

Scanning Electron Microscopy

- Integrated Chemical Analysis by Energy Dispersive X-ray Spectroscopy
- Crystallography and Orientation Imaging Microscopy by Electron Backscatter Diffraction



applications

- ▶ Failure Analysis
- ▶ Identification of fracture modes and origins - fractography
- ▶ Physical and chemical characterization of surfaces
- ▶ Microstructural Analysis
- ▶ Nanoscience
- ▶ Digital Image Analysis
- ▶ Particle Analysis
- ▶ Litigation Support

To provide even greater analytical capabilities, we added Scanning Electron Microscopy to our accredited selection of analytical and testing services. A scanning electron microscope (SEM) is a powerful microscope that uses electrons rather than light to view objects and surfaces in great detail. The shorter wavelength of electrons permits useful magnifications of up to about 100,000X versus about 2000X for light microscopy. An SEM also provides much greater depth of field than light microscopes, allowing complex, three-dimensional objects to remain sharp, in focus, and revealing details that are not visible using light microscopy.

Our SEM is equipped with a powerful Bruker X Flash 7 energy dispersive X-ray spectrometer (EDS) for measuring the chemical composition of whatever is being examined. It also has a state-of-the-art electron backscatter diffraction (EBSD) system that identifies the crystal structure, crystal orientation, lattice parameters, and a host of other crystallographic information.

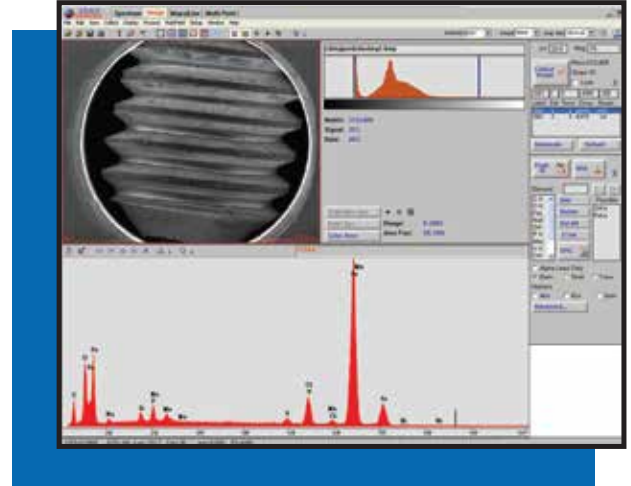
- Large chamber capable of accommodating samples up to approximately 6 inches in diameter and 3.5 inches in height with full X and Y axis travel
- 5 axis (x, y, z, tilt, rotation) motorized stage with 18lb weight capacity, stage can be moved into top corner of chamber to allow extra-large specimens to be placed on chamber floor.
- Secondary, backscattered, and oblique backscattered electron imaging modes
- Accelerating voltages from 5 kV to 30 kV
- 3 nanometers resolution at 30 kV with SE detector
- 2x to 1,000,000x magnification
- Image size up to 16384 x 16384 pixels
- Dual chamber scopes
- Semi-quantitative EDS analysis with elemental mapping capability
- Live remote viewing of your samples from multiple locations via Internet

Energy Dispersive X-ray Spectroscopy System (EDS)

- The EDS system collects elemental analysis information over a range of working distances for samples of varying heights (working distances).
- The EDS system has variable take-off angle compensation to provide more reliable elemental analyses on rough surfaces similar to the analysis of flat surfaces.
- The EDS system has the latest generation of large area detectors which allows for faster data collection and real time elemental mapping.

applications:

- Elemental analysis of deposits, corrosion products, coatings, objects and phases viewed with the SEM
- Graphical display of element distributions throughout your sample
- Detection of all elements except H, He and Li
- Semi-quantitative chemical element analyses
- X-ray mapping
- Line scans
- Phase cluster analysis
- Particle analysis
- Live spectral mapping with complete data recall



Electron Backscatter Diffraction System

The EBSD first captures and records the diffracted electrons. The computer then evaluates the resulting diffraction patterns to provide a myriad of crystallographic information about the sample. EBSD identifies the structure of the crystal, its lattice parameters or size, and its orientation. By combining the crystallographic information from EBSD with the chemical composition information from EDS, phases and crystalline compounds are identified and their distributions and morphologies studied.

applications:

- Orientation imaging microscopy for research level EBSD data collection and analysis
- Crystal structure and orientation
- Metallurgical and geological phase identification and distribution
- Texture analysis
- Crystalline chemical compound identification
- Forward scan electron imaging
- Grain size and shape
- Retained austenite
- Ferrite count
- Inclusion analysis
- Grain boundary and twins analysis
- Carbides and other precipitates analysis
- Plastic deformation analysis

