



Advanced Microscopy

We can provide high-resolution imaging and help you perform structural analysis, research and development.

Why Eurofins | EAG Laboratories?

Eurofins | EAG Laboratories provides the specialized support and services you need to accelerate time to market, fill equipment and expertise gaps, and manage risk associated with product development.

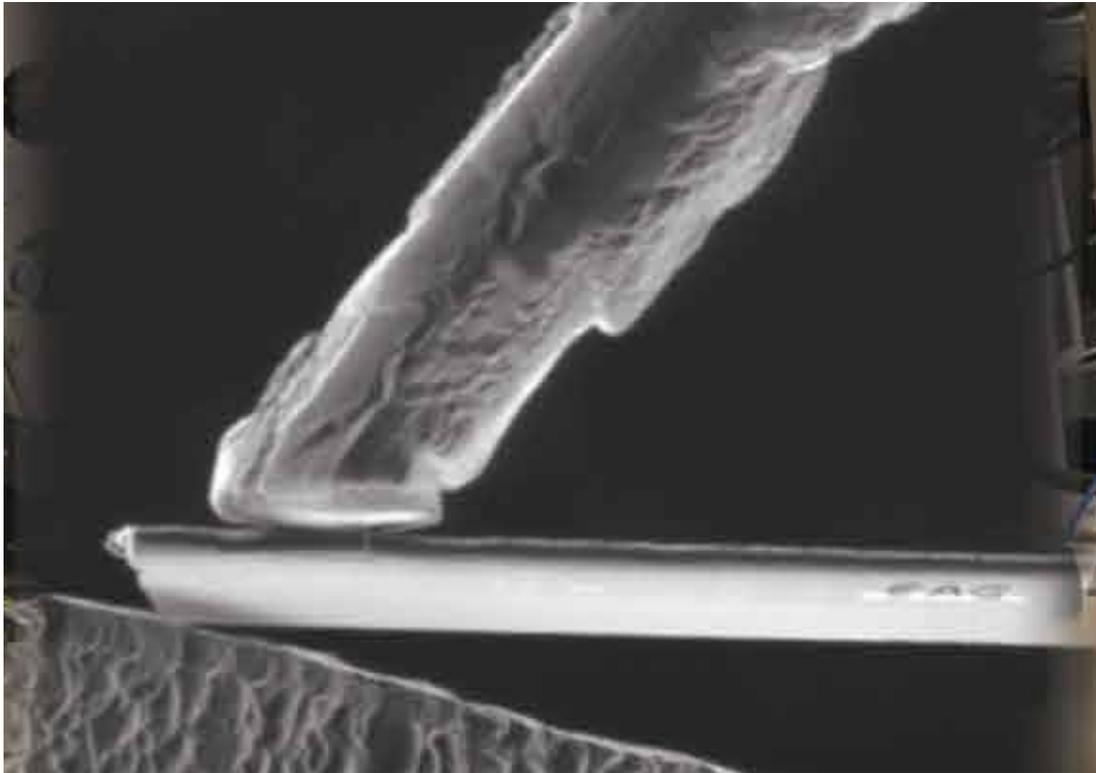
- Sample prep and analysis of wide range of materials
- Expertise in failure analysis with advanced product technologies
- Wide range of instruments and expert staff to handle complex projects
- Quick turn around with accurate analysis and data you can count on

We have a broad range and large installed base of different microscopy tools and services to match your application, ranging from process development to failure analysis. In addition to providing high resolution imaging, our analytical

capability makes us a unique partner that can help you during research, development, and analysis of failures. We can perform structural and cross-sectional analysis, elemental material analysis, and microanalysis with sub-nanometer spatial resolution.

Microscopy techniques include:

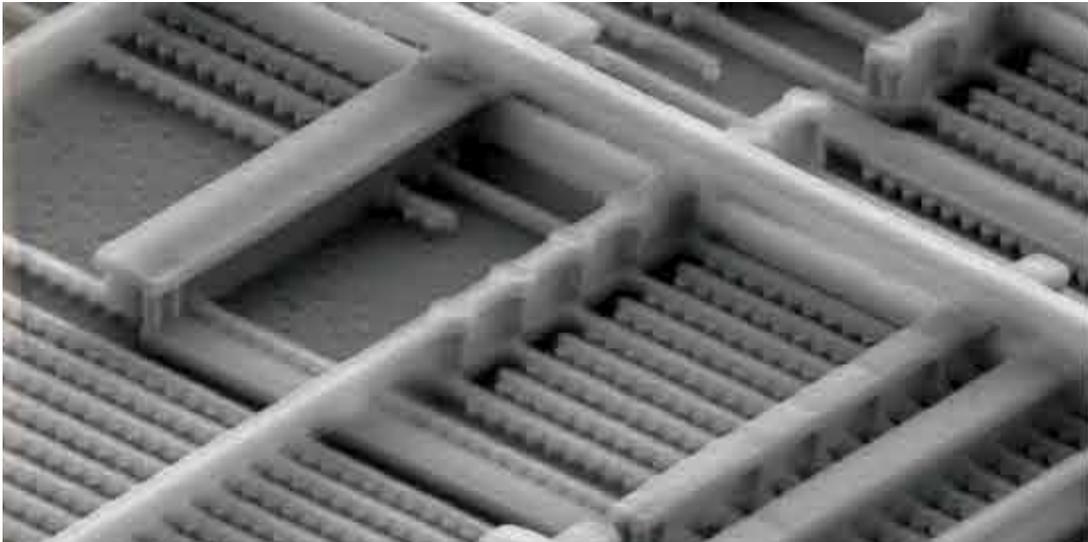
- Field Emission Scanning Electron Microscopy (FESEM)
- Transmission Electron Microscopy (TEM)
- Scanning Transmission Electron Microscopy (STEM)
- Aberration Corrected-STEM
- Dual Beam (FIB/SEM) imaging
- SEM - Energy Dispersive Spectroscopy (EDS)
- TEM - Energy Dispersive Spectroscopy (EDS)
- TEM - Electron Energy Loss Spectroscopy (EELS)



