



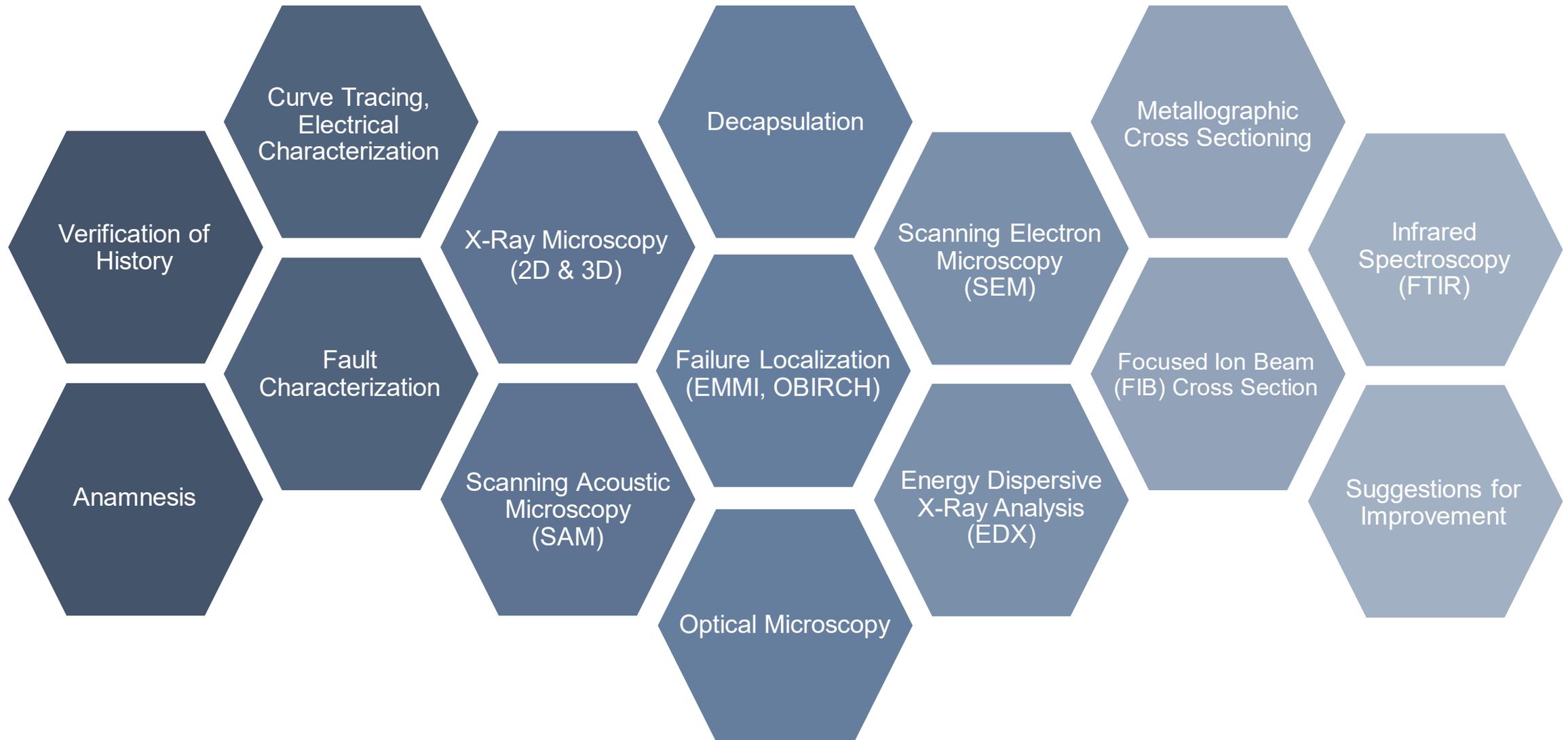
RoodMicrotec

Failure and Technology Analysis

Our Mission

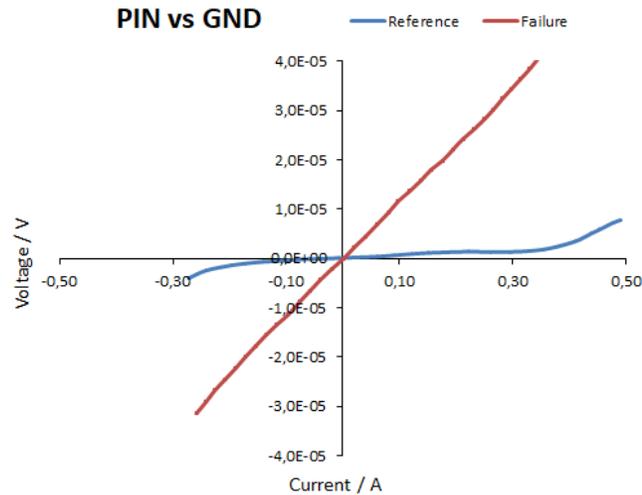


Failure Analysis



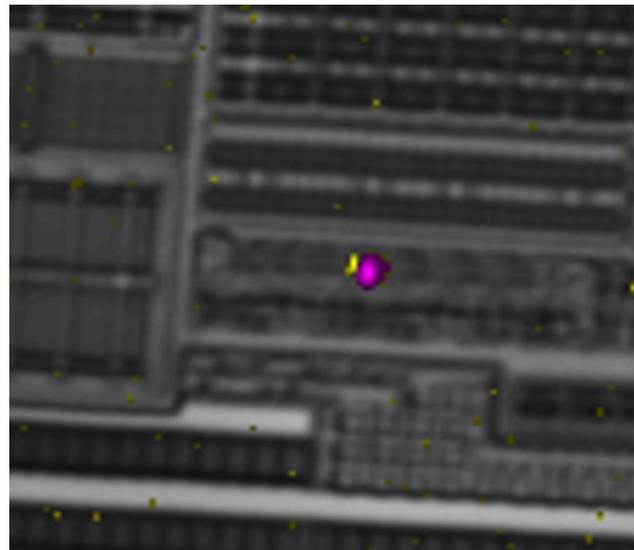
Failure Analysis – Integrated Circuit

1. Electrical Characterization



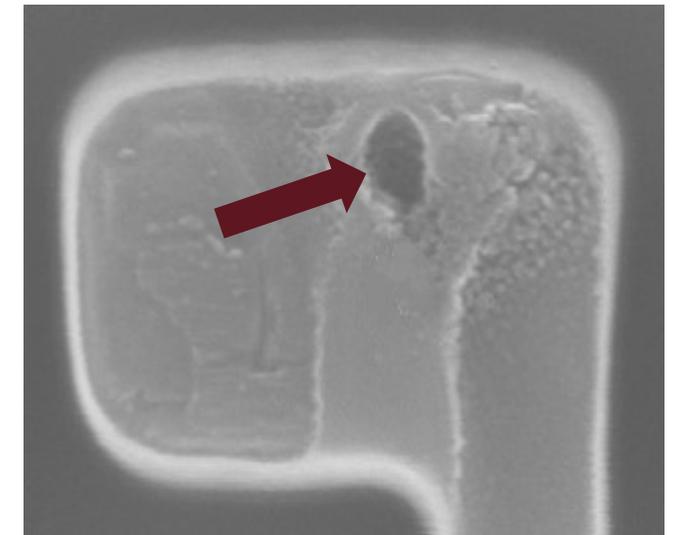
Curve tracer - Ohmic behaviour (8.7 k Ω)

