**13:00 A Novel LED Driver for HID Applications, Compatible with Both EM-ballast and Direct Mains**

Jie Fu, Zhiqian Chen, Shiguang Sun, Gang Wang, Signify Investment, CHN;  
Paul Veldman, Dmytro Malyna, Signify, NL

**13:15 Evaluation of Primary-Side MOSFETs Losses in Resonant LLC Converters**

Domenico Nardo, Alfio Scuto, Simone Buonomo, STMicroelectronics, I

**13:30 Series-Resonant-Converter with Galvanic Isolation and >99% Efficiency**

Jörg Bornwasser, Fraunhofer Institute ISE, D

**13:45 Comparison Between Forced CCM and DCM on Low Load Efficiency of a SiC Based DC-DC Converter**

Philipp Hörauf, Friedrich-Alexander-University Erlangen-Nuremberg, D; Achim Endruschat, Martin März, Fraunhofer Institute IISB, D

### Stream 4

#### Packaging Technologies

**Chairperson:** Wolfram Teppan, LEM Intellectual Property, CH

**13:00 Heat Dissipation Performance Evaluation of Insulated Metal Substrate Based on Transient Analysis**

Si Wei, Zhuzhou CRRC Times Semiconductor, CHN; Yibo Wu, Haotao Ke, Guozhong Dong, Yueping Deng, Guiqing Chang, Yongdian Peng, Haihui Luo, State Key Laboratory of Advanced Power Semiconductor Devices, CHN; Yangang Wang, Dynex Semiconductor, UK

**13:15 Investigation of Large Area Solder Joints in Temperature Shock Tests**

Constanze Weber, Matthias Hutter, Martin Springborn, Stefan Wagner, Fraunhofer Institute IZM, D; Martin Schneider-Ramelow, Technical University of Berlin, D

**13:30 Effect of EMC Adhesion Strength on Ag Plated DCB by Plasma Treatment**

Miso Park, Hyoung-jun Kim, Man-seok Kwak, KCC, ROK

**13:45 Improvements and Measurements on Power Cycle Test Bench with Blocking and Switching Losses**

Alexey Krupin, Jan Fuhrmann, Hans-Günter Eckel, University of Rostock, D

**14:00 Coffee Break**

### Stream 1

#### SiC Devices IV

**Chairperson:** Serge Bontemps, Microchip Technology, F

**14:15 Investigation of 1200 V SiC MOSFETs Switching Performance in 4-pin Package**

Luigi Abbatelli, Giuseppe Catalisano, STMicroelectronics, I

- 14:30 Impact of Self-Heating Effect on Plateau Voltage and Gate Charge Measurement for SiC MOSFETs Characterization**  
Mario Pulvirenti, Angelo Giuseppe Sciacca, Luciano Salvo, Gionatan Montoro, Massimo Nania, STMicroelectronics, I
- 14:45 Hybrid Switch with SiC-MOSFET and Fast IGBT for High Power Applications**  
Felix Kayser, Hans-Günter Eckel, University of Rostock, D; Roman Baburske, Philip Brandt, Ute Queitsch, Infineon Technologies, D
- 15:00 High Power Density SiC Power Module for Formula E: Requirement, Design Considerations and Test Results**  
Milad Maleki, Athanasios Mesemanolis, Lluís Santolaria, Antoni Ruiz, Tobias Keller, Hitachi ABB Power Grids, CH

## Stream 2

### Smart Energy Distribution II

**Chairperson:** Philipp C. Kjaer, Vestas Wind Systems, DK

- 14:15 Low Voltage Power Distribution, Moving From Mechanics to Electronics**  
Andreas Stiedl, Ara Bissal, Roland Hümpfner, Huawei Technologies Duesseldorf, D
- 14:30 An Automatic and Self-Powered Solid-State DC Breaker with Normally-ON SiC JFETs**  
Andreas Giannakis, Dimosthenis Pefititsis, Norwegian University of Science and Technology, N
- 14:45 Characteristics and Possible Resonant Oscillations in an Open Industrial DC Grid**  
Simon Puls, Lenze, D; Slavi Warkentin, Johann Austermann, Holger Borcherdig, Ostwestfalen-Lippe University of Applied Sciences, D
- 15:00 Design of an Adjustable Inductor for a Power Grid Fault Simulator**  
Michael Schmidhuber, Herbert Jungwirth, Herbert Maier, SUMIDA Components & Modules, D

## Stream 3

### DC-DC Converters II

**Chairperson:** Klaus F. Hoffmann, Helmut-Schmidt-University, D

- 14:15 A New High-Frequency High-Efficiency GaN TP PFC with Bidirectional ZVS Cell**  
Ali Tausif, Technical University of Yildiz, TR; Serkan Dusmez, Arçelik R&D, TR
- 14:30 Comparison of Different Inductor Designs based on Litz Wire, Foil and PCB based Windings for DC-DC Converter Operating Into DCM Mode**  
Kaspars Kroics, Technical University of Riga, LV
- 14:45 Analytical Modelling and Optimization of Gapped Core Magnetics in LLC Converter**  
Abdulsamed Lordoglu, Technical University of Yildiz, TR; Mehmet Onur Gulbahce, Fatih Sultan Mehmet Vakif University, TR; Ahmet Derya Kocabas, Istanbul Technical University, TR; Serkan Dusmez, Arçelik, TR
- 15:00 High-Efficiency Half-Bridge Module with SiC MOSFETs for High-Power-Density Applications**  
Yuequan Hu, Jianwen Shao, Wolfspeed, A Cree Company, USA

#### Stream 4

##### Packaging and Reliability I

Chairperson: Christina DiMarino, Virginia Tech, USA

- 14:15**            **12 kV RCRSD-Based Solid State Switch with Ultra-High Current Rise Rates and High Power Density**  
Alexey Khapugin, Viacheslav Muskatinev, Vyacheslav Eliseev, Valentin A. Martynenko, Alexey Grishanin, Dmitriy Nemaev, PJSC Electrovipryamitel, RUS
- 14:30**            **Improving Monitoring of Parallel Ageing of IGBT Bond-Wires and Solder Layers by Temperature Compensation**  
Magnar Hernes, Salvatore D`Arco, Ole Christian Spro, Sintef Energy, N; Dimosthenis Peftitsis, Norwegian University of Science and Technology, N
- 14:45**            **Impact of Threshold Voltage Instabilities of SiC MOSFETs on the Methodology of Power Cycling Tests**  
Carsten Kempiak, Andreas Lindemann, Otto-von-Guericke-University, D
- 15:00**            **A New Approach for Detection of Aging of Power Modules by Evaluation of the Magnetic Field**  
Michael Wolff, Gerd Griepentrog, Technical University of Darmstadt, D

#### 15:15 Coffee Break

#### Stream 1

##### IPMs, Motion Control and Drives

Chairperson: Gianmario Pellegrino, Polytechnic University of Turin, I

- 15:30**            **Automated Measurement Procedure for the Characterization of an IPMSM Used for Automotive Applications**  
Tobias Röser, Felix Bertele, Christoph Cheshire, Ulrich Ammann, University of Applied Sciences Esslingen, D
- 15:45**            **Safety-Related High-Performance Motion Control based on a Quad-Core SoC**  
Timo Wilkening, Jens Onno Krah, Cologne University of Applied Sciences, D; Matteo Salardi, Intel, I; Freddy Heinzelmann, SEW-EURODRIVE, D
- 16:00**            **Development of a GIT GaN Intelligent Power Module**  
Stefan Moser, Maurizio Incurvati, Martin Schiestl, Ronald Stärz, Management Center Innsbruck, A
- 16:15**            **Third Generation of Automotive 650V Intelligent Power Module System for Auxiliary Motor Drive Applications**  
Bumseung Jin, Kangyoon Lee, David Jo, Noah Hur, Choonbae Park, ON Semiconductor, ROK; Allan Zhou, ON Semiconductor, CHN

