

## Registration (Fax Reply)

To: ECPE e.V.  
Att.: Ingrid Bollens, [Ingrid.bollens@ecpe.org](mailto:Ingrid.bollens@ecpe.org)  
Please **e-mail** a scanned copy of the completed form or  
send a fax to: +49 (0)911 / 81 02 88 – 28

Register before **26 June 2013**

### Participation fee:

- ☐ € 530,- \* for industry
- ☐ € 395,- \* for universities/institutes
- ☐ € 120,- \* for students (shortened workshop package)

The fee includes dinner, lunch, coffee/soft drinks and a CD with the workshop presentations. A printed version of the workshop handout is available on request (€ 50-\*).

With the confirmation of registration you will receive the invoice. (\* plus VAT) In case of cancellation after 26 June 2013 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

V15\_2013\_06\_25

## Organisational information

|                       |                                                                                                                                  |
|-----------------------|----------------------------------------------------------------------------------------------------------------------------------|
| <b>Organiser</b>      | ECPE e.V.<br>90443 Nuremberg, Germany<br><a href="http://www.ecpe.org">www.ecpe.org</a>                                          |
| <b>Chairmen</b>       | Prof. Eckhard Wolfgang, ECPE<br>Prof. Thomas Licht, University of Applied Science Dusseldorf<br>Dr. Olaf Wittler, Fraunhofer IZM |
| <b>Organisation</b>   | Ingrid Bollens, ECPE e.V.<br>+49 (0)911 / 81 02 88 – 10<br><a href="mailto:ingrid.bollens@ecpe.org">ingrid.bollens@ecpe.org</a>  |
| <b>Workshop venue</b> | University of Applied Science Dusseldorf<br>Josef-Gockeln-Strasse 9<br>40474 Dusseldorf<br>Germany                               |

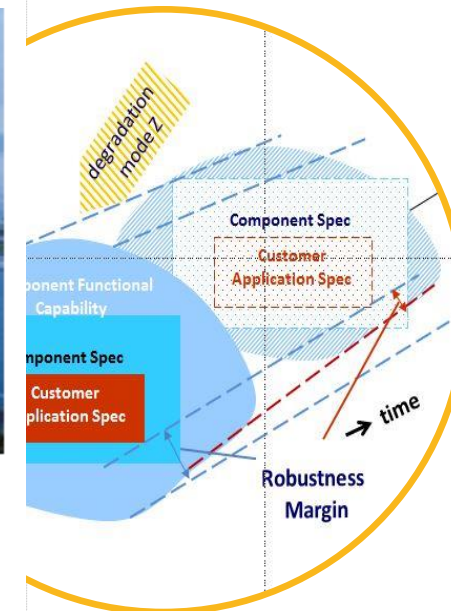


Further information (hotel list and maps) will be provided after registration.



## Programme ECPE Workshop

### Lifetime Modelling and Simulation



**3 – 4 July 2013**  
University of Applied  
Science Dusseldorf  
Dusseldorf,  
Germany

In cooperation with



# ECPE Workshop

## Lifetime Modelling and Simulation

3 – 4 July 2013  
Dusseldorf, Germany

An important part of the SAE J1211 Robustness Validation Handbook is headed "Analysis, Modelling and Simulation". It is based on the Physics-of-Failure approach which means that appropriate models are a prerequisite for lifetime simulation. In addition the different stresses which are applied during operation have to be considered ("mission profile").

The workshop will present and discuss the state-of-the-art of lifetime prognostics in the field of power electronics. Some of the questions which should be answered are:

- How can the mission profile be handled?
- How to deal with multi stresses?
- Root cause for failures in the field or after accelerated testing
- What is the best suited model for a given failure mechanism?
- Which parameters are needed for calibrating models and how can they be extracted from experiments?
- What tests are best suited for verification of lifetime results?

The workshop is divided into six sessions which are: active and passive devices, interconnects (bond wires and die attach), power modules, systems on PCBs and environmental stresses.

The workshop is chaired by Prof. Eckhard Wolfgang (ECPE), Prof. Thomas Licht, University of Applied Science Dusseldorf, Dr. Olaf Wittler (Fraunhofer IZM) and Thomas Harder (ECPE).

