

Organisational Information

Sign up at: www.ecpe.org/events

Registration Deadline:

12 May 2021

Participation Fee:

- € 320,- * for industry
- € 290,- * for universities/institutes
- € 120,- * for students/PhD students (limited spaces; copy of students required)

* plus VAT

- The participation fee includes lectures and digital proceedings (provided 1 day prior to the event by email)
- Participation by web conference tool (Webex). Access data will be provided by email.
- Upon receipt of registration confirmation via email you are signed-up for the event. The invoice will be sent via letter post.
- ECPE members are able to register 1 participant free of charge, 25% discount for further participants.
- 10 % discount for participants from ECPE competence centres.
- Cancellation policy: Full amount will be refunded in case of cancellation up to 1 week prior to the event. After this date and in case of no-show 50 % of the fee is non-refundable (substitutes are accepted anytime).

Organisational Information

Organiser ECPE e.V.
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www.ecpe.org

Technical Chair Prof. Dr. Eckart Hoene,
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Course Instructors:



Prof. Dr. Eckart Hoene,
Fraunhofer IZM (DE)



Prof. Dr. Nando Kaminski
University of Bremen (DE)



Andreas Schletz,
Fraunhofer IISB (DE)



Prof. Dr. Alexander Stadler
University of Applied Science Coburg (DE)



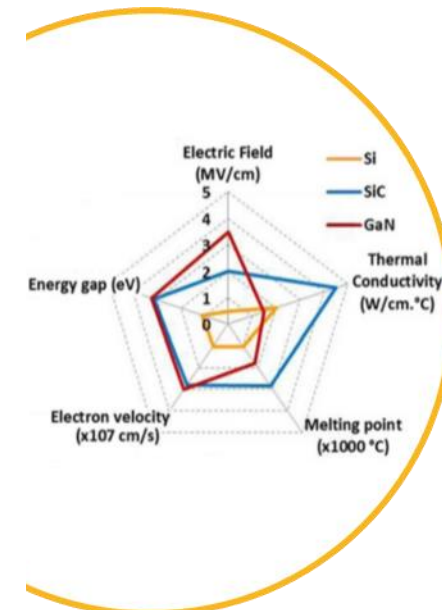
European Center for
Power Electronics e.V.

Digital Event

ECPE Online Tutorial

Wide Bandgap User Training

19 – 20 May 2021



Wide Bandgap User Training

19 – 20 May 2021
Digital Event

Wide bandgap (WBG) semiconductors are the next generation of power electronics. SiC and GaN based systems are the focus of an international cooperation between ECPE and Japanese partners that initially spurred the establishment of this tutorial. The wide spread programme is supposed to convey practical know-how to engineers working with SiC and GaN devices.

Efficient system integration is the key to exploiting the full potential of WBG semiconductors. Power electronics developers need to take into account that high switching speeds, high frequencies and high power densities place special demands on the system components.

This 2-day tutorial addresses all aspects of WBG system integration from the choice of semiconductor components and design options to how to cope with parasitics, EMC and inductance at high switching frequencies. Another topic is test methods – both for electric tests of new power semiconductor components as for the robustness and reliability of modules and systems.

Target Group

This tutorial is intended for engineers and technicians who work or plan to work with WBG devices. Efficient system integration and practical aspects are core components of this course.

Course Instructors:

Prof. Eckart Hoene, Fraunhofer IZM Berlin (DE)
Prof. Nando Kaminski, University of Bremen (DE)
Andreas Schletz, Fraunhofer IISB Erlangen (DE)
Prof. Alexander Stadler, University of Applied Sciences Coburg (DE)

All presentations and discussions will be in English.

Programme

Wednesday, 19 May 2021

08:45 Webex will be started

09:15 **Welcome and tutorial opening**
Peter Rechberger, ECPE

09:30 **Introduction & Motivation for WBG Electronics**

- Opportunities of WBG
- What has been achieved?
- Trends

Eckart Hoene

10:30 Break

10:45 **Wide Bandgap Power Semiconductor Devices**

- General Considerations & Material Basics
- SiC-Switches
- SiC-Diodes
- GaN-Devices

Nando Kaminski

12:45 Lunch break

13:30 **Design of WBG Electronics**

- Which Topologies are Suitable?
- Barriers to Overcome
- Design Rules for Low Inductance Modules

Eckart Hoene

14:45 Break

15:00 **Integrating Fast Switching Semiconductors: The Era of Designing Parasitics**

- Parasitics
- Ultra Low Inductance Modules
- Low Inductance/Zero EMI Modules

Eckart Hoene

16:00 **Drivers & Control Circuitry for WBG Switches**
Eckart Hoene

16:30 Break

16:45 **Testing Wide Bandgap Devices I (Focus on Chip)**

- General Considerations: What's Different
- Individual Robustness and Reliability Tests: Blocking, Gate, Operation

Nando Kaminski

17:30 End of 1st Day

Programme

Thursday, 20 May 2021

08:30 Webex will be started

09:00 **State of the Art Packaging**

- Challenges for Highly Integrated Modules
- SiC Discretes
- SiC Power Modules
- GaN Discretes

Andreas Schletz

10:15 Break

10:30 **Requirements for Inductive Components**

- Effect of High di/dt
- Comparison of Different Winding Techniques
- Thermal Aspects
- Inductor Equivalent Circuit
- Effect of High du/dt
- High Frequency Resonances

Alexander Stadler

12:15 Lunch break

13:00 **Temperature Challenges for Integrated Systems Due to High Power Density**

- Power Semiconductors
- Passive Components: DC-link Capacitor
- Electrical Insulation
- Die Attach

Andreas Schletz

14:00 Break

14:15 **Testing Wide Bandgap Devices II (Focus on Packaging)**

- Failure Mechanisms
- Test Strategies
- Power Cycling and Other Reliability Tests
- Interpretation of Test Results

Andreas Schletz

15:15 Final Discussion Feedback

15:45 End of Tutorial