

# CLIMATIC RELIABILITY OF ELECTRONICS - CHALLENGES AND PERSPECTIVES

## - The 9th International Seminar

21-22 March 2024

DTU Lyngby

Meeting Center - Meeting room 1

Anker Engelunds Vej 1

2800 Kgs. Lyngby

**Registration deadline FRIDAY 15 March 2024**

Today environmental conditions affect functionality of electronic systems, as they are part of all technological applications. Extensive use of power electronics as integral part in many applications such as renewable energy, transportation, and automotive electrification resulting in exposure to harsh climatic conditions and electrochemical/corrosion failure modes.

This is an yearly seminar focusing on the climate related issues of electronics bringing together electronics/electrical and material/corrosion experts. Broadly, seminar will address topics related to low/high voltage and effect of environmental conditions on failure mechanisms, technology sector wise issues, material, design, and PCBA processing aspects in connection with humidity issues, and intrinsic and extrinsic preventive strategies.

### **Seminar topics include, but not limited to:**

- Electronics use in renewable energy sectors and climate related issues.
- Climatic issues related to electronic use in vehicle electrification.
- Mechanisms and issues connected to high voltage/power and modification of failure mechanisms.
- Test methods for simulating climatic effects and standardization.
- Materials use in electronics and issues connected to corrosion.
- Component level corrosion issues and failure mechanisms - High and Low power.
- Effect of PCBA design and processing on climate robustness.

- Intrinsic and extrinsic preventive measures including conformal coating, climate condition-based packaging etc.

**Organizers:**

Professor Rajan Ambat, CELCORR, Technical University of Denmark

## Program

### Day 1 - Thursday 21 March 2024

08:30 - 09:00 **Registration and coffee**

**Session 1: Environmental issues of high power/low power electronic systems, failure mechanisms, and Testing**

09:00 - 09:30 **Intro to Seminar and Multidisciplinary aspects of climate effects on electronics and need of collaborative effort**

*Rajan Ambat, Center for Electronic Corrosion, Technical University of Denmark*

09:30 - 10:00 **Resin encapsulation technology used in Power Modules for environmental protection,**

*Shiori Idaka, Mitsubishi Electric Europe, Germany*

10:00 - 10:30 **Electrical Characteristics of Film Capacitors during HV-H3TRB Reliability Testing**

*Sven Clausner, University of Bremen, Germany*

10:30 - 11:00 **Coffee break**

11:00 - 11:30 **Premature power-converter failure in renewable energy applications - A case for application-specific system testing**

*Katharina Fischer, IWES Fraunhofer, Germany*

11:30 - 12:00 **Cyclic temperature and humidity profile in MFG testing of power electronics**

*Juuso Rautio, LUT University, Finland*

12:00 - 13:00 **Lunch break**

13:00 - 13:30 **Influence of harmful gases on corrosion in power electronics**

*Victoria Zimmermann, IISB Fraunhofer, Germany*

13:30 - 14:00 **Climate driven failure of a diode component and failure analysis**

*John B. Jacobsen & Preben Jakobsen, Grundfos, Denmark*

14:00 - 14:30 **Guideline Proposal for Creepage & Contact Distances in Automotive Electronics**

*Frank Luig, Forvia, Germany*

14:30 - 15:00 **Using the NFPA 921 Standard for a structured Analysis of a Fire involving ECM**

*Lutz Mueller, Robert Bosch, Germany*

15:00 - 15:30 **Coffee break**

15:30 - 16:00 **Degradation studies of thermos transfer molds by EIS**

*Michael Schneider, IKTS Fraunhofer, Germany*

16:00 - 16:30 **A Systematic Corrosion Failure Analysis of Li-ion Powered Hearing Aids from Various Markets**

*Abhijeet Yadav, WS Audiology, Denmark*

16:30 - 17:00 **Multiphysics electrochemical modelling of humidity effects on electronics**

*Kristian Rye Jensen, COMSOL, Denmark*

17:00 - 17:15 **First day summary and bus transport to the dinner location**

18:00 - 21:00 **Seminar dinner**

## Day 2 - Friday 22 March 2024

08:00 - 08:30 **Arrival and coffee**

**Session 2: External climate parameters and corrosion classification for electronics**

08:30 - 09:00 **Causal relationship between atmospheric aerosol electronic circuits: results from corrosion chamber studies**

*Luca Ferrero, University of Milano-Bicocca, Italy*

09:00 - 09:30 **Use of silver and copper coupons to better understand corrosivity of environments in electronics**

*Laura Frisk, Danfoss, Finland*

09:30 - 10:00 **Electronic Manufactured for Climate (ELMC) IFD project: Summary of project outcomes**

*Rajan Ambat, CELCORR, DTU, Denmark*

**Session 3: Process cleanliness effect on corrosion reliability and optimization of cleanliness**

10:00 - 10:30 **Data-driven models as well as analytical models to develop a mechanistic understanding of SIR data**

*Matthew Kottwitz, Sandia National Laboratories, USA*

10:30 - 11:00 **Coffee break**

11:00 - 11:30 **Humidity Robustness of Electronic Control Units - The Hidden Factor Solder Resist**

*Lothar Henneken, Robert Bosch, Germany*

11:30 - 12:00 **Designing for Reliability - Flux Residue Activity under Low Profile Components,**

*Vladimír Sítka, PBT Works, Czech Republic and Mike Bixenman, Magnalytix, USA*

12:00 - 13:00 **Lunch break**

13:00 - 13:30 **Solder Reflow Profile and its Effect on Flux Corrosiveness under Bottom Terminated Components**

*Mike Bixenman, Magnalytix, USA and Vladimír Sítka, PBT Works, Czech Republic*

**13:30 - 14:00 Enhanced SIR Requirements for Automotive e-Mobility***Karthik Vijay, Indium Corporation, Europe***Session 4: Protection of different parts of electronics from corrosion using coatings****14:00 - 14:30 Systemic approach and corrosion protection in microelectronic devices***Bernard Normand, INSA Lyon/ST Microelectronics, France***14:30 - 15:00 Coffee break****15:00 - 15:30 Gel-state Coatings for High Performance and High Reliability Applications***Irina Rasid, ACTNANO, Germany***15:30 - 16:00 Minimizing Corrosion of Electrically Conductive Paint in Challenging Applications***Michael Strong, MG Chemicals, Canada***16:00 - 16:15 Conclusion and closing remark***Rajan Ambat, CELCORR, Technical University of Denmark***Attendance fee**

- 5,800 DDK for members of ATV-SEMAPP, CreCon, DMN, EFC or ECPE
- 6,400 DDK for non-members

All prices are excluded of Danish VAT.

The fee covers conference materials, lunch, coffee and conference dinner.

## Registration

### Register - [CLICK HERE](#)

#### Binding registration

Registration is binding, however substitutions are accepted at any time. Please let us know by mail: [teknologiskvidendeling@construct.dtu.dk](mailto:teknologiskvidendeling@construct.dtu.dk)

#### Conference dinner 21 March 2024

The seminar dinner will be held 21 March at 18:00 at

IDA Conference  
Kalvebod Brygge 31-33  
1780 København V

#### Hotels near DTU

**Zleep hotel Lyngby** - approx. 500 meters from DTU

**This seminar is organized by**

Center for Electronic Corrosion (CELCORR), DTU

European Federation of corrosion (EFC), WP 23 on Corrosion Reliability of Electronics

European Center for Power Electronics (ECPE)