#### Stream 2

##### Modeling and Design

Chairperson: Petar J. Grbovic, University of Innsbruck, A

- 15:30**            **Modeling and Identification of a Hybrid Motor Cable with a Length-dependent Damping Approach**  
Michael Herbst, Franz Maislinger, Leopold Faschang, Goran Stojcic, B&R Industrial Automation, A
- 15:45**            **High Speed Hybrid Simulation Engine for Electrical Mission Profiles**  
Martin Röblitz, Christopher Schmidt, Arendt Wintrich, SEMIKRON, D

**16:00 System-Level Design Approach for LLC Converters**  
Abdulsamed Lordoglu, Technical University of Yildiz, TR; Mehmet Onur Gulbahce, Fatih Sultan Mehmet Vakif University, TR; Ahmet Derya Kocabas, Istanbul Technical University, TR; Serkan Dusmez, Arçelik R&D, TR

**16:15 Design and Implementation of a Plug-In Repetitive Controller for a High Precision Axis System**  
Sebastian Ladenburger, Heinrich Steinhart, Martin Böckler, Swen Bosch, Aalen University of Applied Sciences, D

### Stream 3

#### DC-DC Converter III

**Chairperson:** Francisco Javier Azcondo, University of Cantabria, E



**15:30 Characterisation of a 300 kW Isolated DC-DC Converter using 3.3 kV SiC-MOSFETs**  
Gustavo Fortes, Philippe Ladoux, Joseph Fabre, Didier Flumian, LAPLACE University of Toulouse, F

**15:45 A 1 kW eGaN FET-Based LLC Resonant Converter in the 1/8th Power Brick Size for 48 V Server Applications**  
Michael de Rooij, Jianjing Wang, Amir Negahdari, Yuanzhe Zhang, Efficient Power Conversion, USA

**16:00 Low Inductive Multilayer SiC Power Module for Modular Multiphase DC-DC Converters with Centralized DC-Link**  
Thomas Huber, University of Applied Sciences Landshut, D

### Stream 4

#### Packaging and Reliability II

**Chairperson:** Christina DiMarino, Virginia Tech, USA

**15:30 Simulation Based Design of Experiments of Power Cycling Tests Using Die Top System Interconnect Technology Die Topy System (DTS)**  
Benjamin Fabian, Sven Thomas, Marko Kalajica, Andreas Hinrich, Christophe Féry, Stefan Gunst, Heraeus Electronics, D

**15:45 Selection of Test Site Locations for Long-Term Cosmic Radiation Tests**  
Leon Fauth, Philipp Mand, Jens Friebe, Leibniz University Hannover, D



**16:00 Design and Analysis of a PCB Integrated Differential Current Slope Sensor with Ferrite Support for High dV/dt Operations**  
Dominik Wimmer, Markus Hutterer, Manfred Schrödl, Technical University of Vienna, A

**16:30 End Day 2**

## Wednesday, 5 May 2021

### 09:00 Conference Highlights – Day 3

#### Stream 1

##### Innovative Packaging

Chairperson: Peter Kanschat, Infineon Technologies, D

**09:05**            **Si<sub>3</sub>N<sub>4</sub> Substrates with Anisotropic Thermal Conductivity Suitable for Power Module Applications**  
Teruhisa Okuno, Souhei Arima, Keisuke Tanabe, Gen Tanabe, Yoshiyuki Uchida, Japan Fine Ceramics, J



**09:20**            **Asymmetric Packages for Optimal Performance of GaN-HEMT using PCB Fabrication Technology**  
Ankit Bhushan Sharma, Till Huesgen, University of Applied Sciences Kempten, D; Ingmar Kallfass, Dominik Koch, Julian Weimer, University of Stuttgart, D

**09:35**            **Evaluation of Encapsulation Resin Structure for POL Tile**  
Kei Murayama, Amane Kaneko, Mitsuhiro Aizawa, Kiyoshi Oi, Chiaki Fujisawa, Shinko Electric Industries, J

**09:50**            **Encapsulation Technology of Epoxy Resin for High Temperature Operating Power Modules**  
Yusuke Kaji, Hodaka Rokubuichi, Yutaro Hanawa, Junji Fujino, Koji Yamada, Hiroyuki Harada, Haruo Takao, Mitsubishi Electric, J

#### Stream 2

##### Special Session: High Density Power Adapters

Chairperson: Manfred Schlenk, Dr. Schlenk-Consulting, D

**09:05**            **Ideal Flyback Topology**  
Ionel Dan Jitaru, Rompower Energy System, USA; Andrei Savu, Bogdan Jitariu, Rompower International, RO; Constantin Radoi, Polytechnic Institute of Bucharest, RO

**09:20**            **Study of WBG Switches Benefits on Asymmetrical Half-Bridge Flyback Converter**  
Alfredo Medina Garcia, Juan Cruz Cozar, Infineon Technologies, D; Diego Pedro Morales Santos, Noel Rodriguez, University of Granada, ES; Manfred Schlenk, Dr. Schlenk-Consulting, D

**09:35**            **Fully Integrated 65W High Density USB-PD Charger**  
Alberto Bianco, Claudio Adragna, STMicroelectronics, I

**09:50**            **Reduction of Power Loss in a Flyback Transformer by using Optimized Ferrite Core Geometry**  
Michael Rottner, TDK Electronics, D

#### Stream 3

##### Converter Control

Chairperson: Jose Mario Pacas, University of Siegen, D

**09:05**            **AFE: Control Strategies under Unbalanced Grid Conditions**  
Lukas Fräger, Mohamed Ibrahim, Sascha Langfermann, Michael Owzareck, BLOCK Transformatoren-Elektronik, D; Jens Friebe, Leibniz University Hannover, D

- 09:20**      **Enhancement of Grid-Synchronization Stability by Means of Disturbance Estimation**  
Francisco Freijedo, Roland Hümpfner, Diego López, Huawei Technologies  
Duesseldorf, D
- 09:35**      **Detailed Dynamic Model of an Active Ripple Reduction Circuit and its Multi-Loop Control Strategy**  
Thiago Fonseca Rech, Marcelo Lobo Heldwein, Federal University of Santa Catarina,  
BR
- 09:50**      **Comparison of Different PWM Methods Assuming Equal Harmonic Loss Conditions**  
Ali Sharaf Addin, Thomas Brückner, Universität der Bundeswehr München, D;  
Benjamin Sahan, Hannover University of Applied Science, D

#### Stream 4

##### Electro Magnetic Compatibility and Immunity

**Chairperson:** Andreas Lindemann, Otto-von-Guericke-University Magdeburg, D



- 09:05**      **An Active CM and DM EMI Filter Based on Synthesized and Synchronized Signals for the DC Input of a GaN Inverter**  
Andreas Bendicks, Sebastian Windhövel, Michael Gerten, Stephan Frei, Technical  
University of Dortmund, D
- 09:20**      **Active EMI Suppression with Adapted Cancellation Signals for a Buck Converter in Varying Modes of Operation**  
Andreas Bendicks, Tobias Dörlemann, Stephan Frei, Technische Universität  
Dortmund, D
- 09:35**      **Challenges of Industry 4.0 for the Assessment of Electromagnetic Compatibility (EMC)**  
Christof Ziegler, Christian Paulwitz, Stefan Weber, Huber Bachmaier,  
TDK Electronics, D
- 09:50**      **Prediction and Optimization of Near Magnetic Field Produced by Interconnections of Multi-Cell Converters**  
Glauber de Freitas Lima, Jean-Christophe Crebier, Yves Lembeye, Fabien  
Ndagijimana, G2eLab, F

