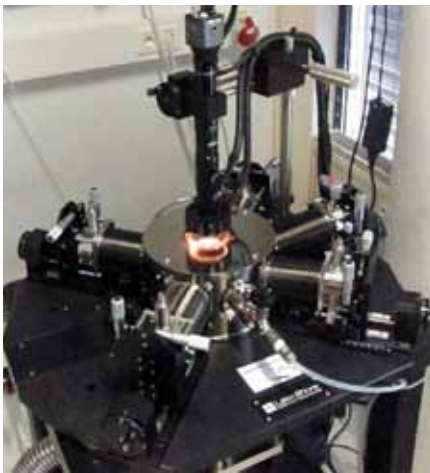


KAI KOMPETENZENTRUM AUTOMOBIL- UND INDUSTRIELEKTRONIK GMBH

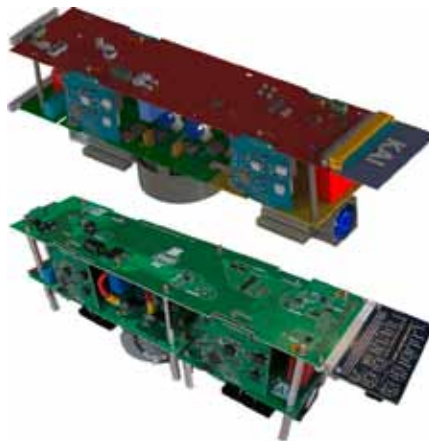
Overview

KAI is an industrial research center in Villach, Austria, founded in 2006 and owned by Infineon Technologies Austria AG. We are focused on power electronics reliability, test concept development, advanced semiconductor materials research, statistical lifetime modeling, data science and multi-physics FEM simulation. Our proven experience in the coordination of interdisciplinary research projects is complemented by an international network of industrial and academic partners.



Key Research Areas

- Physical understanding of microscopic defects and their role in power semiconductor reliability
- Temperature dependent mechanical properties of metals and interfaces for stress-optimized multilayer structures



- Analysis and prevention of semiconductor surface corrosion mechanisms
- Thermo-mechanical fatigue robustness of power device interconnect structures under cyclic stress
- Electro-thermal and mechanical device and system analysis with state of the art FEM simulation
- Application relevant stress test concepts and development of automated real-time test systems
- Verification methodology, functional safety and failure rate estimation
- Application demonstrators and novel design solutions for power systems
- Application of Data Analytics and Machine Learning to support decision making in semiconductor manufacturing

Main Competences

Our scope of research covers all aspects of power semiconductor performance

and reliability in the application fields of automotive and industrial power conversion. We investigate the newest discrete and integrated power devices, advanced materials, cutting-edge technologies and applications.

We develop new methods for application-relevant stress testing of power devices, from the latest generation of automotive smart switches to novel SiC and GaN power semiconductors for efficient power conversion, to identify known and new failure modes and find underlying physical degradation mechanisms.

In close cooperation with our academic research partners we have developed strong competences in understanding and quantifying relevant physical fatigue and damage effects, providing models and parameters for the numerical simulation and a mathematical formulation of lifetime models.

Based on a profound understanding of material and device ageing and degradation, we are able to propose advanced solutions in technology and product design, as well as new methods to verify the improved reliability of innovative power semiconductor technologies and products.

