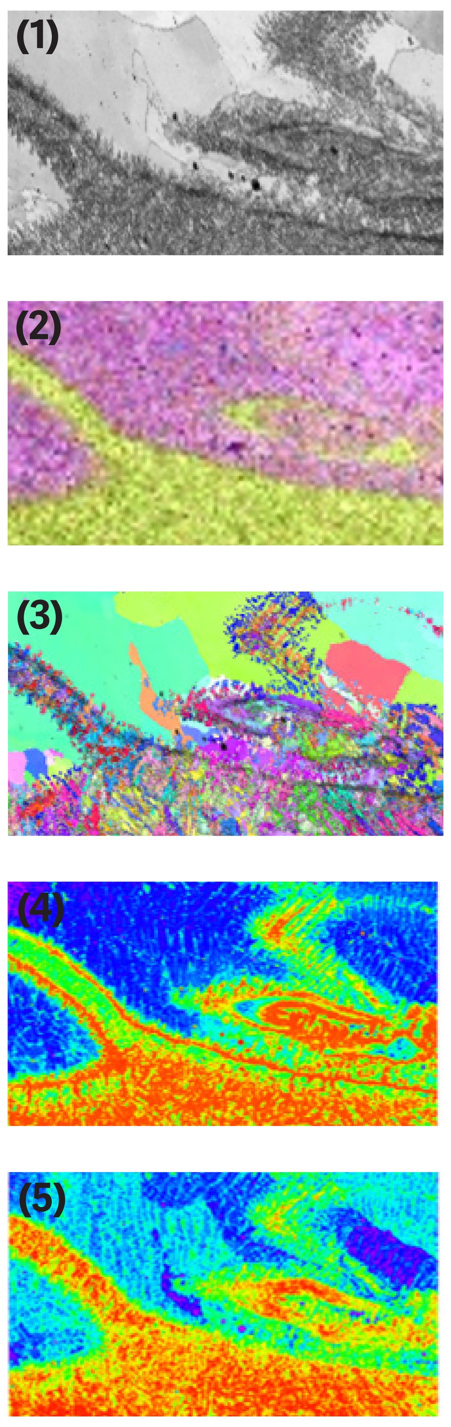
Materials Engineering

Correlative Process- and Failure Analysis

We combine high resolution element analytic methods with surface & structure analysis methodologies and micromechanical characterisation to identify your process limits and to boost your innovation potential in respect to materials & processing R&D.



Imaging of a laser induced welding zone utilizing a correlative analysis approach:
(1) REM overview
(2) EDX element plot
(3) EBSD plot
(4) Hardness plot
(5) Young's modulus plot

Element analysis

- Spatially resolved element analysis by **E**lectron **D**isperse **X**-ray analysis.
- Quantitative element analysis of metal/alloy by **O**ptical **E**mission **S**pectroscopy
- Quantitative element analysis by **X**-**R**ay **F**luorescence Spectroscopy
- Quantitative analysis of organic compounds by **G**as **C**hromatography coupled **M**ass **S**pectrometry