#### 10:05 Coffee Break

#### Stream 1

##### High Power SiC Devices

**Chairperson:** Nando Kaminski, University of Bremen, D

- 10:20**      **All SiC Module with 1700V Rated 2nd Generation Trench Gate SiC-MOSFETs**  
Alexander Theisen, Fuji Electric Europe, D; Aiko Takasaki, Keiji Okumura, Yoshiyuki  
Kusunoki, Yasuyuki Kobayashi, Tomojuki Kani, Rikihiko Maruyama, Fuji Electric, J
- 10:35**      **Enhancement of Switching Performance and Output Power Density in 3.3 kV Full SiC Power Module**  
Takahiro Morikawa, Seiichi Hayakawa, Kan Yasui, Tatsunori Murata, Koyo Kinoshita,  
Tetsuo Oda, Katsuaki Saito, Yuji Takayanagi, Hitachi Power Semiconductor Device, J;  
Toru Masuda, Hitachi Research Laboratory, J



**10:50**      **3.3kV All SiC MOSFET Module with Schottky Barrier Diode Embedded SiC MOSFET**  
Hiroshi Kono, Tomohiro Iguchi, Tatsuya Hirakawa, Hiroyuki Irifune, Takahiro Kawano, Masaru Furukawa, Kenya Sano, Masakazu Yamaguchi, Hisashi Suzuki, Toshiba Electronic Devices & Storage, J; Georges Tchouangue, Toshiba Electronics Europe, D

**11:05**      **Power Cycling Capability Comparison of SiC-MOSFETs with SBD under Different Conduction Modes**  
Yong Zhang, Wei Zhou, Coresing Semiconductor Technology, CHN; Xiaoping Dai, CRRZ Zhuzhou Institute, CHN

### Stream 2

#### Power Converters in Transportation Applications

**Chairperson:** Philippe Ladoux, University of Toulouse, F

**10:20**      **Quasi-Isolated HV/HV-DC-DC Converter for Electric Driven Vehicles with Multiple High-Voltage Levels**  
Andre Haspel, Urs Boehme, Mercedes-Benz, D

**10:35**      **Single-Phase Operation of Common-Mode-Free Bidirectional Three-Phase PFC-Rectifier for Non-Isolated EV Charger with Minimized DC-Link**  
Benjamin Strothmann, Gerrit Book, Frank Schafmeister, Jochim Böcker, University of Paderborn, D

**10:50**      **Optimal Sizing on a Mission Profile of Isolated NPC DC-DC Converters using 3.3 kV SiC MOSFETs for Power Electronic Traction Transformers**  
Piotr Dworakowski, Caroline Stackler, Florent Morel, Alexis Fouineau, François Wallart, Supergrid Institute, F; Philippe Ladoux, Université de Toulouse, F

### Stream 3

#### System Reliability and Sustainability

**Chairperson:** Katsuaki Saito, Hitachi Power Semiconductor Device, J

**10:20**      **Health Management of Power Electronics Systems**  
Jürgen Schuderer, Chunlei Liu, Antoni Ruiz, Thomas Gloor, Silvan Rehm, Gontran Pâques, Hitachi ABB Power Grids, CH; Antony Hilliard, Sarala Naidu, Hitachi ABB Power Grids, S; Roland Scherwey, University of Applied Sciences and Arts Western, CH

**10:35**      **Analysis of Passive Power Components Reuse**  
Boubakr Rahmani, Jean-Christophe Crebier, Yves Lembeye, G2eLab, F; Maud Rio, Gscop, F

**10:50**      **A Framework for Reliability Analysis of a SiC Converter for Automotive On-Board Charger Applications**  
Nicola Schulz, Paula Diaz Reigosa, Thomas Keller, Tobias Strittmatter, Ishan Pendharkar, University of Applied Sciences Windisch, CH

### Stream 4

#### Power Quality

**Chairperson:** Jacques Laeuffer, Dtalents, F

**10:20**      **A Highly Integrated 25-Level Cascaded H-Bridge Active Filter for the Mitigation of High Order Current Harmonics**  
Daniel Bernet, Rüdiger Schwendemann, Lukas Stefanski, Marc Hiller, Karlsruhe Institute of Technology, D

**10:35 Advantages of SiC MOSFETs in High Frequency Bidirectional PFC Converters for Industrial Applications**  
Giuseppe Aiello, Francesco Gennaro, STMicroelectronics, I; Mario Cacciato, University of Catania, I

**10:50 Condition Monitoring of Power Semiconductors by Means of the Controller Output Voltage Harmonics**  
Firat Yüce, Marc Hiller, Karlsruhe Institute of Technology, D

**11:05 Coffee Break**

**11:20 Stream 5**  
**Keynote: Next Generation of Power Electronics Module Packaging**  
Hannes Stahr, AT&S, A

**Chairperson:** Frank Osterwald, Danfoss Silicon Power, D

**12:00 Lunch Break**

**13:00 Stream 5**  
**Impulse Keynote: Future of Work**  
Hanne Caspersen, Trendone, D

**13:40 Coffee Break**

**Stream 1**  
**SiC / GaN Devices I**  
**Chairperson:** Elison Matioli, POWERlab, EPFL, CH

**13:55 Experimental Characterization of Different GaN HEMTs used in a Full-Bridge Totem-Pole Power Factor Correction Topology for Electric Vehicles Charging Circuits**  
Marco Chiado Caponet, Beuth University of Applied Sciences Berlin, D

**14:10 Switching Loss Estimation of GaN-HEMTs by Thermal Measurement Procedure**  
Benedikt Kohlhepp, Daniel Kübrich, Raffael Schwanninger, Thomas Dürbaum, Friedrich-Alexander-University Erlangen-Nuremberg, D

**14:25 GaN based Integrated Power Stages (IPS) for Low Power Adapter/Charger Applications**  
Robert Vartanian, Deepak Veeredy, Infineon Technologies, USA;  
Alfredo Medina Garcia, Infineon Technologies, D

**14:40 High-Power Density DC-DC Converters Using Highly-Integrated Half-Bridge GaN ICs**  
Michael Basler, Stefan Moench, Richard Reiner, Fouad Benkhelifa, Rüdiger Quay, Oliver Ambacher, Fraunhofer Institute IAF, D; Gerald Weidinger, Gerald Weis, AT&S Austria Technologie & Systemtechnik, A; Ingmar Kallfass, University of Stuttgart, D



## Stream 2

### SiC in Transportation Application

Chairperson: Philippe Ladoux, University of Toulouse, F



- 13:55**      **A SiC Based High Efficiency 22kW Bi-Directional EV On-Board Charger**  
Chen Wei, Ying Liu, Haitao Xie, Zongzeng Hu, Wolfspeed, A Cree Company, CHN;  
Jianwen Shao, Wolfspeed, A Cree Company, USA
- 14:10**      **Bearing Shield Integrated SiC-Based Traction Inverter for a Dual Three-Phase PMSM Drive System**  
Christian Mertens, Julian Berlinecke, Robert Plikat, Volkswagen, D; Jasper Schnack, Jan-Philipp Gördes, Jan Stolley, Ulf Schümann, Ronald Eisele, University of Applied Sciences Kiel, D; Aylin Bicakci, Klaus Olesen, Frank Osterwald, Danfoss Silicon Power, D; Malte Päsler, Anton Gorodnichev, Fraunhofer Institute ISIT, D; Sven Brückner, FTCap|Mersen, D
- 14:25**      **Measures to Improve Efficiency, Peak Power Density and Current Density in an Automotive SiC Drive Train Inverter – Sensitivity Analysis of Design Parameters**  
Teresa Bertelshofer, Stefan Hain, ZF Friedrichshafen, D; Cam Pham, Helong Li, CREE Europe, D; Alexander Streibel, Ole Mühlfeld, Danfoss Silicon Power, D
- 14:40**      **Tailoring the Chip Area of SiC MOSFET Power Modules for Traction Applications**  
Stefan Schönewolf, Andreas März, Andreas Nagel, Siemens Mobility, D