2. Localization on Die Level



Backside OBIRCH - Signal in digital circuit

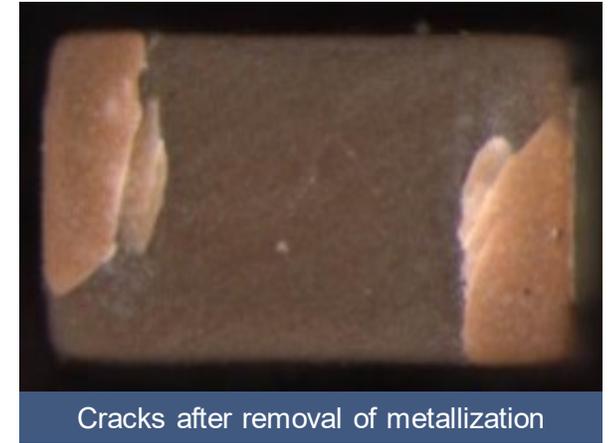
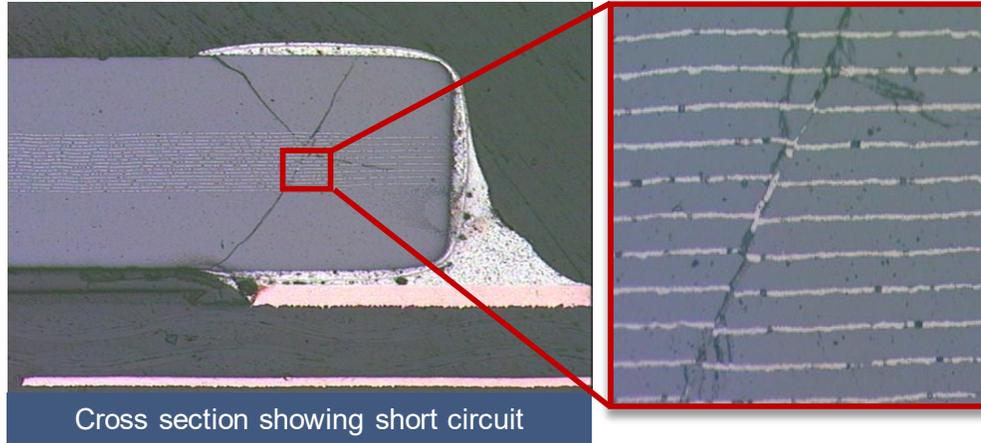
3. Physical Determination



SEM bulk silicon inspection
MOSFET gate oxide damage

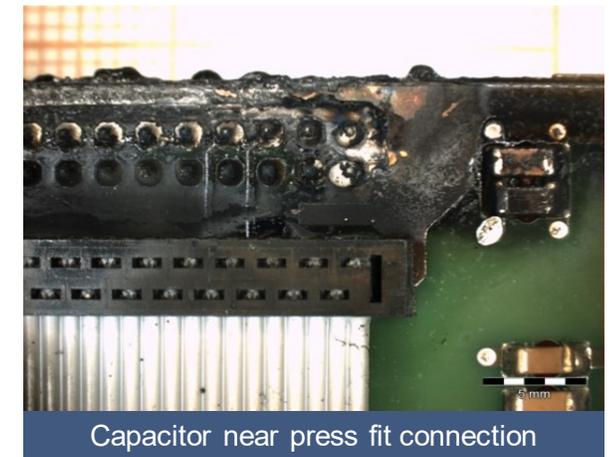
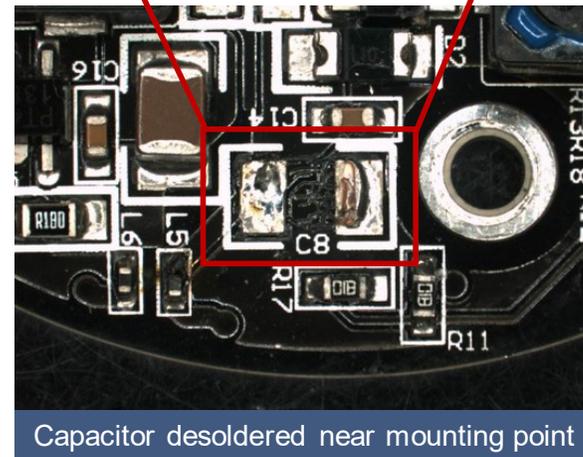
Root cause: ESD induced gate oxide breakdown

