

# Austrian Centre for Electron Microscopy and Nanoanalysis

## Research

- Nanoanalysis of Materials
- Functional Nanofabrication
- 3D and *in situ* Characterisation
- Soft Matter and Biomicroscopy

## Industry Services

**Expertise and Experience** in providing detailed structural and compositional micro- and nano-analysis: various materials, semiconductor devices, composites, and biomaterials  
**Consultancy** in the field of materials, routine quality control analysis, acquisition of microscopes  
**Access** to other facilities and networks within the research community  
**Collaborative Research & Development Projects**

## In-house Facilities

- Atomic Force Microscopy (AFM)
- Focused Ion Beam Microscopy (FIB)
- Infrared and Raman Microspectrometry
- Scanning Electron Microscopy (SEM)
- Environmental SEM (ESEM)
- Transmission Electron Microscopy (TEM)
- X-ray Diffraction (XRD)
- Advanced Specimen Preparation

## Know-how Transfer

**Training** on in-house instruments for SMEs who wish to upskill their staff  
**Microscopy Courses:** SEM-Course, GIF-School  
**Lectures** at the Graz University of Technology  
**Bachelor, Master and PhD Projects**  
**External Presentations** on conferences and workshops

"Situated in the heart of Graz, Austria's second largest city, FELMI-ZFE has an international reputation for the quality of its research and teaching in electron microscopy and nanoanalysis. Our institute is a leading centre for research, (post)graduate education and services with a continuing tradition of excellence.

For 65 years, we are trying to bridge the gap between academic research and practical problem solving as well as industrial needs. The expertise of our staff and their contributions represent the most significant aspect of the institute fulfilling its task of seeing the invisible."

*Ferdinand Hofer*



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www.tuv.at





**Institute for Electron Microscopy and Nanoanalysis**  
Graz University of Technology

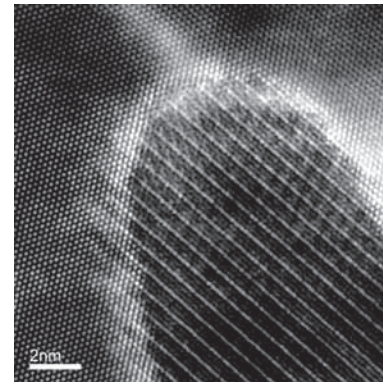
**Graz Centre for Electron Microscopy**  
Association for the Promotion of Electron Microscopy and Fine Structure Research

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# High Resolution Materials Characterisation

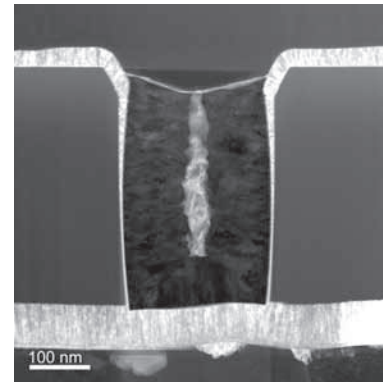
## Microanalysis and Material Surfaces



Steel structure (STEM-HAADF)

- Surface and bulk characterisation of materials via high resolution electron microscopy
- Analytical characterisation via X-ray spectrometry (EDXS/WDXS)
- Crystallographic phase and texture analysis of materials via electron and X-ray diffraction
- High resolution 3D topography of any given material via electron microscopy, atomic force microscopy, Raman microscopy, and optical microscopy

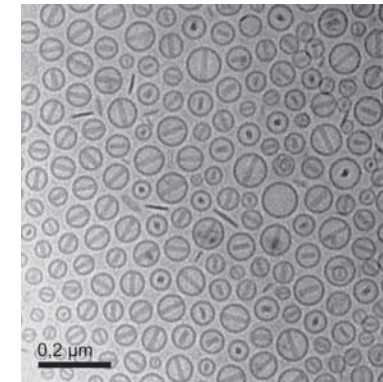
## Semiconductors and Nanostructures



Cross-section through a semiconductor device (STEM-HAADF)

- Analysis of the internal structure of material interfaces in (in)organic semiconductor devices
- Unique expertise in the field of high resolution transmission electron microscopy and spectroscopy (EELS, EDXS) at atomic resolution
- Microscopic modification of electronic devices via focused ion beam processing
- 3D nanoscale analysis via electron tomography

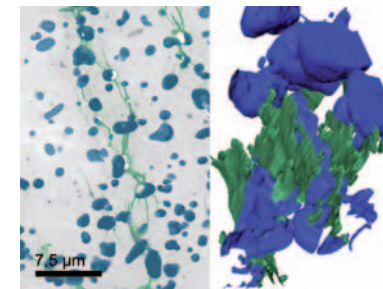
## Biomaterials and Pharmaceutical Products



Liposomes (Cryo-TEM)

- Micro- and nanostructure, chemical composition and 3D structural information of organic materials, composite materials, pharmaceutical products, and biological materials at room and cryo temperatures
- Real time investigation of biological and pharmaceutical processes via high speed AFM in ambient or liquid environments

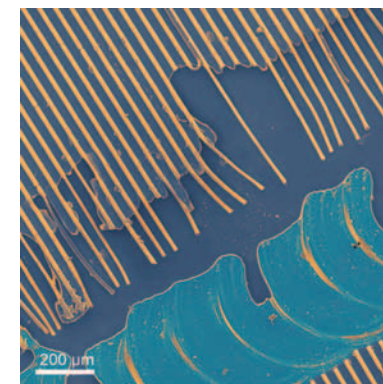
## Polymers and Nanocomposites



3D reconstruction of cracks (green) in polymer after tensile test (SEM-BSE)

- Chemical imaging and phase analysis of organic materials via the pioneering combination of infrared and Raman microspectrometry
- Electron microscopy of polymers, biomaterials and biomedical specimens
- Interface analysis in polymer composites
- Tensile testing of polymers and biomaterials inside scanning electron microscopes

## Defect and Failure Analysis



Weld seam (SEM)

- Metallic and semiconducting materials, structural components, composite materials, and polymers
- Cross-sectional subsurface analysis of materials via FIB
- 3D microscopy of defects via electron tomography
- Leading know-how thanks to proven experience in fracture and failure analysis