## Stream 3

### Control and Drive Strategies

Chairperson: Manfred Schrödl, Vienna University of Technology, A

- 13:55**      **Harmonic Impedance Analysis of a Grid-Connected Converter System with Various Control Methods**  
Julian Struwe, Pascal Winter, Holger Wrede, José Miguel Cajigal-Núñez, University of Applied Sciences Duesseldorf, D
- 14:10**      **Black Start Capability and Islanded Operation of Power Converters with Virtual Synchronous Generator Control**  
Florian Redmann, Alexander Ernst, Bernd Orlik, University of Bremen, D
- 14:25**      **Validation of a Generator-Side Boost Converter with Load by a Fictitious Synchronous Machine**  
Alexander Ernst, David Matthies, Wilfried Holzke, Bernd Orlik, University of Bremen, D
- 14:40**      **Small-Signal Model and Control Design Considerations for Three-Phase Dual Active Bridge Converters**  
Eduardo Oliveira, Huawei Technologies Duesseldorf, D; Olympio Cipriano da Silva Filho, Federal University of the Semi-Arid Region, BR; Xiao Yu, Peter Zacharias, University of Kassel, D

## Stream 4

### Thermal Management I

Chairperson: Enrique J. Dede, University of Valencia, E

- 13:55**      **Short Thermal Peak Management for Electronic Devices Using Phase Change Materials**  
Rabih Khazaka, Stéphane Azzopardi, Aude Cailler Gruet, Safran, F

- 14:10 Performance of a Low-Budget, High Precision Calorimetric System for Measuring Power Losses in Power Electronics Components and Circuits**  
Finn Tenzer, Felix Bröcker, Norman Landskron, Michael Meissner, Klaus Hoffmann, Helmut Schmidt University, D
- 14:25 Additive Manufactured Heatsinks for Power Electronics Assemblies – Multi Physics Topology Optimisation**  
Hassan Akhtar, Helen Terry, Phivos Ioannou, Liam Mills, Sandeep Samanthula, Alice Wise, Manufacturing Technology Centre, GB
- 14:40 Modeling and Thermal Analysis of Cooling Solutions for High Voltage SMD Packages**  
Giuseppe Mauromicale, Domenico Nardo, Alfio Scuto, Giuseppe Sorrentino, Luigi Abbatelli, STMicroelectronics, I; Giacomo Scelba, Giuseppe Scarcella, Arturo Pagano, University of Catania, I

**14:55 Coffee Break**

**Stream 1**

**SiC / GaN Devices II**

**Chairperson:** Elison Matioli, POWERlab, EPFL, CH

- 15:10 Temperature-Dependent Electrical Characteristics of a  $\beta$ -Ga<sub>2</sub>O<sub>3</sub> Schottky Barrier Diode**  
Florian Wilhelmi, ZF Friedrichshafen, D; Shinji Kunori, Kohei Sasaki, Akito Kuramata, Novel Crystal Technology, J; Yuji Komatsu, ZF Japan, J; Andreas Lindemann, Otto-von-Guericke-University, D
- 15:25 Comparison of Fast Switching High Current Power Devices**  
Edward Shelton, Kawsar Ali, Renke Han, Daniel Rogers, University of Oxford, GB; Jeff Carter, Lathom Louco, Borg Warner, USA, Mike Beadman, Cambridge Design Partnership, GB; Patrick Palmer, Simon Fraser University, CDN
- 15:40 Identifying Unequal Temperature Distributions in SiC MOSFET Power Modules**  
Christoph Lüdecke, Rik W. De Doncker, Michael Laumen, Niklas Fritz, ISEA RWTH Aachen, University, D
- 15:55 Directly Cooled Silicon Carbide Power Modules: Thermal Model and Experimental Characterization**  
Giuseppe Mauromicale, Alessandra Cascio, Marco Papaserio, Daniela Grazia Cavallaro, Gaetano Bazzano, Angelo Alberto Messina, Michele Calabretta, Alessandro Sitta, STMicroelectronics, I; Salvatore Patanè, University of Messina, I

**Stream 2**

**Thermal Management and Cooling**

**Chairperson:** Uwe Scheuermann, Semikron Elektronik, D

- 15:10 Thermal Management of Power Components and Electric Systems Using Channels Embedded in Metallic Parts by Friction Stir Channeling**  
Vito Di Pietro, Joao Gandra, Steve Dodds, TWI, GB
- 15:25 Pumped 2-Phase Cooling as an Enabler for Modular, Medium-Voltage, Solid-State Circuit Breaker**  
Andrew Slippey, Devin Pellicone, Advanced Cooling Technologies, USA; Andrew Rockhill, Douglas Folts, Andy Schroedermeier, Eaton Research Labs, USA

**15:40 An Inverse Method to Evaluate the Chip Temperature Distribution within Press Pack IGBT**

Jie Chen, Erpin Deng, Yongzhang Huang, North China Electrical Power University, CHN

**15:55 Influence of Internal Semiconductor Processes on Errors at Measurement of Thermal Resistance**

Weinan Chen, Erping Deng, Josef Lutz, Thomas Basler, Technical University of Chemnitz, D

**Stream 3**

**Power Supplies**

**Chairperson:** Martin März, Fraunhofer Institute IISB, D

**15:10 Implementation of Active-Clamped Flyback DC-DC Converter in an 800 V System**  
Darko Vracar, Martin Pavlovsky, BRUSA Elektronik, D

**15:25 Full GaN Asymmetrical Half-Bridge PWM Converter with Synchronous Rectifier for a High Efficient 90 W Laptop Charger**

Benedikt Kohlhepp, Valentin Zeller, Thomas Dürbaum, Friedrich-Alexander-University Erlangen-Nuremberg, D

**15:40 High Efficiency, Narrow Output Range and Extended Hold-Up Time Power Supply with Planar and Integrated Magnetics for Server Applications**

Manuel Escudero, Matteo-Alessandro Kutschak, David Meneses, Infineon Technologies, A; Noel Rodriguez, Diego Pedro Morales, University of Granada, E

**15:55 Wide Input Voltage Range Soft Switching Converter for Railway Rolling Stock Auxiliary Power Supply**

Thomas Dias, Philippe Ladoux, Sébastien Sanchez, Laboratoire LAPLACE, F; Tomasz Mielczarski, Philippe Aubin, Faiveley Transport, F

**Stream 4**

**Thermal Management II**

**Chairperson:** Enrique J. Dede, University of Valencia, E

**15:10 Improved Natural-Air-Convection-Cooling Formulas for Medium Frequency Transformer Design Optimization**

Jonas Le Roy, Marko Mogorovic, Drazen Dujic, Power Electronics Laboratory, EPFL, CH

**15:25 Experimental Validation of Linear Damage Superposition for IGBT Power Modules under High and Low Temperature Stress Cycles**

Magnar Hernes, Salvatore D'Arco, Ole Christian Spro, Sintef Energy, N; Dimosthenis Peftitsis, Norwegian University of Science and Technology, N