Transmission Electron Microscopy (TEM)

Transmission Electron Microscopy (TEM) and Scanning Transmission Electron Microscopy (STEM) are closely related techniques that use an electron beam to image the internal structure of a sample. High energy electrons, incident on ultra-thin samples allow for image resolutions that are on the order of 2Å. Compared to SEM, TEM and STEM have better spatial resolution and are capable of additional analytical measurements, but require significantly more sample preparation. Although more time consuming than many other common analytical tools, the wealth of information available from TEM and STEM analyses is impressive. Not

only can outstanding image resolution be obtained, it is also possible to characterize crystallographic phase, crystallographic orientation (by diffraction experiments), produce elemental maps (using EDS or EELS), and obtain images that highlight elemental contrast (dark field STEM mode). These can all be done from nm-sized areas that can be precisely located. STEM and TEM are the ultimate failure analysis tools for thin film and IC samples. Eurofins | EAG Laboratories has recently added an Aberration Corrected-STEM instrument to provide the best available image resolution from a commercial independent microscopy service.



Scanning Electron Microscopy (SEM)

Scanning Electron Microscopy (SEM) provides high-resolution and large-depth-of-field images of the sample surface and near-surface. SEM is one of the most widely used analytical tools due to the extremely detailed images it can quickly provide. Coupled to an Energy Dispersive X-ray Spectroscopy (EDS) detector, SEM also offers elemental identification of nearly the entire periodic table.

SEM is used in cases where optical microscopy cannot provide sufficient image resolution or high enough magnification. Applications include failure analysis, dimensional analysis, process characterization, reverse engineering, and particle identification. Our highly skilled staff enables you to meet the desired outcomes. Person-to-person service ensures good communication of the results and their implications. Customers are often present during the analysis, enabling an immediate sharing of data, imaging and information.

Dual Beam FIB (DBFIB)

A Focused Ion Beam (FIB) instrument uses a finely focused ion beam to modify and image the sample of interest. FIB is chiefly used to create very precise cross sections of a sample for subsequent imaging via SEM, STEM or TEM or to perform circuit modification. Additionally FIB imaging can be used to image a sample directly, detecting emitted electrons either from the ion or electron beam. The contrast mechanism for FIB is different than for SEM or S/TEM, so unique structural information can be obtained in some cases. A dual beam FIB/SEM integrates these two techniques into one tool, facilitating “cut and look” studies.

Sample preparation

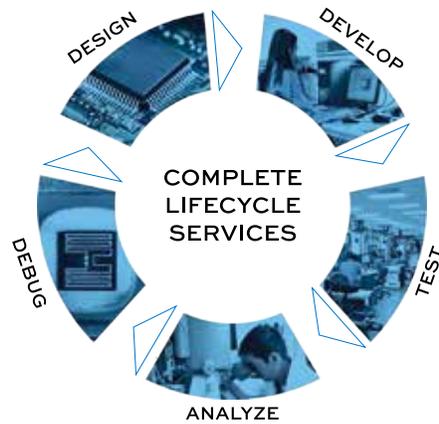
As a sample preparation tool, the FIB can accurately produce cross-sections of a sample that are impossible to create otherwise:

- FIB has revolutionized sample preparation for TEM samples, making it

possible to identify sub-micron features and precisely prepare cross sections.

- FIB-prepared sections are used extensively in SEM microscopy, where the FIB preparation, SEM imaging, and elemental analysis can happen on the same multi-technique tool.
- FIB-prepared sections are also used in Auger Electron Spectroscopy to provide elemental identification of subsurface features quickly and precisely.
- It is an ideal tool for examining products with small, difficult-to-access features, such as those found in the semiconductor industry and for subsurface particle identification.
- It is a good option for products that are hard to cross section, such as soft polymers that are challenging to polish.

Eurofins | EAG Laboratories works with a wide range of materials and regularly assists companies with FIB sample preparations and analyses. No other lab can match our skill set, experience, and fleet of instruments. Plus, you can count on fast turnaround times, accurate data, and person-to-person service, ensuring you understand the information that you receive.



Engineering Sciences

- ATE Test Development and Pilot / Production Test
- Burn-in and Reliability Qualification
- ESD and Latch-up Testing
- Debug and FIB Circuit Edit
- Failure Analysis
- Advanced Microscopy (SEM, TEM, FIB/SEM)
- PCB Design and Hardware

Eurofins | EAG Laboratories delivers comprehensive design, development, test, analysis and debug services that are differentiated by expert engineering capability and comprehensive capital equipment and processes.