Failure Analysis – Ceramic Capacitor

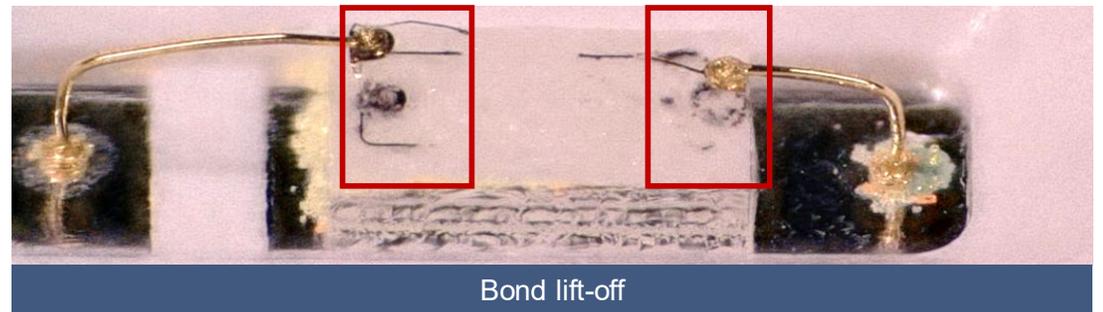
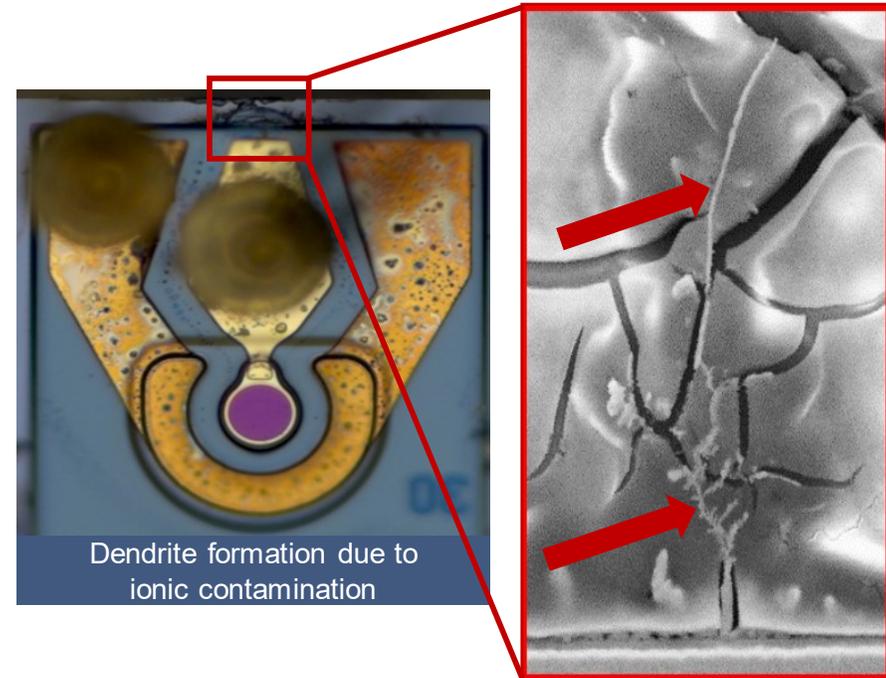
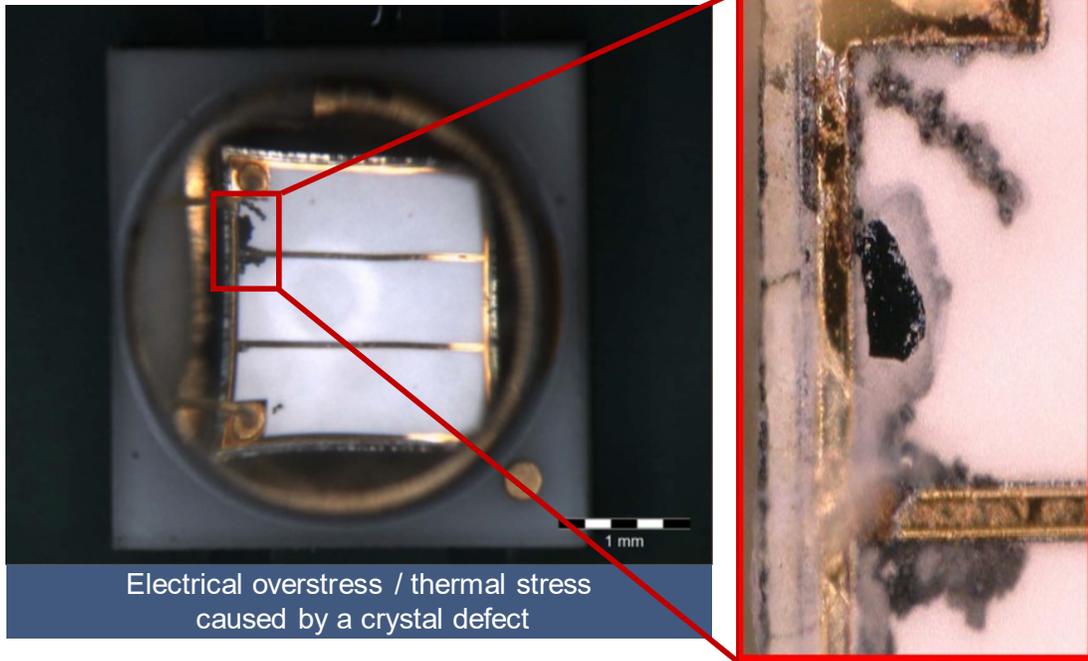


Sources of mechanical overstress:

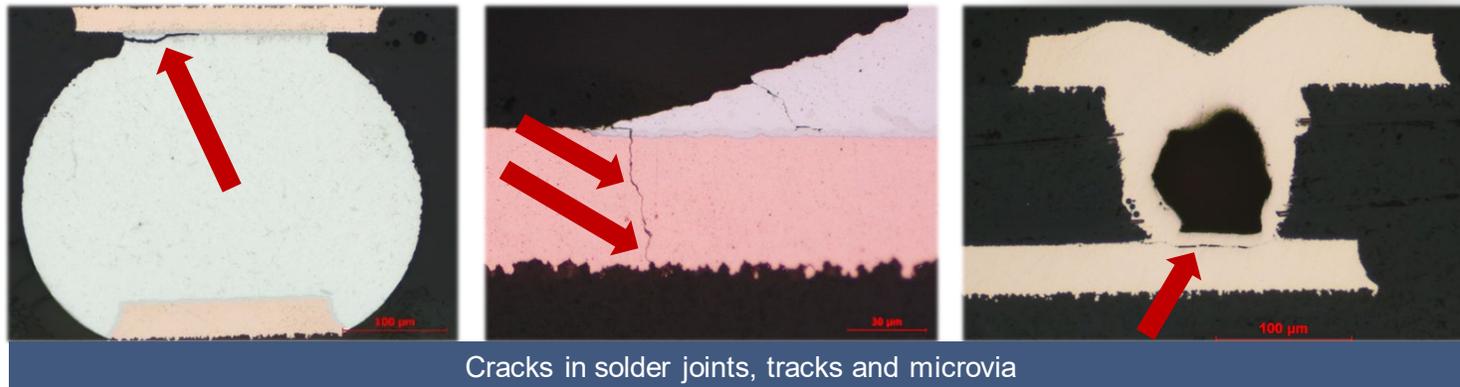
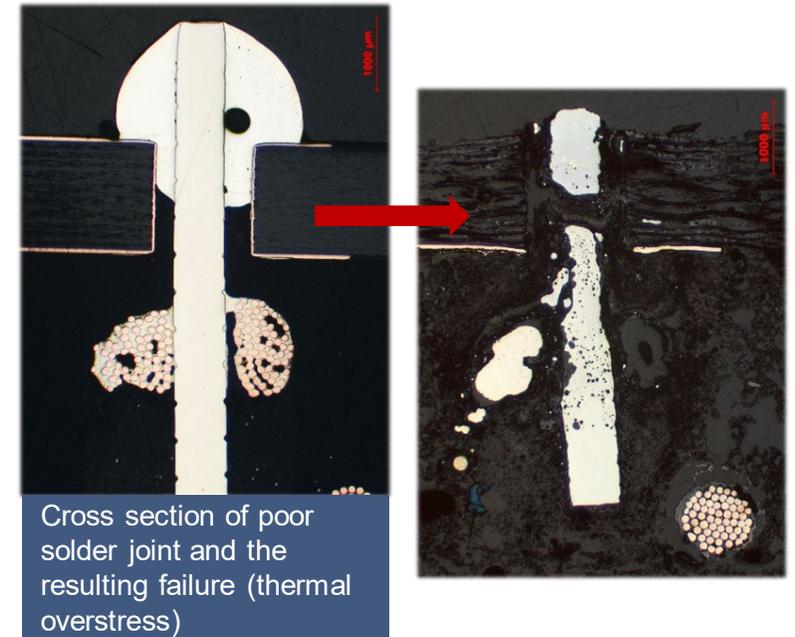
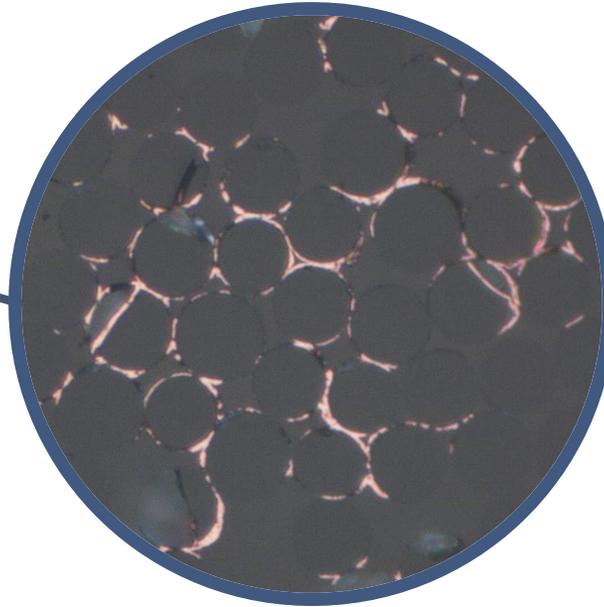
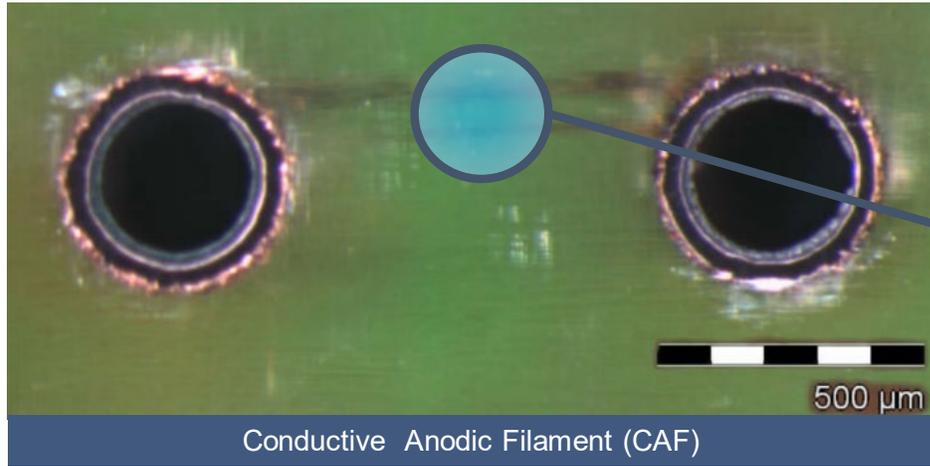
- Board assembly
- Singulation of a multi panel
- Assembly of components in press-fit technology
- Assembly in the system (e.g. screwed connections)
- Temperature change loads of fully molded printed circuit board assemblies