**15:40 Analysis of Surface Mount Heat Sinks for SiC MOSFETs Concerning Heat Dissipation and EMC Behaviour**

Eric Fritze, Lars Zey, Klaus Hoffmann, Kai Rathjen, Stefan Dickmann, Helmut Schmidt University, D; Oliver Woywode, Philips Medical Systems DMC, D

**15:55 Automated Calorimetric Measurement with a Peltier Element for Switching Loss Characterization**

Dominik Koch, Julian Weimer, Ingmar Kalfass, University of Stuttgart, D; Samuel Araujo, Robert Bosch, D

**16:10 End Day 3**

## Thursday, 6 May 2021

### 09:00 Conference Highlights – Day 4

#### Stream 1

#### High Power Silicon Devices

**Chairperson:** Gourab Majumdar, Mitsubishi Electric, J

- 09:05**            **Innovative Si Increases Output Power of Inverters**  
Katsuaki Saito, Hitachi Power Semiconductor Device, J; Tomoyasu Furukawa, Tomoyuki Miyoshi, Mutsuhiro Mori, So Watanabe, Hitachi, J
- 09:20**            **Design Features and Performance Evaluation of the First 6.5kV/1200A Trench Gate IGBT Module**  
Luther-King Ngwendson, Arthur Su, Yangang Wang, Imran Siddiqui, Dynex Semiconductor, GB
- 09:35**            **Second Generation BIGT Chip Advancing the StakPak Platform**  
Boni Boksteen, Daniel Prindle, Franc Dugal, Wolfgang Amadeus Vitale, Evgeny Tsyplakov, Virgiliu Botan, Gontran Pâques, Hitachi ABB Power Grids, CH
- 09:50**            **10kV RC-IGCT and Fast Recovery Diode: with an Improved Technology Trade-Off Performance**  
Umamaheswara Reddy Vemulapati, Thomas Stiasny, Chiara Corvasce, Christian Winter, Tobias Wikström, Hitachi ABB Power Grids, CH; Matthias Lüscher, ABB Switzerland, CH
- 10:05**            **Expanding the Output Power of PrimePACK™ with RC-IGBT in Industrial Applications**  
Lukas Kleingrothe, Fuji Electric, D; Yuta Ebukuro, Akio Yamano, Mitsuhiro Kakefu, Shinichi Yoshiwatari, Yasuyuki Kobayashi, Yuki Oda, Kaname Mitsuzuka, Seiji Momota, Taichi Itoh, Soichi Okita, Fuji Electric, J

#### Stream 2

#### Intelligent Gate Drivers

**Chairperson:** Hans-Günter Eckel, University of Rostock, D

- 09:05**            **Active Gate Control with Synthesized Signals to Avoid Overshoots and Ringing in DC-to-DC Converters**  
Andreas Bendicks, Stephan Frei, Caroline Krause, Technical University of Dortmund, D
- 09:20**            **How to Turn off SiC MOSFET with Low Losses and Low EMI Across the Full Operating Range**  
Zheming Li, Robert W. Maier, Mark-M. Bakran, University of Bayreuth, D; Daniel Domes, Franz-J. Niedernostheide, Infineon Technologies, D
- 09:35**            **An Adaptive Current Source Gate Driver for SiC MOSFETs with Double Gate Current Injection**  
Gard Lyng Rødal, Dimosthenis Pefitsis, Norwegian University of Science and Technology, N
- 09:50**            **Implementation of Current-Source Gate Driver with Open-Loop Slope Shaping for SiC-MOSFETs**  
Manuel Riefer, Jonathan Winkler, Sebastian Strache, Robert Bosch, D; Ingmar Kallfass, University of Stuttgart, D

- 10:05 Gate-Drive Scheme Reduces Inverter Complexity in Drives Systems using Discrete IGBT in Parallel**  
Wolfgang Frank, Infineon Technologies, D

### Stream 3

#### Aircraft and Other Transportations Systems

Chairperson: Stéphane Lefebvre, CNAM-SATIE, F

- 09:05 Real-Time Monitoring of Harmonic Losses of PMSMs in Electric Drives using a Fourier Decomposition Method**  
Maximilian Weber, Michele Hirsch, Sebastian Busch, Robert Bosch, D; Hans-Christian Reuss, University of Stuttgart, D
- 09:20 Real-Time Data Acquisition for Electrically Powered Commercial Vehicles - Challenges and Solutions**  
Timo Möller, Lukas Böhning, Ulf Schwalbe, Mathias Herget, University of Applied Sciences Fulda, D
- 09:35 Comparison of Modulation Strategies for Common-Mode Distortion Reduction in Aircraft AC Converter Applications**  
Normann Schwingal, Robin Weiß, Tobias Barth, Steffen Bernet, Technical University of Dresden, D
- 09:50 Design of a Photovoltaic Power Supply for Nanosatellites**  
Tobias Brinker, Jens Friebe, Adrian Gehl, Janosch Graue, Frederik Priefer, Francis Sawang, Bernhard Wicht, Leibniz University Hannover, D
- 10:05 Investigation of Novel Multi-Phase Field-Oriented Drive Inverter Control with Fail-Operational Capabilities for Aircraft Applications**  
Florian Hilpert, Christian Bentheimer, Torsten Müller, Bernd Eckardt, Fraunhofer Institute IISB, D

### Stream 4

#### Renewable Energy and Storage Systems I

Chairperson: Mike Meinhardt, SMA Solar Technology, D

- 09:05 Two-Stage Probabilistic Short-Term Wind Power Prediction Using Neural Network with MC Dropout and Control Information**  
Shuichi Sato, Masaki Takanashi, Toyota Central R&D Labs, J; Kentaro Indo, Nozomu Nishihara, Eurus Technical Service, J; Hiroto Ichikawa, Eurus Energy Holdings, J; Hirohisa Watanabe, Toyota Tsusho, J
- 09:20 Sensorless Predictive Direct Power Control with On-Line Inductance Estimation for Grid-Connected PV Applications**  
Mostafa Ahmed, Ibrahim Harbi, Mohamed Abdelrahem, Ralph Kennel, Technical University of Munich, D
- 09:35 Predictive Model-based Maximum Power Point Tracking Technique for PV Applications with Reduced Sensor Count**  
Mostafa Ahmed, Mohamed Abdelrahem, Ibrahim Harbi, Ralph Kennel, Technical University of Munich
- 09:50 A 200kW Three-Level Flying Capacitor Inverter Using Si/SiC Based Devices for Photovoltaic Applications**  
Luis Gabriel Alves Rodrigues, Gaëtan Perez, CEA/INES, F

**10:05**      **Modular Multilevel Converter for Variable Speed Operation of Pumped Storage Hydropower Plants**  
Raghendra Tiwari, Roy Nilsen, Arne Nysveen, Norwegian University of Science and Technology, N

**10:20 Coffee Break**

**Stream 1  
Power Cycling**

**Chairperson:** Mark M. Bakran, University of Bayreuth, D



**10:35**      **Chip Area Impact on Power Cycling Lifetime of IGBT Modules**  
Fabian Nehr, Marion Kind, Marina Montaine, Uwe Scheuermann, SEMIKRON, D



**10:50**      **Power Cycling Lifetime Investigation under Low Temperature Swings and 50 Hz Load with Experiment and Simulation**  
Christian Schwabe, Nick Thönelt, Peter Seidel, Josef Lutz, Thomas Basler, Technical University of Chemnitz, D



**11:05**      **Accelerated Qualification of Highly Reliable Chip Interconnect Technology by Power Cycling Under Thermal Overload**  
Carsten Kempiak, Anton Chupryn, Andreas Lindemann, Otto-von-Guericke-University, D; Alexander Schiffmacher, Jürgen Wilde, Albert-Ludwigs-University Freiburg, D; Jacek Rudzki, Frank Osterwald, Danfoss Silicon Power, D

