Aerospace & Advanced Composites GmbH
Viktor-Kaplan-Straße 2
2700 Wiener Neustadt, Österreich
office@aac-research.at
+43 2622 90550-50
+43 2622 90550-99

# Electron Microscopy (SEM)

Two high-resolution electron microscopes (SEMs) are available to perform high-quality investigations. Unique field emission columns have been developed for applications in the field of modern material science and technology and offer outstanding options for characterisation of complex structures down to nano-scale.

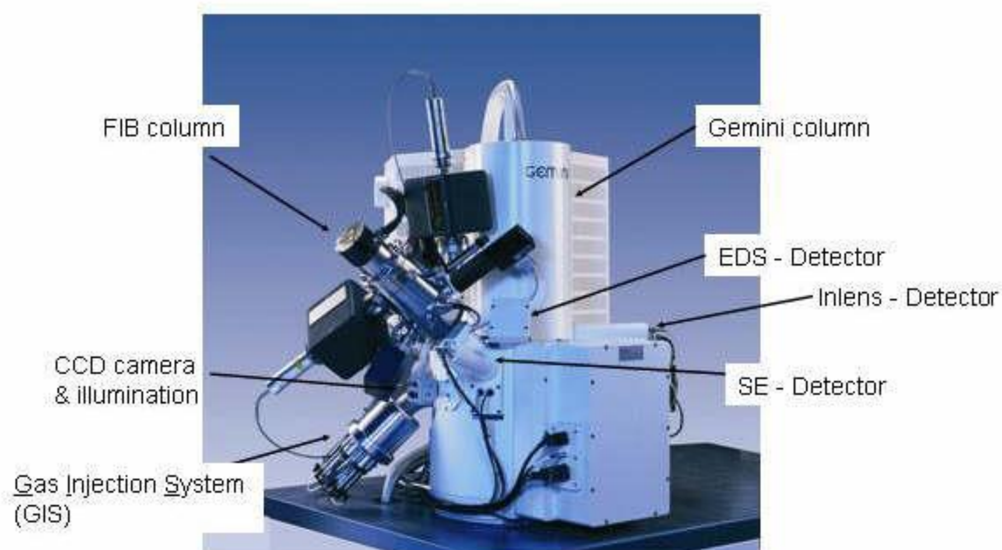


*Figure 1: System configuration*

## Key features:

- Ultra-high resolution Field emission column allowing excellent contrast imaging:
  - high voltage: 1,0 nm resolution at 15 kV
  - low voltage: 1,7 nm resolution at 1 kV
  - ultra-low voltage: 4.0 nm resolution at 0,1 kV
- Equipped with EDS– Detector system to assess chemical compositions (see separate pdf file)
- Wide range of magnification - 12 – 980 000x
- Variable pressure - mode (VP) allows examination of non-conducting specimens without preparation. Pressure adjustable between 2 – 133 Pa, in steps of 1 Pa
- High current mode for analytical applications e.g., EDS or EBSD (4pA – 10 nA)

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- In-lens detector to achieve high image quality especially at low beam voltages
- Backscattered detector (QBSD) for enhanced material contrast (Z-contrast)
- Large specimen chamber allows investigation of large samples
- Fully motorized, 5-axes eucentric specimen stage gives flexibility to handle complexly shaped specimens and offers the possibility to relocate marked areas.
- CCD chamber camera for safe specimen handling and navigation
- High performance FIB column (Ga2+ ion beam source)
    - CrossBeam-operation: high resolution live imaging during FIB-milling
    - Endpoint detection for automated milling
    - Multi-channel gas injection system (GIS) for 5 different gases allows material deposition and enhanced or selective etching

  → see separate pdf-file for more details
- Heating/cooling-device allowing a sample temperature from -150 to +350°C.

## Examples:

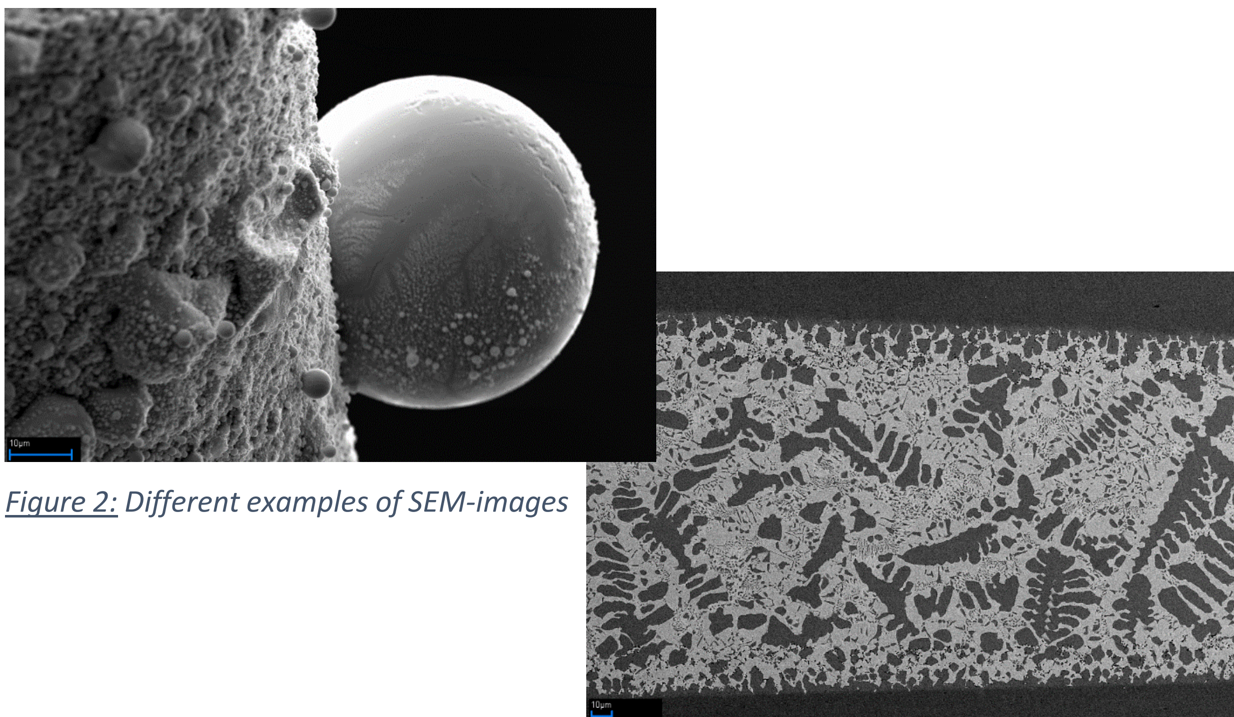

*Figure 2: Different examples of SEM-images*