Failure Analysis – LED



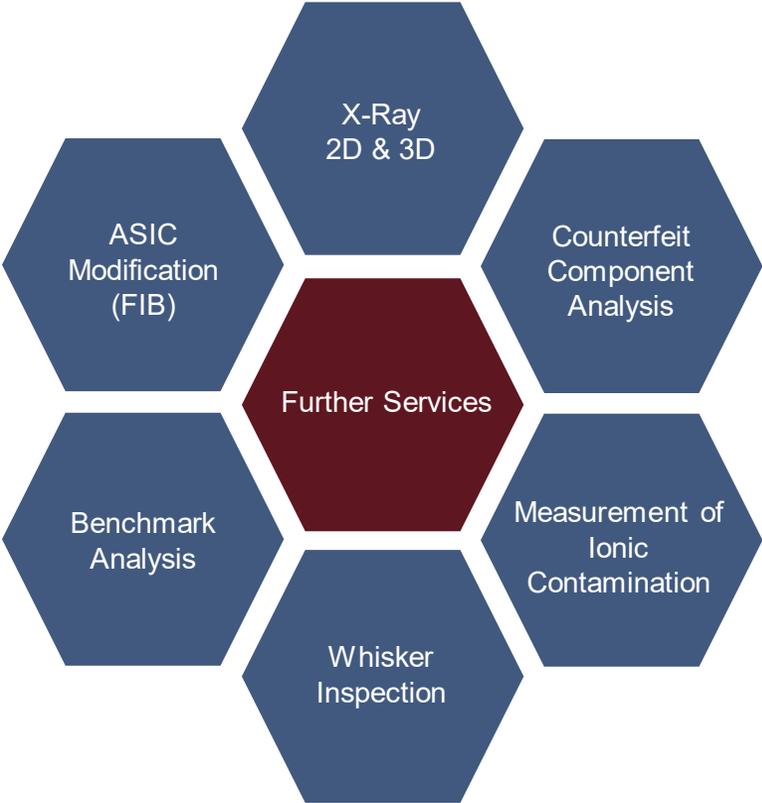
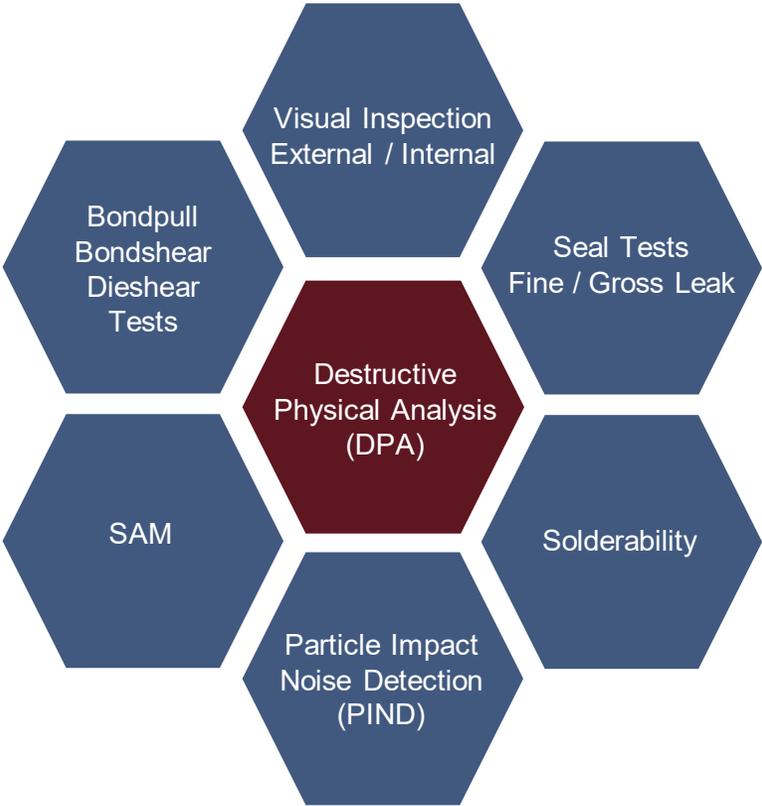
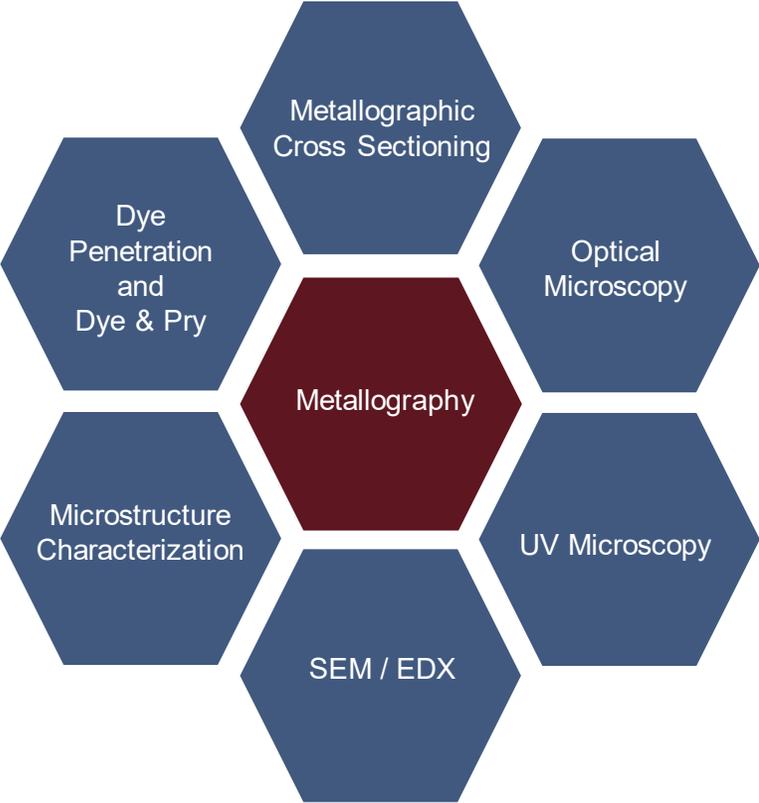
Failure Analysis – Printed Circuit Board Assembly (PCBA)