**11:20**      **Influence of Power Cycling Aging to IGBT Hard Switching Behavior**  
Xing Liu, Erping Deng, Thomas Basler, Christian Bäuml, Josef Lutz, Qi Huang, Technical University of Chemnitz, D; Jie Chen, North China Electric Power University, CHN

**Stream 2  
Control Techniques in Electrical Drives**

**Chairperson:** Klaus Marahrens, SEW-EURODRIVE, D

**10:35**      **Novel Flux-Weakening Strategy Considering the Saturation Effects for Electric Vehicles**  
Carlos Miguel-Espinar, Daniel Montesinos-Miracle, Daniel Heredero-Peris, Xavier Escaler, Oriol Subirats-Rillo, UPC, E

**10:50**      **A Low-Profile GaN-Based Integrated Motor Drive for 48V FOC Applications**  
Martin Wattenberg, Edward A. Jones, Juan Sanchez, Infineon Technologies, A

**11:05**      **High-Performance Control Architecture for Automation Drives based on a Low-Cost Microcontroller in Combination with a Low-Cost FPGA**  
Tobias Schmidt, Jens Onno Krahl, University of Applied Sciences Cologne, D; Joachim Holtz, University of Wuppertal, D

**11:20**      **Lean Safe Drive Architecture with Fully Integrated Multi-Axis Safety Functions due to an Extremely Fast Safety-related Fieldbus Interface**  
Jens Onno Krahl, Malte Katz, Tobias Schmidt, University of Applied Sciences Cologne, D; Ben Jeppesen, Intel, GB

### Stream 3

#### **Special Session: Additive Manufacturing and Printed Electronics**

**Chairperson:** Ulf Schwalbe, University of Applied Sciences Fulda, D

- 10:35            Printing Beyond Color - The Potential of Printed Electronics Circuitry for Industrial Applications**  
Reinhard Baumann, Technical University of Chemnitz, D; Ralf Zichner, Fraunhofer Institute ENAS, D
- 10:50            Current Applications and Outlook of AME Additively Manufactured Electronics aka. 3D printed Electronics**  
Valentin Storz, Nano Dimension, IL
- 11:05            Scalable 3D Printed Electronics – “Fully Additive To High Volume Manufacture**  
Martin Hedges, Neotech AMT, D
- 11:20            Disruptive Approach of Additive Manufactured Electronics (AME)**  
Michael Schleicher, Matthias Kujath, SEMIKRON, D; Valentin Storz, Nano Dimension, IL

### Stream 4

#### **Renewable Energy and Storage Systems II**

**Chairperson:** Mike Meinhardt, SMA Solar Technology, D

- 10:35            A Novel Adaptive Square-Root Unscented Kalman Filter for Battery SoC Estimation**  
Davide Fusco, Mauro Di Monaco, Francesco Porpora, Giuseppe Tomasso, University of Cassino and Southern Lazio, I
- 10:50            Methods for Voltage Equalization of Energy Storage Systems**  
Dimitar Arnaudov, Krasimir Kishkin, Vladimir Dimitrov, Teodora Todorova, Technical University of Sofia, BG
- 11:05            Developing an Advanced Equivalent Circuit Model for a Li-Ion Battery for Battery Monitoring in Electric Vehicles**  
Mussab Najeeb, Technical University of Ilmenau, D; Ulf Schwalbe, University of Applied Sciences Fulda, D
- 11:20            Energy Storage Capabilities of Supercapacitors in a High Power Application**  
Frank Puhane, Rene Kalbitz, Würth Elektronik eiSos, D

**11:35 Coffee Break**

**11:50**

### Stream 5

#### **Keynote: HVDC Grid Challenges Locks and Opportunities**

Seddik Bacha, SuperGrid Institute, F

**Chairperson:** Philippe Ladoux, University of Toulouse, F

**12:30 Lunch Break**

**13:30 Jump-In Discussions**

**14:00 Coffee Break**

**Stream 1**

**Design Tools I**

**Chairperson:** Jose Mario Pacas, University of Siegen, D

- 14:15**            **A New Analog Behavioral SPICE Macro Model with Self-Heating Effects for Gallium Nitride HEMTs**  
Gaetano Verona, Alessandra Raffa, Pier Paolo Veneziano, Carlo Brugaletta, Gaetano Bazzano, STMicroelectronics, I
- 14:30**            **How to Choose the Optimal GaN-HEMT for a Hard Switching Application - A Guide**  
Julian Dobusch, Raffael Schwanninger, Benedikt Kohlhepp, Thomas Dürbaum, Friedrich-Alexander-University Erlangen-Nuremberg, D
- 14:45**            **Design Guidelines for the Optimization of High Frequency PCB Transformers**  
Lucía Clavero Ordóñez, Miroљub Bakic, Thiwanka Wijekoon, Huawei Technologies Nuremberg Research Center, D; Alberto Delgado Expósito, Pedro Alou Cervera, Technical University of Madrid, E;
- 15:00**            **Efficiency and Power Density Optimization of Three-Level TP PFC**  
Enis Baris Bulut, University of Trakya, TR; Mehmet Onur Gulbahce, Fatih Sultan Mehmet Vakif University, TR; Derya Ahmet Kocabas, Istanbul Technical University, TR; Serkan Dusmez, Arçelik, TR

**Stream 2**

**AC-DC and DC-AC Conversion I**

**Chairperson:** Hans Ertl, Vienna University of Technology, A

- 14:15**            **Highly Efficient SiC-Based Active Infeed Converter for Industrial DC Conductor Systems**  
Jan-Niklas Koch, Raphael Otte, Holger Borcherding, Technical University of Ostwestfalen-Lippe, D
- 14:30**            **Inverter Design Study for a Battery Cooling Compressor for 800V Electric Vehicles with Focus on Efficiency and Inverter Volume**  
Max Kolletzki, Marco Denk, Dominik Anderson, Brose Fahrzeugteile D; Lukas Reißenweber, Alexander Stadler, University of Applied Sciences and Arts Coburg, D
- 14:45**            **Design and Optimization of Simultaneous Wireless Power Transfer and Near Field Communication Systems**  
Christian Merz, Daniel Gückelhorn, Cem Som, Würth Elektronik eiSos, D
- 15:00**            **Efficiency-Oriented Design of Litz Wire for Several kW Power Experimented on 20kW Prototype**  
Damien Lemaitre, Benoit Sarrazin, Yves Lembeye, Alexis Derbey, G2elab, F; Yohan Wanderoild, EDF, F

**Stream 3**

**Advanced Si Devices I**

**Chairperson:** Peter Zacharias, University of Kassel, D

- 14:15**            **Influence of Passive IGBT Control Scheme on Diode Recovery Behavior in Device Characterization Measurements**  
Uwe Schilling, Jürgen Engstler, Peter Beckedahl, SEMIKRON Elektronik, D



- 14:30 Rugged LV Trench IGBT with Extreme Stability in Continuous SOA Operation: Next Generation LV Technology at Hitachi ABB Powergrids**  
Elizabeth Buitrago, Nick Schneider, Wolfgang Vitale, Gaurav Gupta, Luca DeMichielis, Hitachi ABB Power Grids, CH
- 14:45 Higher Output Performance Despite Chip Shrinkage: New FF600R12ME7\_B11 Outperforms Former Generation**  
Jan Baurichter, Klaus Vogel, Andreas Schmal, Oliver Lenze, Philipp Ross, Elena Aksel, Infineon Technologies, D
- 15:00 Retrofit of a Superstar: New EconoDUAL™ 3 Black Series combines new Features with Well-Known Advantages**  
Klaus Vogel, Jan Baurichter, Vitali Weiss, Christian Steininger, Fabian Severin, Infineon Technologies, D