All presentations and discussions will be in English.

## Programme

Wednesday, 3 July 2013

10:00 Start of Registration / Welcome Coffee

10:30 **Welcome Address, Opening**

T. Licht, University of Applied Science Dusseldorf (D)  
T. Harder, E. Wolfgang, ECPE (D)

10:50 **Securing Lifetime by Simulation: OEM's Position**  
OEM Representative(s) (D)

### Mission Profile

11:25 **Step by step methodology of device lifetime based on mission profile**

K. Mainka, Infineon Technologies (D)

11:50 **Life time Prediction from Mission Profile**  
M. Ciappa, ETH Zurich (CH)

### Active and Passive Devices

12:15 **Ageing of Thin Film Capacitors**  
W. Grimm, EPCOS (D)

12:40 **Reliability of Capacitors and Competing Solutions for DC-Link Applications in Power Electronics Converters**  
H. Wang, Aalborg University (DK)

13:05 Discussion

13:15 Lunch

### Interconnects: Bond Wires

14:10 **Pragmatic Bond Wire Model**  
U. Scheuermann, Semikron Elektronik (D)

14:35 **Degradation of Al-Thick Wire Bonds**  
T. Prewitz, Fraunhofer IZM (D)

15:00 **FEM Simulation of Bond Wire Fatigue and Comparison with Experimental data**  
F. Sauerland, Infineon Technologies (D)

15:25 Discussion

15:35 Coffee break

### Interconnects: Die Attach

16:05 **Lifetime Model for Solder Layers**  
A. Stupar, ETH Zurich (CH)

16:30 **Degradation of Die Attach Interconnects**  
M. Sousa, Fraunhofer IZM (D)

16:55 **Material Parameters for Lead-free Solder Joints**  
S. Jules, Valeo (F)

17:20 **Test Data for Die Attach Lifetime Modelling**  
S. Kraft, Fraunhofer IISB (D)

17:45 Discussion (15 minutes)

19:30 Dinner at Loungebar Restaurant Canoo,  
Robert-Lehr Ufer 19, 40474 Düsseldorf

## Programme

Thursday, 4 July 2013

### Power Modules

8:30 **Lifetime Modelling of IGBT Modules**  
D. Chamund, Dynex Semiconductor (UK)

8:55 **Lifetime Improvement of DCB Substrates**  
A. Roth, KCC Europe (D)

9:20 **Delamination Modelling for Power Modules**  
R. Dudek, Fraunhofer ENAS (D)

9:45 **Ageing of Mold Compounds**  
M. Goroll, R. Pufall, Infineon Technologies (D)

10:10 Discussion

10:20 Coffee break

### Systems on PCB

10:50 **End-of-Life Simulation and Testing of an Automotive Electronic Control Unit**  
P. McCluskey, CALCE, University of Maryland (US)

11:25 **Solder Joint Lifetime of PCBs: Simulation and Test**  
P. de Place Rikken, Danfoss Power Electronics (DK)

11:50 **Design to Reliability Approach for Traction Systems**  
B. Cascone/ AnsaldoBreda, G. Busatto, U Cassino (I)

12:15 Discussion

12:30 Lunch

### Environmental and Multiple Stresses

13:35 **Predictive Computer Simulations of Cosmic-Ray-Induced Failure of High Power Semiconductor Devices**  
G. Wachutka, Technical University Munich (D)

14:00 **Physical Cross-Couplings and Multi-Disciplinary Design Approach for Improved Power Device Robustness and Reliability**  
A. Castellazzi, University of Nottingham (UK)

14:25 **Humidity and Cyclic Load**  
N. Kaminski, University of Bremen (D)

14:50 **Combined Testing: Some Examples in Railway Traction**  
M. Piton, Alstom, (F).

15:15 **Lifetime Simulation Based on Physics of Failure and Mission Profiles**  
M. Abrate, Centro Ricerche Fiat – CRF (I)

15:40 Discussion

16:00 End of Workshop

16:15 **Optional: Lab tour**