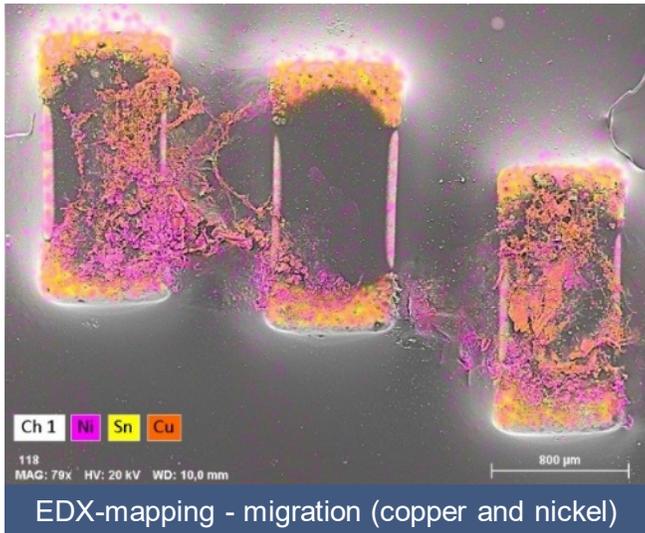
Typical failures on PCBA-Level:

- Whisker growth
- Conductive Anodic Filaments (CAF)
- Delamination
- Dendrite formation
- Material migration
- Insufficient solder joints
- Cracks in solder joints, tracks and vias

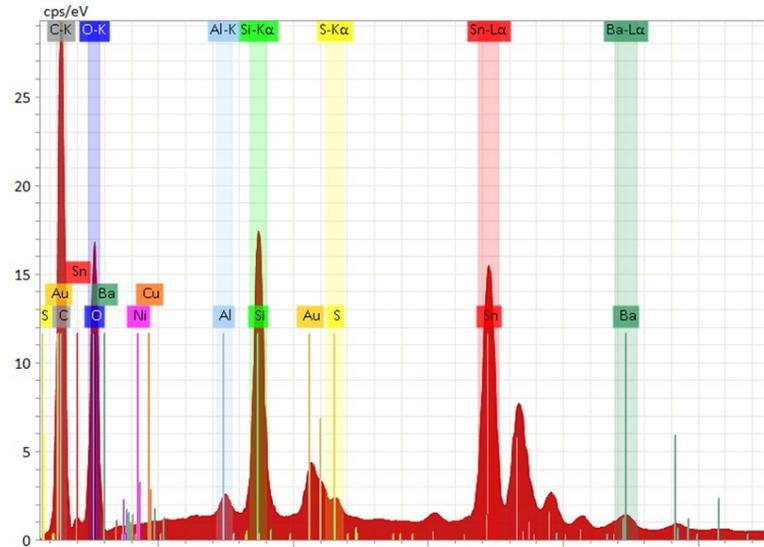
Technology Analysis



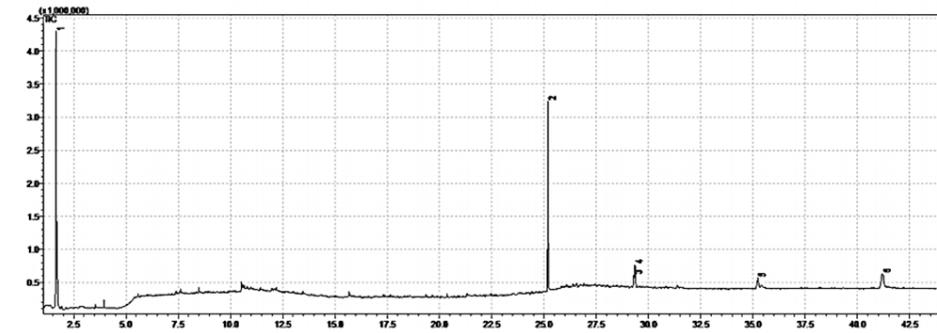
Technology Analysis – Material Analysis



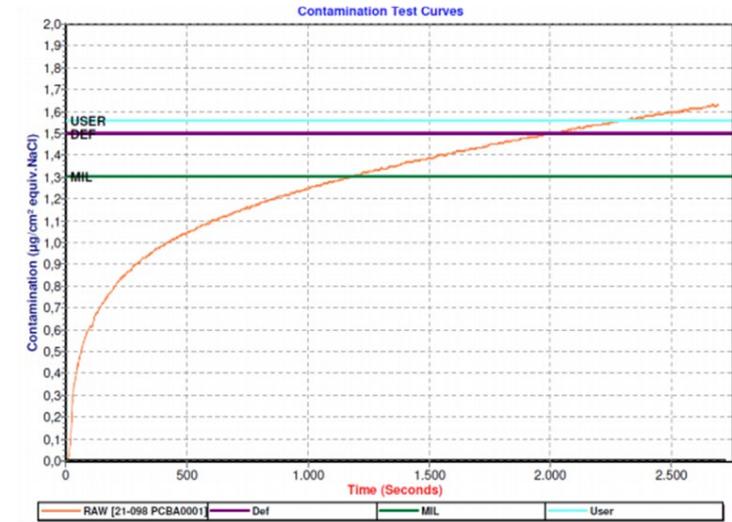
EDX-mapping - migration (copper and nickel)