#### Stream 4

##### Gate Drivers and Sensing I

**Chairperson:** Ulrich Kirchenberger, STMicroelectronics, D

- 14:15 Development of a Powerful Gate-Driver-Circuit for High-Frequency Control of a DC-DC-Converter Based on Gallium Nitride Transistors**  
Raphael Löffler, Jan Hückelheim, Dominik Koch, Ingmar Kallfass, University of Stuttgart, D
- 14:30 Transmission Line Approach for the PCB Gate Interconnection Design in GaN-Based High-Frequency Power Converters**  
Alonso Gutierrez Galeano, Emmanuel Marcault, CEA, F; Corinne Alonso, David Tremouilles, LAAS-CNRS, F
- 14:45 Automated PCB Parasitics Extraction from EDA Tools for Power Electronics Design Support**  
Sven Fießler, Technical University of Ilmenau, D; Ulf Schwalbe, University of Applied Sciences Fulda, D
- 15:00 Indirect Multiple DC Link Current Sensing Using Op-Amp Circuits in a Three-Phase Three-Level PWM Inverter**  
Arturs Bogdanovs, Oskars Krievs, Riga Technical University, LV; Johannes Pforr, University of Applied Sciences Ingolstadt, D

#### 15:15 Coffee Break

#### Stream 1

##### Design Tools II

**Chairperson:** Marco Liserre, Christian-Albrechts-University of Kiel, D

- 15:30 A Design Method of an Embedded Real-Time Simulator for Electric Drives using Low-Cost System-on-Chip Platform**  
Aravinda Perera, Roy Nilsen, Thomas Haugan, Norwegian University of Science and Technology, N; Kjell Ljøekelsøy, SINTEF Energy Research, N
- 15:45 Modular Power Electronics Platform for Evaluation and Rapid Prototyping Using an NPC Converter**  
Folkhart Grieger, Kostiantyn Koïro, Philipp Jungklass, Andreas von Daake, Nils Falke, IAV, D

**16:00 How a Hybrid Power Amplifier Using Power Hardware-in-the-Loop Technologies Can Perform Studies on Highly Resonant Grid Phenomena**

Jonas Steffen, Ron Brandl, Fan Wang, Fabian Schnabel, Anton Gorodnichev, Jörg Kirchhof, Matthias Klee, Axel Seibel, Marco Jung, Fraunhofer Institute IEE, D; Michael Schmidhuber, SUMIDA Components & Modules, D

**16:15 High Power Converter 100 W Buck-Boost in Detail – Selection of the Capacitors**

Frank Puhane, Andreas Nadler, Würth Elektronik eiSos, D

**Stream 2**

**AC-DC and DC-AC Conversion II**

**Chairperson:** Hans Ertl, Vienna University of Technology, A

**15:30 Double Side Cooled Modules Enable Future Generation of SiC-Traction-Inverters**

Peter Weiss, Christoph Bauer, Robert Jung, Katharina Berberich, AVL Software and Functions, D

**15:45 Efficiency Comparison of Three-Phase Four-Wire Inverter Topologies for Unbalanced and Nonlinear Loads**

Daniel Stracke, Marco Jung, Fabian Schnabel, Sebastian Sprunck, Fraunhofer Institute IEE, D

**16:00 Optimized Design Method and Control of an Auxiliary Resonant Commutated Pole Inverter for Two Level Photovoltaic Inverters**

Gholamreza Tabrizi, Fabian Schnabel, Marco Jung, Fraunhofer Institute IEE, D

**16:15 Design of an Intelligent, Modular IGBT/SiC Inverter Platform up to 400 kW for Fast Realization of New Test-Bench Concepts**

Johannes Stoß, Simon Frank, Nikolas Menger, Fabian Sommer, Marco Gast, Simon Decker, Andreas Liske, Marc Hiller, Karlsruhe Institute of Technology, D

**Stream 3**

**Advanced Si Devices II**

**Chairperson:** Peter Zacharias, University of Kassel, D

**15:30 Nexperia Innovative Current Sharing Technology in Parallel MOSFETs Applications**

Stein Hans Nesbakk, Nexperia UK, GB

**15:45 Super SOA Power MOSFETs Solution in HOT-Swap Application**

Sami Ould-Ahmed, Mark Gajda, Nexperia UK, GB

**16:00 Benchmarking and Efficiency Analysis of State-Of-The-Art 200 V Diode Technologies Under Fast Switching Conditions**

Ali Aneissi, Michael Meissner, Klaus Hoffmann, Helmut Schmidt University, D; Reza Behtash, Jan Fischer, Sebastian Fahlbusch, Nexperia, D

**16:15 New Generation High Power Density 3300V RC-IGBT Power Module**

Guozhong Dong, Yongdian Peng, Haihui Luo, Guiqing Chang, State Key Laboratory of Advanced Power Semiconductor Devices, CHN; Lihen Zhu, Tao Yuan, Yibo Wu, Menyan Wang, CRRC Times Semiconductor, CHN

#### Stream 4

##### Gate Drivers and Sensing II

Chairperson: Ulrich Kirchenberger, STMicroelectronics, D

- 15:30 Thermal Impedance Measurement Utilizing Optical Measurement and Thermal Impedance Model for Multichip SiC MOSFET Module with Anti-Parallel Diodes**  
Min-Ki Kim, Sang Won Yoon, Hanyang University, ROK
- 15:45 L860: An NTC Thermistor Chip Suitable for Temperature Control in Power Modules**  
Thomas Taubert, TDK Sensors, D; Thomas Bernert, Jan Ihle, Lutz Heiner Kirsten, TDK Electronics, A; Peter Supancic, University of Leoben, A
- 16:00 Mirror Source based Overcurrent and Short Circuit Protection Method for High Power SiC MOSFETs**  
Fabian Sommer, Fabian Stamer, Nikolas Menger, Marc Hiller, Karlsruhe Institute of Technology, D; Nils Soltau, Shiori Idaka, Mitsubishi Electric Europe, D
- 16:15 Investigation of Output Stage in Gate Driver ICs**  
Emanuel-Petre Eni, Wolfgang Frank, Haitham Elsayed, Infineon Technologies, D

16:30 End Day 4

## Friday, 7 May 2021

### 09:00 Conference Highlights – Day 5

#### Stream 1

##### Automotive Applications I

Chairperson: Daniel Chatroux, CDA-LITEN, F

- 09:05 AirSiC – A Silicon-Carbide Based Air-Cooled Traction Inverter is the Enabler for a Simplified, Distributed Powertrain System in a Passenger Vehicle**  
Christian Schweikert, Infineon Technologies, D; Jan Zachariae, VW, D; Tim-Andy Benning, AVL Software and Functions, D; Randeep Singh, Fujikura, D
- 09:20 Junction Temperature Estimation for a High Power SiC Traction Inverter**  
Laura Siplika, Bernd Plassnegger, Markus Koller, AIT Austrian Institute of Technology, A
- 09:35 Comparison Between Copper-Aluminium Laser Joining using Short Pulses and Continuous Wave Mode**  
Elie Haddad, Johanna Helm, Alexander Olowinsky, Fraunhofer Institute ILT, D; Ole Katz, RWTH Aachen University, D
- 09:50 Control of a Three Level Three Phase 20 kW Power Factor Correction (PFC) for Charging Applications**  
Akshay Mahajan, Christoph Siedle, Stefan Reichert, Fraunhofer Institute ISE, D

