

How can we help you?

With our in-depth knowledge on material properties and behavior, we enable effective development processes for our partners and support them in new technological solutions by providing expertise in material characterization and failure analysis. Our customers benefit from a better understanding of material and process related problems and failure modes, an increased reliability and robustness of their electronic systems and thus improved cost efficiency and faster time to market.

We support our partners

- with high-performance failure diagnostics and reliability studies in the **detection of faults and analysis of failures** to ensure a long lifetime of their products in use
- in the **development of innovative material solutions** and technologies for power electronics. For this purpose, we use methods of **material diagnostics** and develop an in-depth understanding of the material behavior in use and possible material interactions at interfaces
- with methods of materials analytics for the **qualification of new manufacturing processes** for industrial practice
- with modern and optimized diagnostic methods in ensuring an optimum yield in series production and thereby contribute to **quality assurance**
- through the **optimization and development of innovative testing and diagnostic methods** for quality assurance

Further information can be found here:

www.imws.fraunhofer.de

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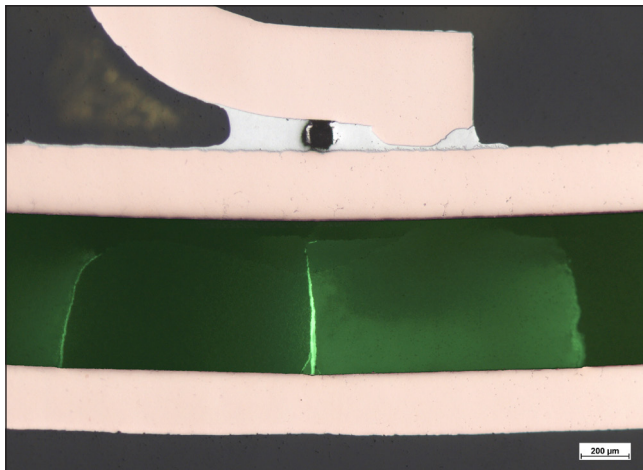
We understand failures and risks!

Material
diagnostics for
power electronics

Material diagnostics for power electronics

Power electronic devices and modules gain in importance as they influence strongly the efficiency of generation, conversion, distribution and use of electrical energy in various applications - from mobile phones to hybrid cars up to wind turbines. Similar to microelectronics, reliability and lifetime are of prime importance for the operational performance of the systems, while at the same time very high demands are placed on the quality of the single components.

With complex material diagnostics, we research the microstructure-property relationships of materials used for power electronic components and systems, identify their application limits and thus significantly supporting quality assurance with our work.



Crack detection and analysis in ceramic substrates of power modules



We support our customers with material diagnostics and failure analysis to ensure a long lifetime and reliable behaviour of their power electronic devices during application.«

Sandy Klengel
Group Manager

Complex Material Diagnostics

- Investigation of microstructure-property relationships (for encapsulation and housing materials / die attach / substrates / power semiconductors, ...)

Process evaluation in electronics development

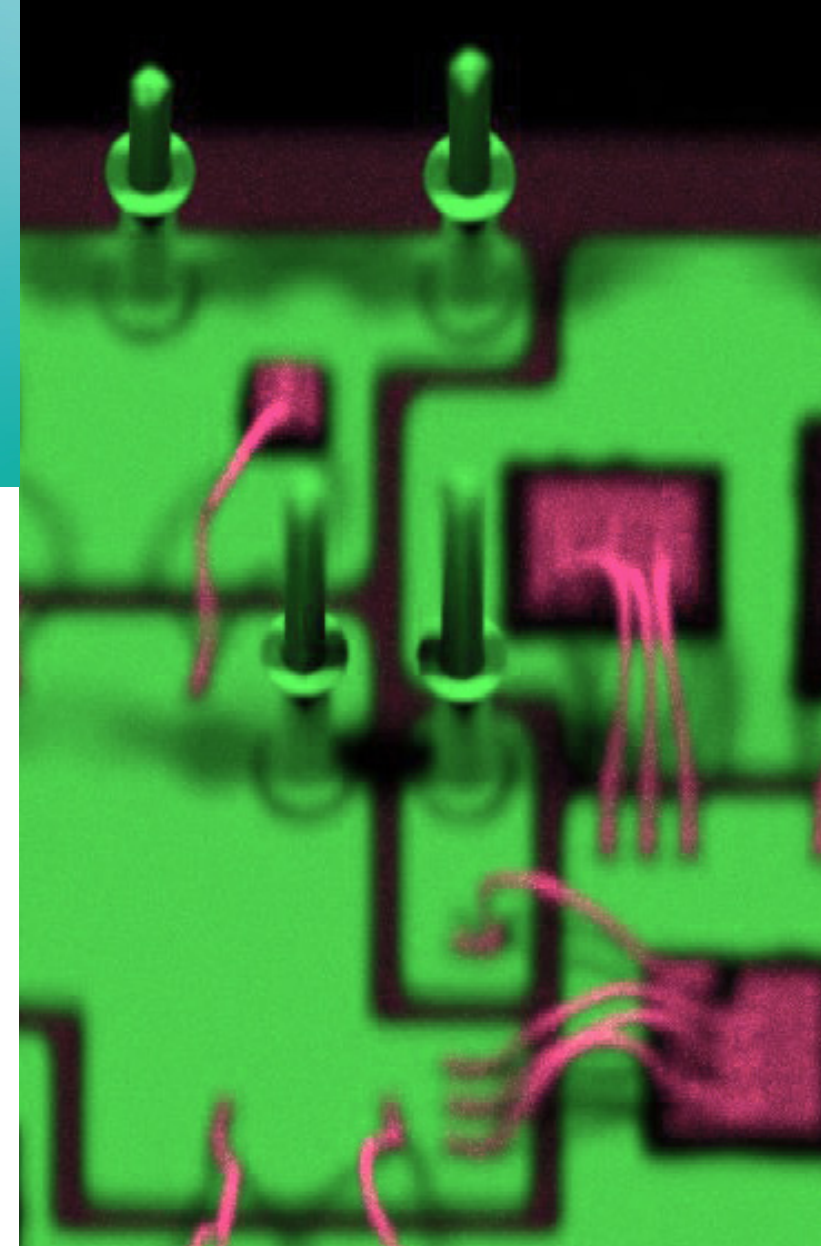
- Providing support for the introduction of innovative materials and new processes
- Analysis and evaluation of new module concepts

Module reliability and failure analysis

- Complex failure diagnostics on power electronic components & systems for field returns
- Identification of failure causes during qualification and processing

Further development of procedures for quality monitoring, testing and defect analysis

- e.g. non-destructive assessment of the porosity in Ag-sinter joints based on acoustic inspection, supported by deep learning algorithms
- test and test specimen development for insulation materials



Our services

We cover the entire process flow: from the design phase to production and qualification. That way, we help our customers to achieve a strong market position, greater customer satisfaction and an improved cost structure.