Structure analysis

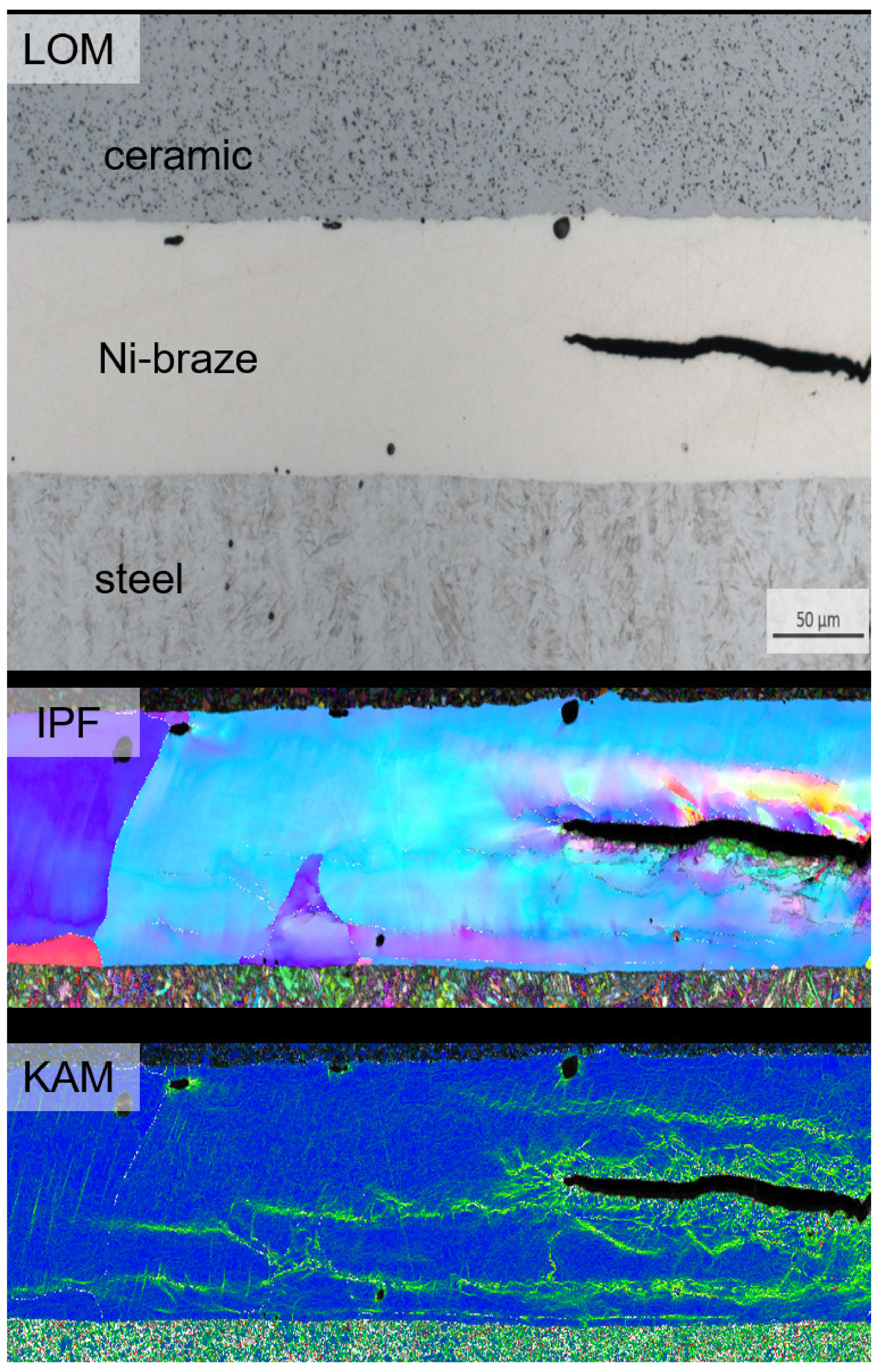
- Spatially resolved crystal lattice analysis by **E**lectron **B**ack**S**catter **D**iffraction
- Phase analysis and texture measurement by **X**-**R**ay **D**iffraction
- Identification of chemical substances or functional groups by **F**ourier **T**ransform **I**nfra**R**ed Microscopy

Surface Analysis

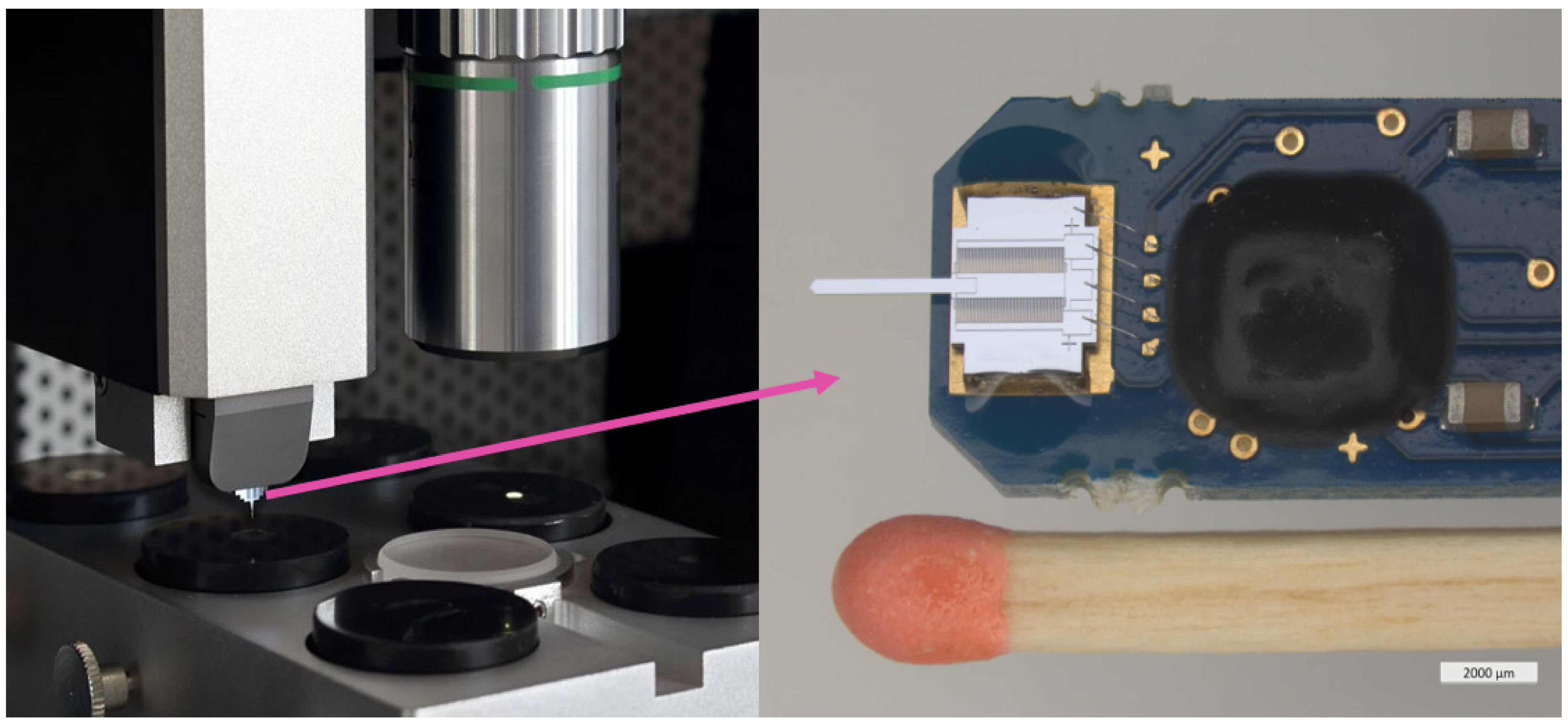
- Surface and fabric analysis by high resolution field emission **S**canning **E**lectron **M**icroscopy