## Stream 2

### Power Quality and EMC I

**Chairperson:** Hilmar Darrelmann, Darrelmann + Partner Ingenieure, D

- 09:05**            **Reduction of Harmonic Currents with a Very Low-Cost Power Factor Corrector Stage in Three Phase Power Supply Systems**  
Marco Chiado Caponet, Beuth University of Applied Sciences Berlin, D
- 09:20**            **A Differential Mode Noise Estimation and Filter Size Comparison in Totem-Pole PFC Converters**  
Ali Tausif, Technical University of Yildiz, TR; Serkan Dusmez, Arçelik, TR
- 09:35**            **Voltage Controlled Shunt Active Power Filter with Grid Impedance Estimation**  
Swen Bosch, Jochen Staiger, Heinrich Steinhart, University of Applied Sciences Aalen, D
- 09:50**            **Investigation of the Suitability of an Electrical Machine Emulation for EMC Component Tests of Drive Inverters**  
Michaela Gruber, Manuel Fischer, Michael Beltle, Stefan Tenbohlen, University of Stuttgart, D

## Stream 3

### Digital Control I

**Chairperson:** Ilknur Colak, Maschinenfabrik Reinhausen, D

- 09:05**            **Flatness based Control of DC-DC Converters with Constant Power Loads**  
Michael Zauner, Philipp Mandl, Christoph Hametner, Stefan Jakubek, Technical University of Vienna, A; Oliver König, AVL LIST, A
- 09:20**            **Comparison of Control Algorithms for the Suppression of Current Harmonics in PMSMs**  
Annette Mai, Bernhard Wagner, Nuremberg Institute of Technology Georg Simon Ohm, D; Stefan Arenz, Fraunhofer Institute IISB, D
- 09:35**            **Adaptive Reference Current Waveform Adjustment for the Torque Control of Transverse Flux Machines**  
Sören Behrens, Holger Groke, Bernd Orlik, University of Bremen, D
- 09:50**            **Finite Element Analysis of a PMSM for Position Sensorless Control with the INFORM Method**  
Richard Spießberger, Andreas Brunner, Manfred Schrödl, Technical University of Vienna, A

## Stream 4

### Inductors and Transformers I

**Chairperson:** Peter Wallmeier, Delta Energy Systems, D

- 09:05**            **Low-Power High-Frequency PCB Transformer Design with Medium-Voltage Isolation**  
Ole Christian Spro, Frank Mauseth, Dimosthenis Peftitsis, Norwegian University of Science and Technology, N
- 09:20**            **Simple Steady-State Loss Measurement of Toroidal Cores at High Switching Frequencies**  
Sascha Langfermann, Lukas Fräger, Michael Owzareck, BLOCK Transformatoren-Elektronik, D; Urs Obernolte, Lenze, D

**09:35 Calculation Method for Four-Legged Inductors of Sine-Wave Filters in Drive Systems**

Michael Owzareck, Sören Fröhling, Sascha Langfermann, Lukas Fräger, BLOCK Transformatoren-Elektronik, D; Nejila Parspour, University of Stuttgart, D

**09:50 Calculation and Verification of High-Frequency Losses in Power Inductors for Automotive Application**

Christoph Drexler, Manfred Wohlstreicher, Philemon Wrensch, Herbert Jungwirth, Michael Schmidhuber, SUMIDA Components & Modules, D

**10:05 Jump-In Discussions**

**10:35 Coffee Break**

**Stream 1**

**Automotive Applications II**

**Chairperson:** Daniel Chatroux, CDA-LITEN, F

**10:50 Automotive Traction Inverter using 4th Generation SiC MOSFET Power Module**

Kotaro Shibata, Atsushi Yamaguchi, Hirokatsu Umegami, Masashi Hayashiguchi, Noriaki Kawamoto, Akihiro Hikasa, ROHM, J

**11:05 Simulation and Control of a New Integrated Battery System for Automotive Applications**

Clément Mayet, Denis Labrousse, Adrien Dittrick, Bertrand Revol, Rihab Bkekri, SATIE, F; Francis Roy, STELLANTIS, F

**11:20 An Advanced Adjustable Switch Hybrid (ASH) Concept for High Power Automotive Converters**

Munaf Rahimo, MTAL, CH; Renato A. Minamisawa, Silvia Mastellone, Tanya Koottungal, Joachim Spoendlin, University of Applied Sciences Northwestern, CH; Iulian Nistor, mqSemi, CH; Thiago Batista, Soeiro Delft University of Technology, N

**11:35 Isolated Single – Stage Interleave Resonant Converter for EV Charger with Passive Output Ripple Cancellation Circuit**

Abidemi Eleyele, University of Uppsala, S; Grover Torrico-Bascopé, Huawei Technologies, S

**Stream 2**

**Power Quality and EMC II**

**Chairperson:** Hilmar Darrelmann, Darrelmann + Partner Ingenieure, D

**10:50 Characterization of a New Hybrid Thermal Conductive and EMI Absorber Material**

Antonio Alcarria, Jorge Victoria, Sebastian Mirasol, Würth Elektronik eiSos, D; Adrian Suarez, Pedro Martínez, Julio Martos, Jesus Soret, Raimundo Olcina, Jose Torres, University of Valencia, E

**11:05 Superiority of Full SiC Interleaved PFC Module in Radiated Noise Comparison with Hybrid SiC Module**

Shin Suzuki, Toshiya Tadakuma, Motonobu Joko, Mitsubishi Electric, J

**11:20 Influence of MOSFET Scattering on Common Mode Cancellation in Phase Shifted Inverter Operation**

Jonas Bertelmann, Michael Beltle, Stefan Tenbohlen, University of Stuttgart, D

**11:35**      **Semi-Analytical Model of Parasitic Capacitance of Inductor with Conductive Core**  
Florentin Salomez, Arnaud Videt, Nadir Idir, University of Lille, F

**Stream 3**

**Digital Control II**

**Chairperson:** Ilknur Colak, Maschinenfabrik Reinhausen, D

**10:50**      **Comparison of Pole Restraining and Cascaded Control Shown on a Three-Phase-Three-Level PFC Application**  
Marcel Gladen, WILO, D; Volker Staudt, Ruhr-University Bochum, D

**11:05**      **Position Sensorless Control of a Ferrite Magnet Assisted Synchronous Reluctance Machine in the Whole Speed Range**  
Mario Nikowitz, Matthias Hofer, Manfred Schrödl, Technical University of Vienna, A

**11:20**      **Weighting Factorless Reduced-Complexity FCS-MPC for Modified Packed U-cell Inverter Topology**  
Ibrahim Harbi, Mohamed Abdelrahem, Mostafa Ahmed, Ralph Kennel, Technical University of Munich, D

**Stream 4**

**Inductors and Transformers II**

**Chairperson:** Peter Wallmeier, Delta Energy Systems, D

**10:50**      **Analysis of Approaches for Reduction of the Parasitic Capacitances in Transformers with Copper Foil Windings for Fast Switching Applications**  
Christian Bödeker, Michael Meissner, Klaus Hoffmann, Helmut Schmidt University, D; Christian Dietmann, Tobias Appel, Daniel Benner, STS - Spezial-Transformatoren Stockach, D

**11:05**      **Novel Measurements Characterizing a Ferrite in Deep Saturation**  
Jeremias Kaiser, Andreas Bammes, Thomas Dürbaum, Friedrich-Alexander-University Erlangen-Nuremberg, D

**11:20**      **Design of PCB-Mounted Power Chokes for Simple Integration and Direct Heatsink Assembly**  
Lukas Fräger, Sascha Langfermann, Michael Owzareck, Dieter Hestermann, Dennis Kampen, BLOCK Transformatoren-Elektronik, D

**11:50 End Day 5**