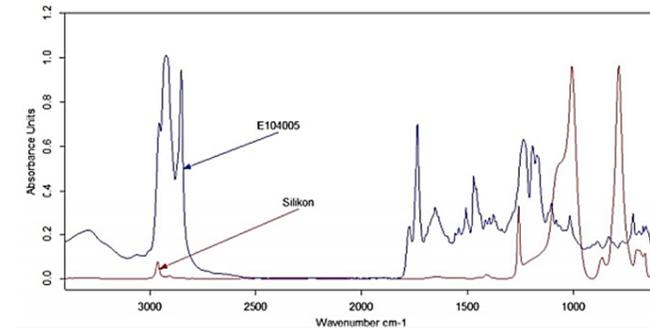
EDX-spectrum of anorganic contamination



GCMS/TDS-spectrum of organic contamination

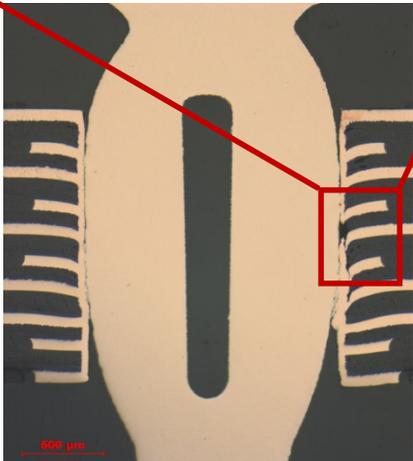
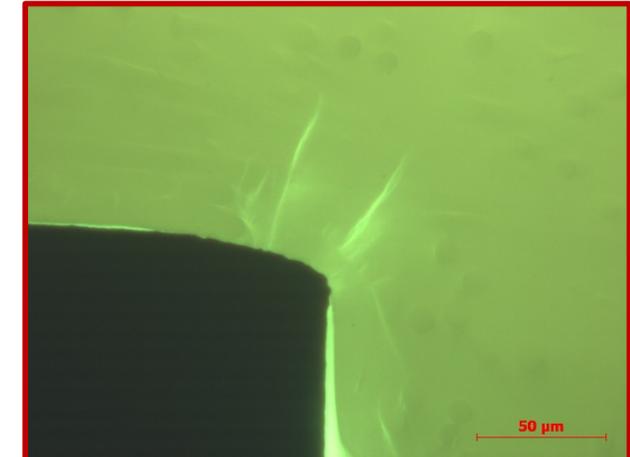
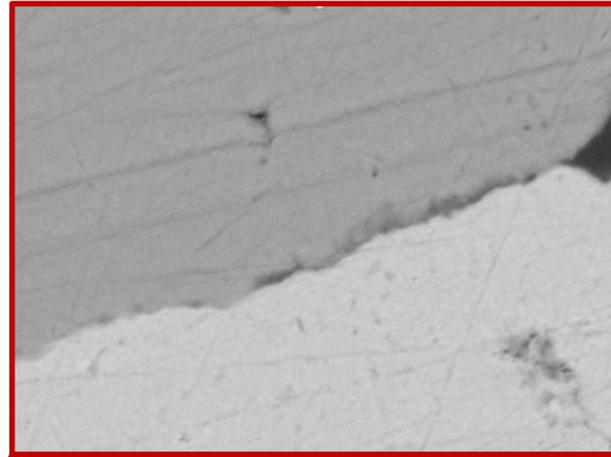


Measurement of ionic contamination

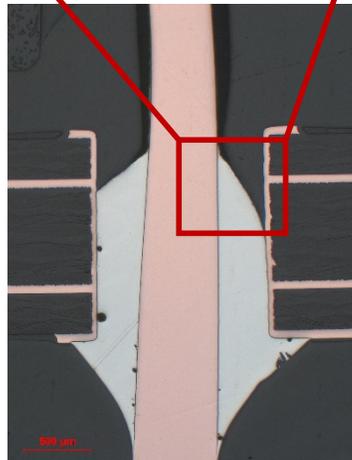


FTIR-spectrum (silicone detection)

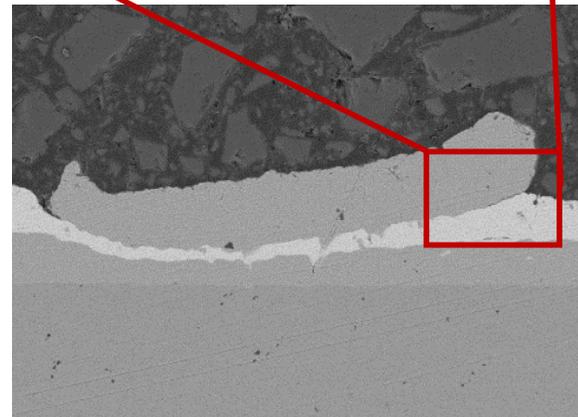
Technology Analysis – Metallography



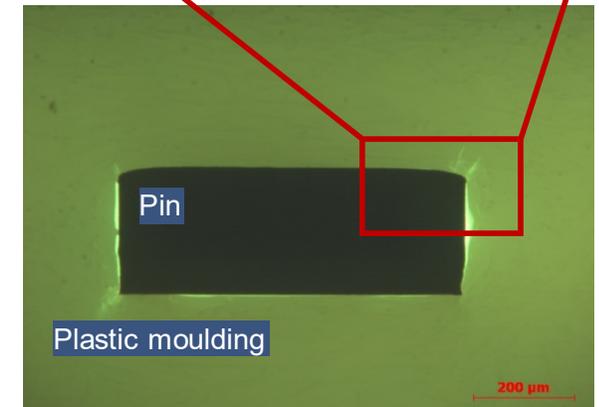
Pressfit pin creating jet effect
Destruction of the via
metallization



Cross sectioning and optical microscopy of
solder joints
Assessment according to standards

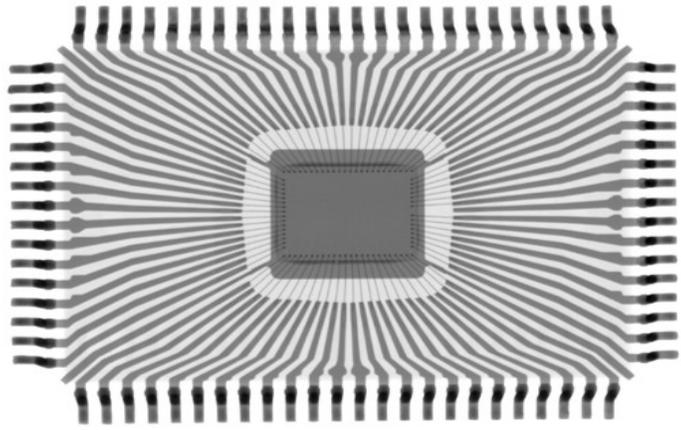


Failed stitch bonding
Disconnectivity of Cu-bond

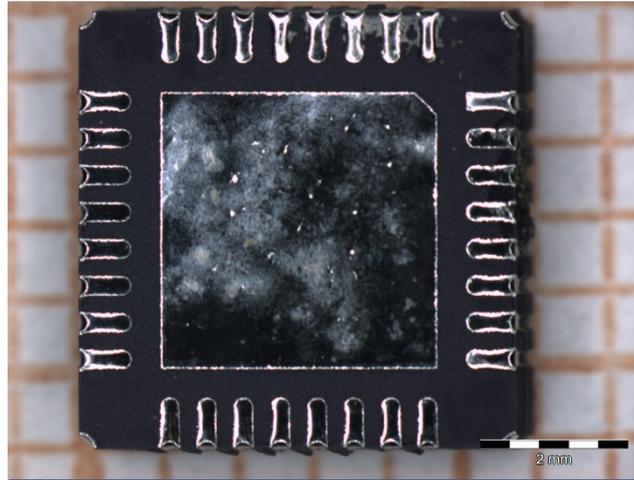


Optical microscopy in UV-light
Detection and analysis of cracks and gaps

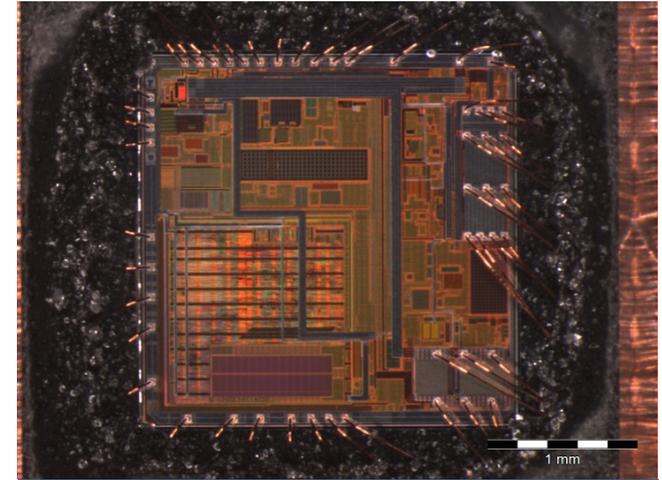
Destructive Physical Analysis (DPA)



