

HAADF Annular SEM STEM detector

Applications:

- Characterisation of nano-structured materials
- Inorganic and organic samples
- Crystalline and amorphous materials
- Semiconductors, metal oxide catalysts, crystal structure

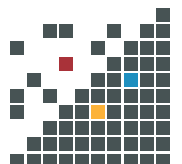
Features:

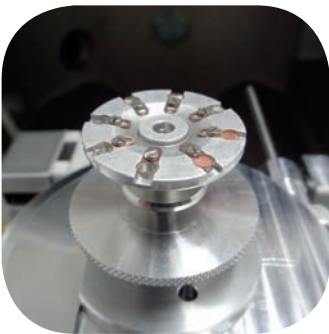
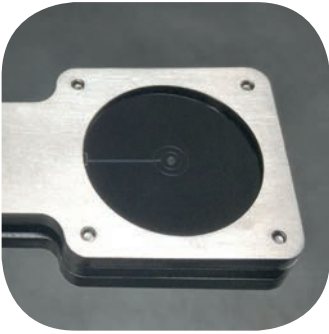
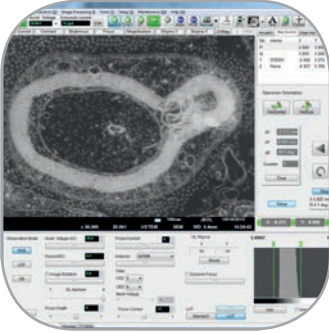
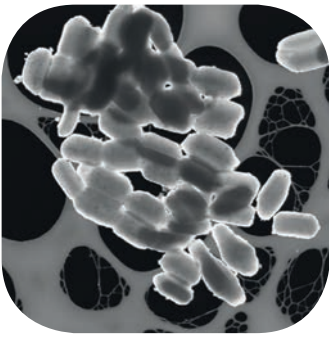
- Low kV operation (1kV to 30kV)
- Bright field, LAADF, MAADF & HAADF detector segments
- Three simultaneous video outputs, eg. LAADF, MAADF & HAADF
- Resolution close to that of the SEM (in SE mode)
- 12 position 3.05mm grid holder
- High speed TV rate imaging
- Motorised insertion & retraction
- PC controlled with USB interface

High Angle Annular Dark Field (HAADF) Scanning Transmission Electron Microscopy (STEM) is a very powerful technique to provide direct information on a local chemistry of nano-materials at atomic scale. Using the retrofit Deben Annular STEM, SEM users can acquire HAADF transmitted electron images for a fraction of the cost of a dedicated Transmission Electron Microscope (TEM) with HAADF detector fitted.

With HAADF imaging the inner angle of the annular darkfield detector is made large enough that no Bragg diffracted electrons are collected. Resultant images come from elastically scattered electrons which have passed very close to the atomic nuclei of the sample. High resolution is possible with no unwanted diffraction contrast which can mask structural information. The HAADF signal is directly proportional to the density and thickness of the specimen and proportional to $Z^3/2$ where Z is the atomic number. Therefore it is possible to produce images which show contrast due to the mass-thickness (ie. the signal is proportional to the number of atoms) or Z contrast images (where the signal is proportional to the atomic number of the sample).

STEM on a conventional SEM is a useful tool for biological and materials applications. However with a Deben Annular STEM on a FE-SEM images comparable to a dedicated TEM are easily obtainable without the need for advanced experience in TEM or the large budget for such high-end equipment. The STEM detector is designed so that the specimen and area of interest are quickly found. Alignment follows normal SEM operation routines and the operator can also easily switch between STEM and SEM mode with just a click of the mouse. Operating with small beam currents between 1kV and 30kV minimises damage to delicate samples, allowing stable slow scans and time to collect images with a high pixel density.





The Deben Annular STEM detector is configured with three independent annular dark field rings; high angle, medium angle and low angle, along with a single bright field channel via 150µm aperture.

Advantages of using the Deben Annular STEM are; higher spatial resolution than bulk sample imaging, greater contrast of low-Z materials and a more gentle investigation of sensitive or thin materials than higher kV TEMs. Other benefits include reduced effects from contamination, less charging, and minimised beam damage.

3.05mm TEM specimen grids are easily mounted to the 12 position grid holder. Any combination of bright and dark field diodes (including reversed polarity) may be selected for processing.

Image acquisition is via a microprocessor controlled amplifier providing an unrivalled scope of adjustment and optimisation. High quality images can easily be acquired and fed back into the SEM video system via the SEM auxiliary video input for viewing, further processing and saving.

Motorised insertion & retraction is supplied as standard, allowing keypad and PC positioning control. Alignment of the detector position is better than 20µm.

Software can be installed on the SEM or a standalone computer, acquisition parameters can be set to automatic or manual, providing ease of use for novice or expert microscopists.

Outline Specifications

- Retractable mounting mechanics including feed-through flanges and mounting adaptors to suit most SEMs
- Motorised insertion and retraction
- 12 position 3.05mm grid holder with mountings to suit SEM stage
- 4 input channels; three dark field and one bright field
- Auxiliary video input is required on SEM for image display and saving
- 150µm bright field aperture
- 8,000,000:1 total gain range, auto control system with imaging to TV rate
- Gen5 microprocessor controlled amplifier system with all cables and manuals
- PC software for USB system control
- Three simultaneous analogue video outputs
- Easy to use software control interface compatible with Windows™ XP/7.0, 32/64bit
- Operating voltage 115V or 230V, fully CE and RoHS compliant

Options

- Bellows sealing

