

CAM IS A COMPETENCE CENTER FOR
MICROSTRUCTURE DIAGNOSTICS
AND MATERIAL CHARACTERIZATION
WITHIN FRAUNHOFER IMWS IN HALLE

CENTER FOR APPLIED MICRO- STRUCTURE DIAGNOSTICS (CAM)

The Center for Applied Microstructure Diagnostics is a leading service provider for failure diagnostics and materials assessment. Contract R & D for industry, semiconductor technologies, microelectronic components, microsystems and nanostructured materials is our day-to-day business.

At CAM, we cover the entire work flow from non-destructive defect localization over high precision target preparation to cutting edge nanoanalytics supplemented by micro-mechanical testing, finite element modelling and numerical simulation. In preparation for future challenges, we do accomplish intense forefront research in cooperation with international partners.

CONTACT US

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MAJOR APPLICATIONS

Electronics and microsystem technologies:

- Si-based semiconductor IC technologies (CMOS, BiCMOS, HV CMOS)
- Optoelectronics and HF electronics
- Power electronics
- Organic electronics
- Microelectronics packaging
- Advanced 3D System Integration
- Interconnecting materials for photovoltaics (cooperation with Fraunhofer CSP)
- MEMS and actuators
- Sensor materials

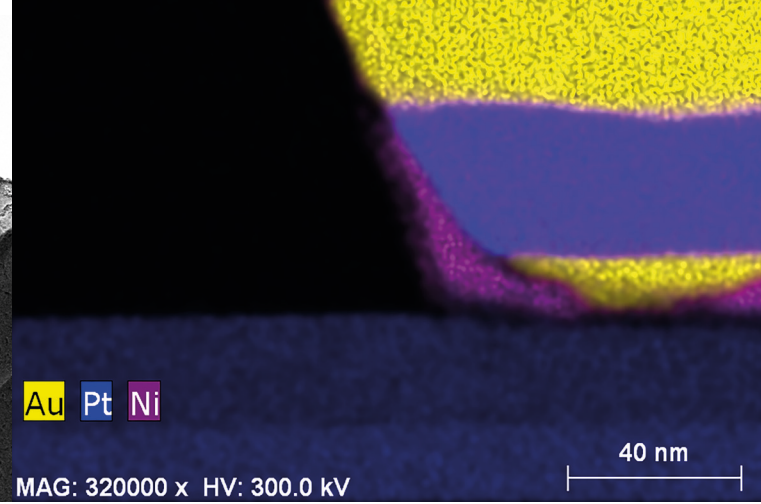
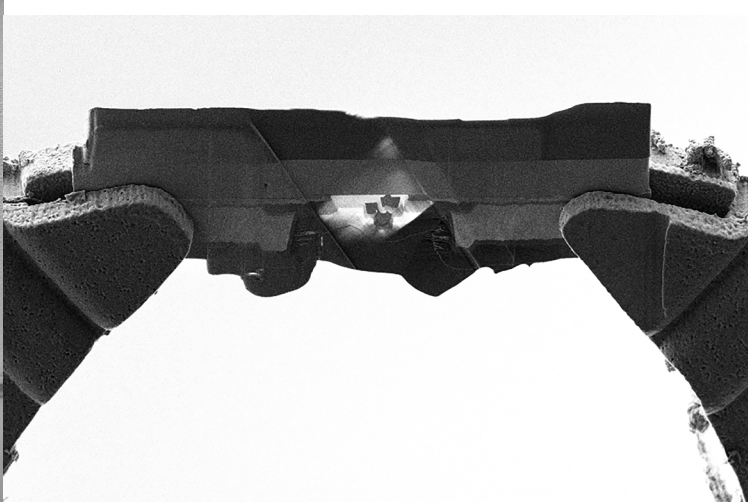
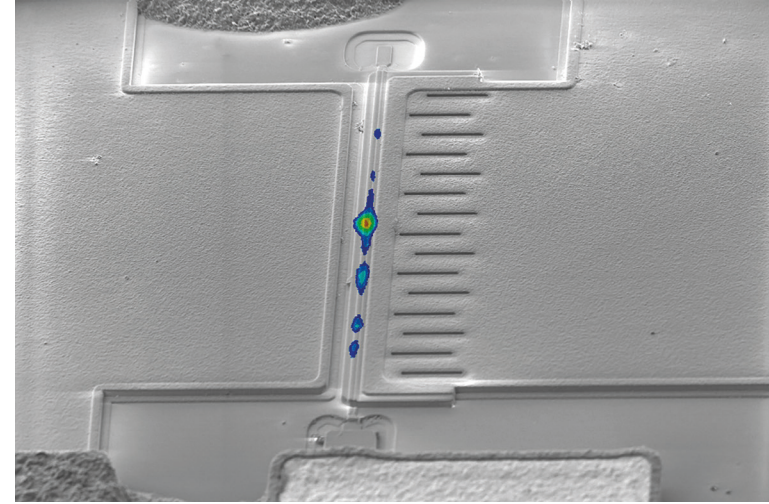
Nanotechnologies:

- Pigments and nanoparticles
- Optical coatings
- Nanostructured glasses, ceramics and glass ceramics
- Selected health care materials

FRAUNHOFER IMWS
CENTER FOR APPLIED MICROSTRUCTURE DIAGNOSTICS

COMPOUND SEMICONDUCTOR





COMPOUND SEMICONDUCTOR

Wide band gap semiconductor high electron mobility transistors (HEMT) and light emitting devices (LED) reach ultimate performances in terms of maximum operating temperature, power conversion efficiency, breakdown voltages and light emitting efficiency. However, performance and degradation of such devices is strongly affected by interface perfection and crystal defects in the epitaxial hetero-structures as well as the formation of metal/semiconductor interfaces for Schottky and ohmic contacts on the atomic scale.

Together with industrial manufacturers and research institutes, Fraunhofer CAM is working to understand design and process related root causes for performance variations and aging defects in order to optimize manufacturing quality, device performance and long term operational behavior of such devices.

We apply high end atomic resolution electron microscopy and further material and thermal analysis techniques for in-depth analyses of functional device structures, hetero epitaxial substrates and related defects. Furthermore, we collaborate with diagnostic tool manufactures to continuously improve preparation and analysis techniques.

OUR SERVICES

- Atomic scale analytics of device structures and related defects causing performance variations
- Analysis of degradation mechanisms and defect types caused by processing and aging
- Metrology, structural and chemical analysis of advanced technologies and devices
- Analysis of process related residual stresses (STEM-NBED) within the device structure
- Detection and assessment of local lattice strain distributions by SEM-EBSD
- High resolution pn-junction analyses on LED structures using SEM-EBIC
- Top-down and through the wafer defect localization (breakdown shorts, leakage paths)
- Determination of channel temperatures and device heating by thermal imaging
- Characterization of interface delaminations using scanning acoustic microscopy (SAM)
- Mechanical testing and finite element modelling to analyze fracture toughness of semiconductor substrates

EQUIPMENT

- Chemical etching and decapsulation
- Local mechanical grinding and CMP tools
- Focused ion beam circuit edit FIB with integrated IR microscope, CAD navigation and trench etching
- Prober module with 4 tips for SEM and FIB and parameter analyzer for electrical characterization
- High resolution Lock-in-Thermography system
- Scanning electron microscopy with elemental analysis by EDS, WDS
- Electron beam absorbed and electron beam induced imaging systems (EBAC, EBIC)
- Electron backscatter diffraction (EBSD)
- Combined FIB/SEM tools for cross sectioning and TEM lamella preparation
- Plasma-FIB tool for large area cross sectioning
- High resolution TEM/STEM microscopes (60-300kV) with image corrector, HAADF, EDS, EELS
- Tof-SIMS, XPS and AFM surface analysis