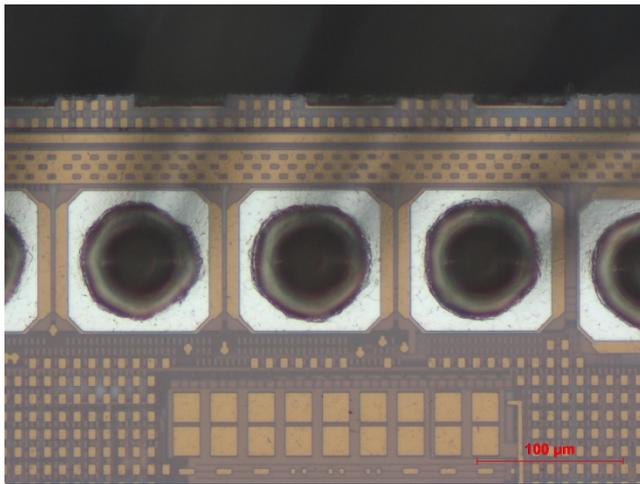
X-ray microscopy



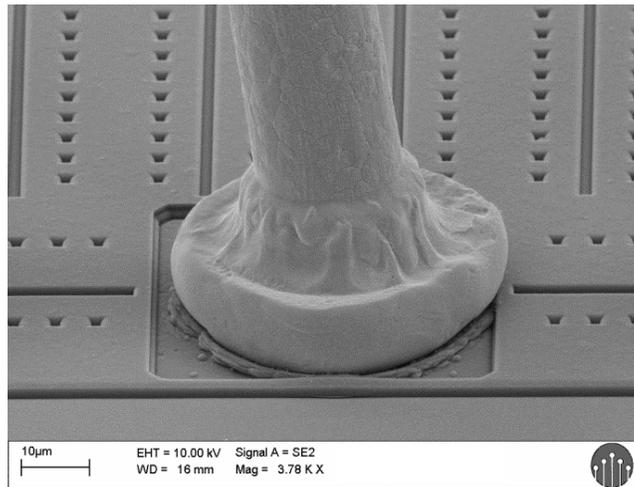
Solderability test



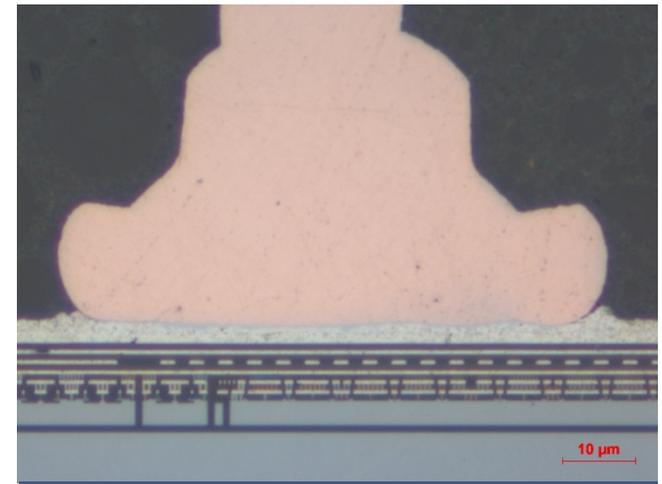
Chemical decapsulation



Internal visual inspection

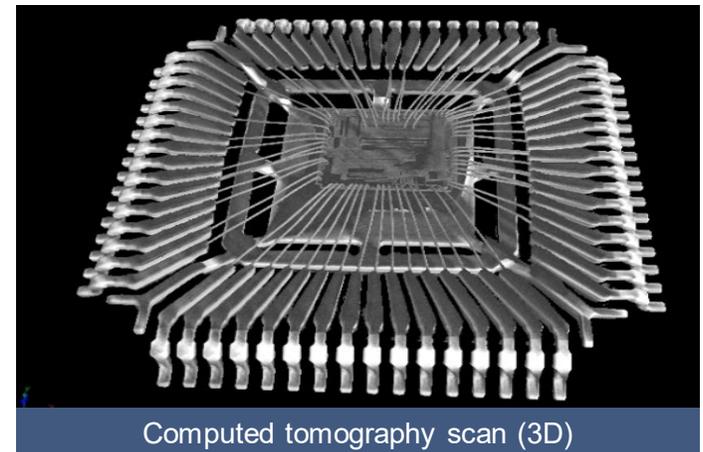
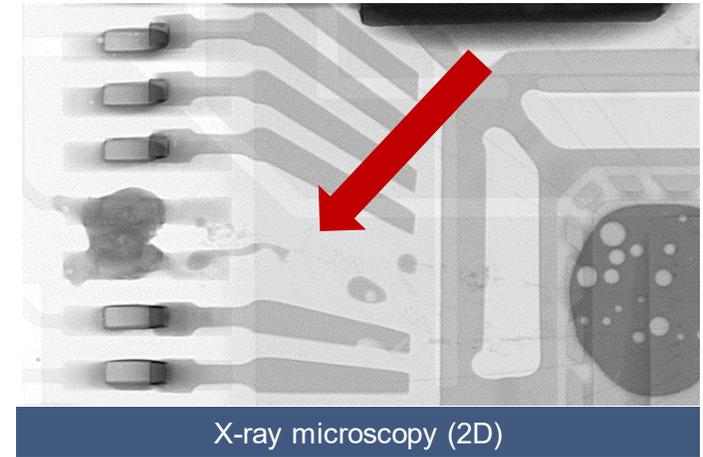
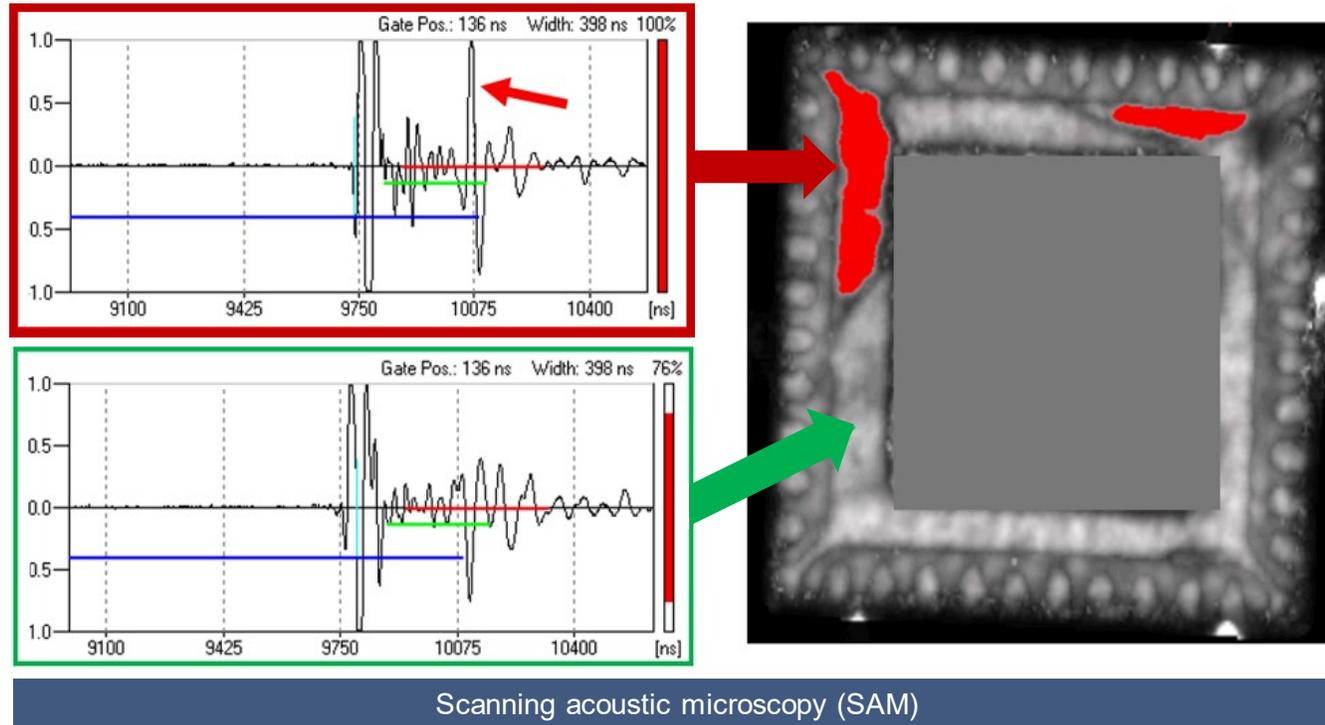


