How can we help you?

We offer an integrated approach of different defect analysis methods (non-destructive defect localisation and electrical measurements) with a comprehensive expertise in the fields of acoustic microscopy (SAM), lock-in thermography (LIT), high-frequency acoustics and electrical characterisation.

Our Services

- Analyses in accordance with customer requirements to address critical issues
- Development and application-specific design of focused acoustic probe heads
- Development of metrology and set-ups for acoustics, thermography and other non-destructive techniques
- Software implementation of hardware solutions
- Development of signal and data analysis methods together with associated software

Customers benefit from our expertise in

- Scanning Acoustic Microscopy (SAM)
- Lock-in Thermography (LIT)
- High-frequency acoustic measurement methods
- Magnet microscopy
- Hardware-, software and method development
- Signal and data analytics
- Machine learning based signal and data analytics

Further information can be found here:

www.imws.fraunhofer.de

Fraunhofer IMWS

Fraunhofer Institute for Microstructure of Materials and Systems IMWS

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We develop new tools and methods.

Non-destructive defect localisation

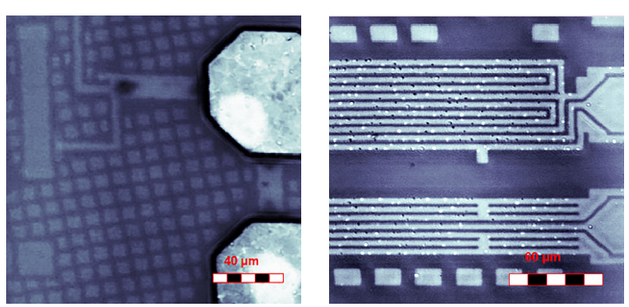
09/ 2022

Non-destructive defect localisation

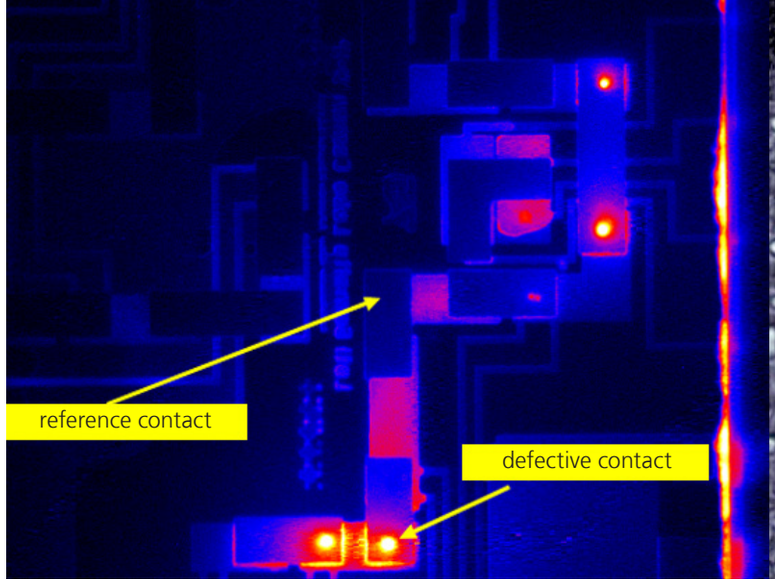
Whether novel mobility concepts, intelligent production or modern energy technology: reliable and robust electronics are a prerequisite for sustainable market success in those areas. In this context, failure analysis of complex microelectronic components is of increasing importance for ensuring and improving reliability, quality and production yield.

In the case of complex and fully enclosed components in particular, non-destructive testing methods are required to localise short circuits and electrical opens in the circuitry, for example. Here, localisation on a macroscopic and microscopic level is essential to navigate subsequent high-resolution analysis techniques. In this context, the preservation of the original state of the samples is necessary in order not to alter the defect situation.

Depending on the type of the defect (mechanical-, structural alterations, delamination, electrical short-circuit, -open, etc.), different contrast mechanisms are required for inspection. We adapt our measurement technology to the respective inspection task for the purpose of defect analysis and quality assurance.



Acoustic GHz-microscopy: (left) delaminated wire bond pads with grain structure visible. In the background subsurface features. (right) Voids in power metal lines induced upon thermal stressing.



Localization of High-ohmic flip chip contacts through Si layer

Scanning Acoustic Microscopy

- Non-destructive, spatial and depth-resolved imaging of interface delamination
- Imaging of local gradients in the mechanical parameters, accompanying e.g. cracks, voids, inclusions
- Quantitative estimation of sound velocity, acoustic impedance, topography and elastic properties

Lock-In Thermography

- Localization of resistive defects at IC and interconnect level
- Non-destructive 3D defect localization of resistive defects in fully packaged microelectronic devices
- Spatially resolved determination of temperature distributions

Development of Analysis Methods

- Non-destructive measurement approaches
- Time-domain reflectometry, magnetic imaging, etc.
- Prototyping of setups; hard- and software development
- Conventional and intelligent (ML) signal analysis

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Together with our customers, we develop non-destructive test and analysis methods and adapt them to the respective customer requests. Furthermore, we provide our expertise to our customers by conducting specific analyses tailored to their needs.«

Dr. Sebastian Brand,
Team Manager