

Registration (Fax Reply)

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Register before **10 June 2010**

Participation fee:

- ☐ €530,- *
☐ €395,- * for university members
☐ €120,- * for students (shortened seminar package)

The fee includes dinner, lunch, coffee/soft drinks and a CD with the seminar presentations. A printed version of the seminar handout is available on request (€42,- *).

With the confirmation of seminar registration you will receive the invoice. (* plus 19 % VAT)
In case of cancellation after 10 June 2010 or non-attendance 50 % of the participation fee are payable.

Three participants from each ECPE member company free of charge. Allocation in sequence of registration.

Sender:

title, given name, name

company, department

full address

phone, fax

e-mail

date, signature

Organizational information

Organizer: ECPE e.V.
90443 Nuremberg, Germany
www.ecpe.org

Chairs of seminar: Dr. Martin Rittner
Robert Bosch GmbH
Dipl.-Phys. Thomas Harder
ECPE e.V.

Organization: Ingrid Bollens, ECPE e.V.
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Place of seminar: Munich, Germany



Further information (hotel list and maps) will be provided after registration.

Draft



**ECPE European Center for
Power Electronics e.V.**

ECPE Workshop

Power Electronics Substrates - Materials, Performance, Processing and Reliability

17 - 18 June 2010

Munich, Germany

in cooperation with



Introduction

ECPE Workshop Power Electronics Substrates - Materials, Performance, Processing and Reliability

17 - 18 June 2010
Munich, Germany

Substrates are key components in power electronics assemblies as they have to provide multiple functions as mechanical carrier as well as for electrical interconnection enabling high currents, electrical insulation providing high breakdown voltages and high thermal conductivity to remove the dissipated heat. Even with the ultra-high efficiencies of today's power electronic systems, the losses are considerable and must be transferred via a heat sink to the ambient. And a higher level of integration with increasing power densities is leading to higher operation temperatures up to 200°C in some applications.

The choice of a substrate material and technology is defining the reliability of a power electronic system due to the thermo-mechanical properties under thermal cycling load.

Apart from the substrate performance, costs is of course an issue for the choice of the right substrate in a specific application. Starting from state of the art Direct Bonded Copper substrates, alternative materials and technologies for ceramic based substrates, insulated metal substrates, PCB based solutions and new approaches using sprayed metal and insulation layers will be presented and discussed.

Furthermore, the process compatibility e.g. regarding soldering, sintering and wire bonding will be discussed together with basic failure modes and reliability aspects.

The workshop is chaired by Dr. M. Rittner (Robert Bosch) together with T. Harder and J. Koszescha (ECPE). All presentations and discussions will be in English. It is planned to organise a tabletop exhibition in the frame of the workshop.

Programme

Thursday, 17 June 2010

9:45 **Start of Registration**
10:15 **Welcome, Opening**
T. Harder, ECPE e.V.
M. Rittner, Robert Bosch

Introduction

10:30 **Overview of Power Electronics Substrates and Requirements of Automotive and Industrial Applications**
M. Rittner, Robert Bosch

Ceramic based Substrates

11:00 **Direct Bonded Copper (DBC) and Active Metal Brazed (AMB) Substrates: Status & Potential**
NN, (???)
11:30 **Direct Aluminium Bond (DAB) Substrates a surprising material**
H. Knoll / O. Zschieschang, IXYS (enquired)
12:00 Discussion

12:15 *Lunch*

13:15 **AIMIC – Aluminium metallisation, for Automotive Application**
NN, Dowa (enquired)
13:45 **Si₃N₄ based Substrates**
NN, Kyocera (enquired)
14:15 **Benchmark: Performance & Reliability of Ceramic based Substrates**
A. Roth, Fraunhofer IISB
14:45 Discussion

15:00 *Coffee Break*

Insulated Metal Substrates (IMS)

15:30 **IMS with Polymer Insulation**
NN, Bergquist
16:00 **IMS with anorganic Insulation (Anotherm)**
NN, TT Electronics
R. Pierzina, Hauber und Graf Electronics (enquired)
16:30 **IMS Substrates with anorganic dielectric**
M. Töpfer, Fraunhofer IZM (To be asked)
17:00 Discussion
17:15 **End of 1st Day**
19:30 Dinner

Programme

Friday, 18 June 2010

Polymer based Substrates (PCB type)

8:30 **PCB with Copper Inlays / Combi-Board**
T. Gottwald, Schweizer Electronic (enquired)
9:00 **Thick Copper Metallization / Iceberg Technology**
NN, Andus (to be asked)
9:30 Case Study: **Soldering Process Compatibility I**
R. Diehm, SEHO Systems (to be asked)
9:50 Case Study: **Soldering Process Compatibility II**
M. Poech, Fraunhofer ISIT (enquired)
10:10 Discussion

10:20 *Coffee Break*

Advanced Substrate Technologies

10:45 Case Study: **Insulated Molded Leadframe (IML)**
J.M. Morelle, Valeo
11:05 Case Study: **SPRAYTEC Project Results**
G. Müller, Fraunhofer IPA
11:25 Case Study: **Cold Gas Spraying (CGS) Metallization based Ceramics Substrates**
J. Wilde / E. Rastjagaev, University of Freiburg/IMTEK
11:45 **Advanced Surface Finishes for Soldering, Ag Sintering and Wire Bonding**
S. Schmitz, Fraunhofer IZM
12:15 Discussion

12:30 *Lunch*

Failure Modes and Reliability

13:30 **Thermo-mechanics & Failure Modes**
M. Poech, Fraunhofer ISIT
14:00 **Conductive Anodic Filament Growth (CAF)**
M. Mayr, Isola
14:30 **Partial Discharge on Ceramic and Polymer based Substrates**
N. Wang, University of Manchester
15:00 ??
?
15:30 Wrap up, Final discussion
16:00 End of Workshop

The final Seminar Programme will be available mid of May 2010