Scanning electron microscopy



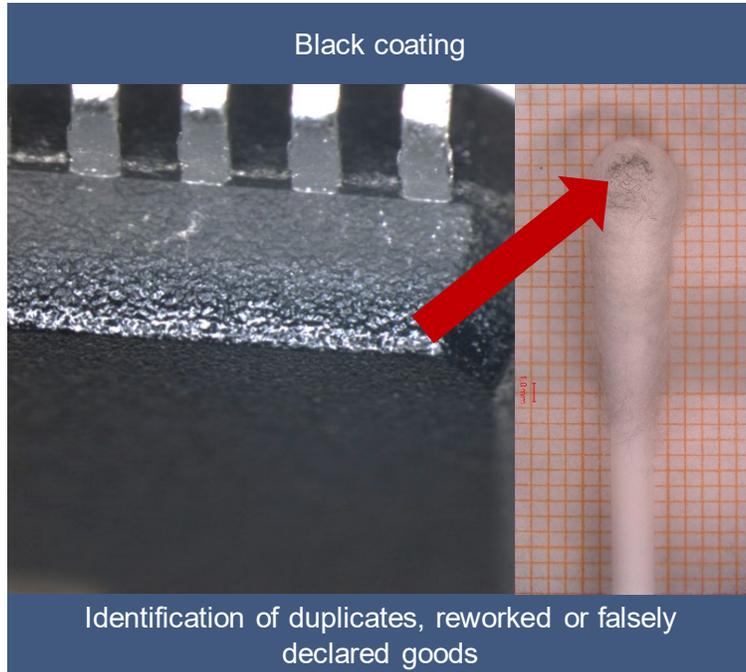
Bond characterization

Non-Destructive Examination



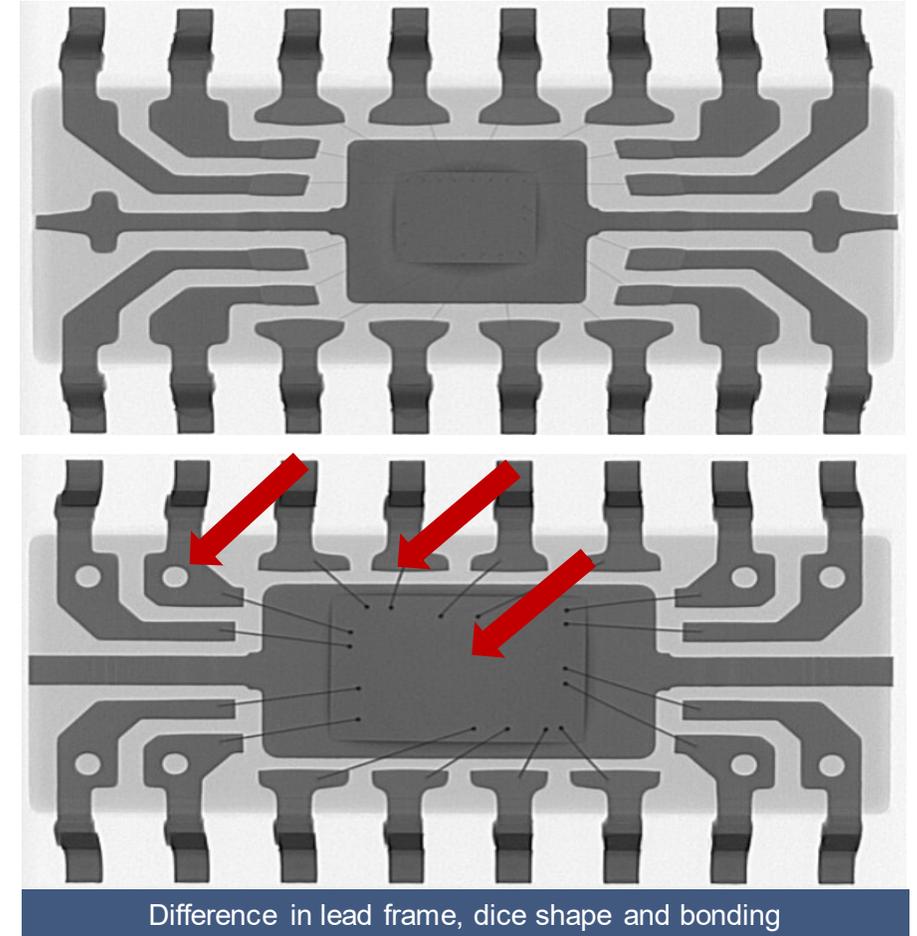
Examination of test specimens without destruction, enables analyses without direct intervention on potential defect positions

Counterfeit Component Analysis



Inspection methods:

- Light-optical inspection of the housing and the terminal metallization
- X-ray microscopy to inspect the lead frame and bonding
- Solvent wiping test to identify blacktopping
- Wet chemical exposure of the die



Committed to Quality

Accredited and certified lab
according to



The test laboratories are accredited according to DIN EN ISO/IEC 17025:2018 by the accreditation body DAkkS. The accreditation is valid only for the scope listed in the annex of the accreditation certificates D-PL-12120-01-02.

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