Micromechanical Testing

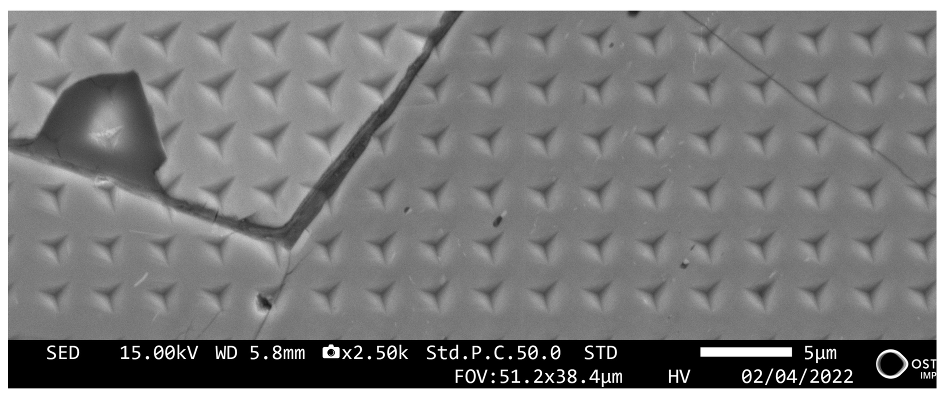
- Micro load-displacement experiments from mN to N in mode I/II/III
- Microhardness >2.5 mN
- Nanohardness by Nanoindentation up to 2 N
- Nano to micro fatigue testing from µN to mN in mode I/II/III



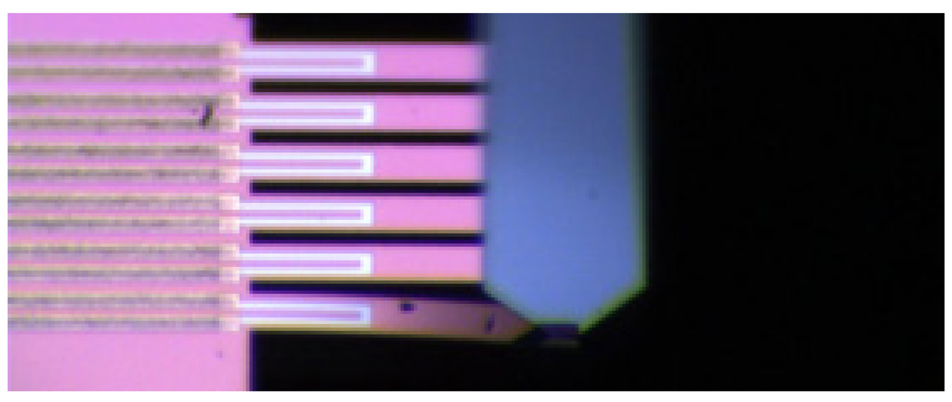
Crack in solder joint visualized by optical light microscopy (LOM) and EBSD showing cristallographic misorientation (IPF) and strain distribution (KAM)



Nano-indentation test setup (left) and detail of MEMS based nano-indenter showing the brazed indenter onto a MEMS force sensor (right).



SEM image of nano-indents in a mineral phase



Cantilever fatigue test of microstructure by nano-indentation testing

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