

EVO® MA and LS STEM Detection System

Introduction

The information limit for the EVO® MA and LS SEMs can be further extended to by using the EVO® STEM (Scanning Transmission Electron Microscopy) detector. High resolution STEM imaging is now readily attainable and can save valuable processing time on TEM systems. The resolving power of the EVO® STEM enables high sample throughput for quality assurance applications and routine type measurements. Compared to conventional TEM images, those obtained by the EVO® STEM show improved resolution and enhanced contrast. This is due to significantly lower electron beam energies used in the SEM which result in reduced excited volume and increased cross sections at lower accelerating voltages. Moreover, the small-excited volume in thin sections results in dramatic improvement of resolution for EDS analysis, enabling nano particle analysis.

Typical application fields are:

Materials analysis (polymer, ceramics, nano particles)

Life sciences (histology, pathology)

Instrumentation

Various types of STEM detectors have been available from several manufacturers, but operation has not always been straight forward. The EVO® STEM unit has therefore been designed as a cost effective compact unit containing both the specimen and the detector. The module is easy to install on a specimen holder for standard specimen stubs, and provides imaging performance using existing electronics of the 4 quadrant BSE detector system. The STEM unit consists of a diode electron detector positioned under an electron transparent thin specimen in a pre-aligned holder which fits directly on the specimen stage. The EVO® STEM unit enables positioning of the thin

specimen close to the objective lens which improves resolution. The collected signals are equivalent to bright field imaging. Using EVO® MA and LS series microscopes in the variable pressure mode enables the possibility to explore the nanostructure of non-conducting specimens. The STEM detector can easily be connected to an existing pull-push, swing, or lens mounted 4 Quadrant Backscattered Detector (4QBSD) electronics. Following Carl Zeiss NTS's philosophy to protect our customers investments, the EVO® STEM unit is compatible with the installed base of EVO® series and previous 1400 series microscopes equipped with a 4QBSD.

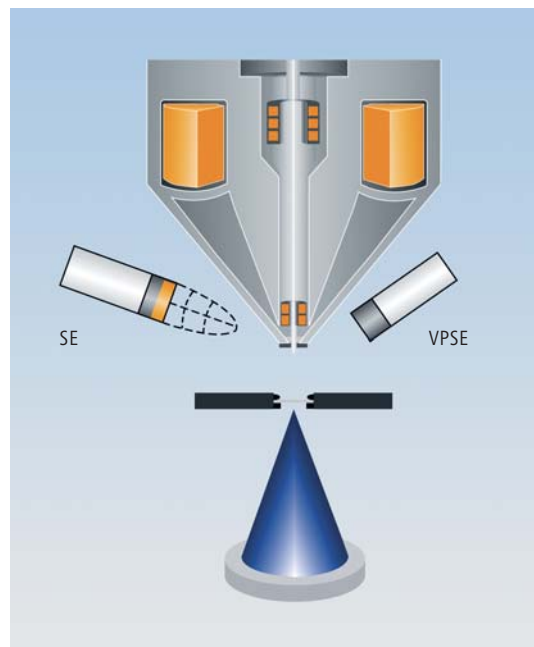


Fig. 1: EVO® detector positioning.
Showing ET, VPSE and STEM detectors



We make it visible.

Fig.2:
Several STEM polymer
samples held in a
standard TEM grid

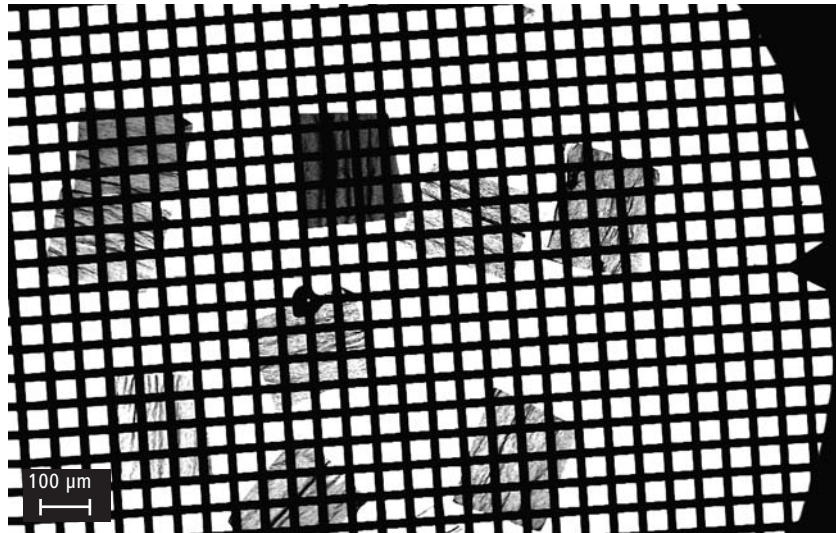


Fig. 3:
Natural rubber (25 kV)

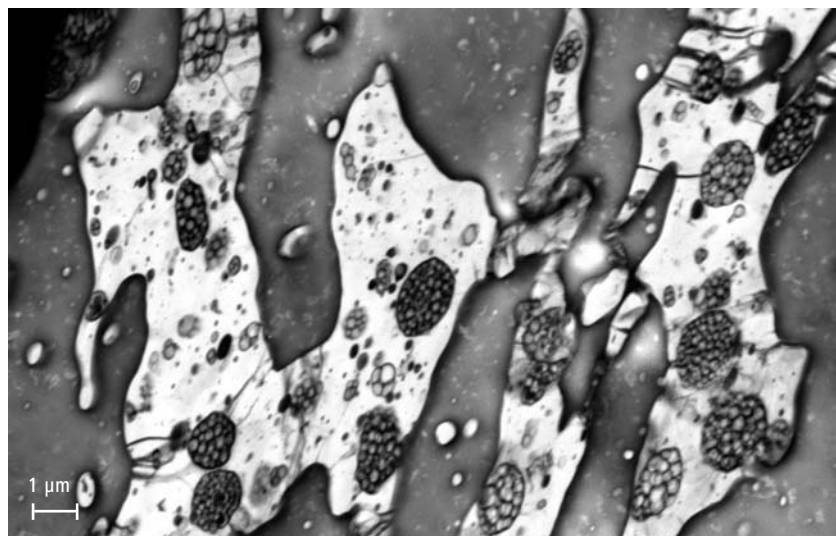
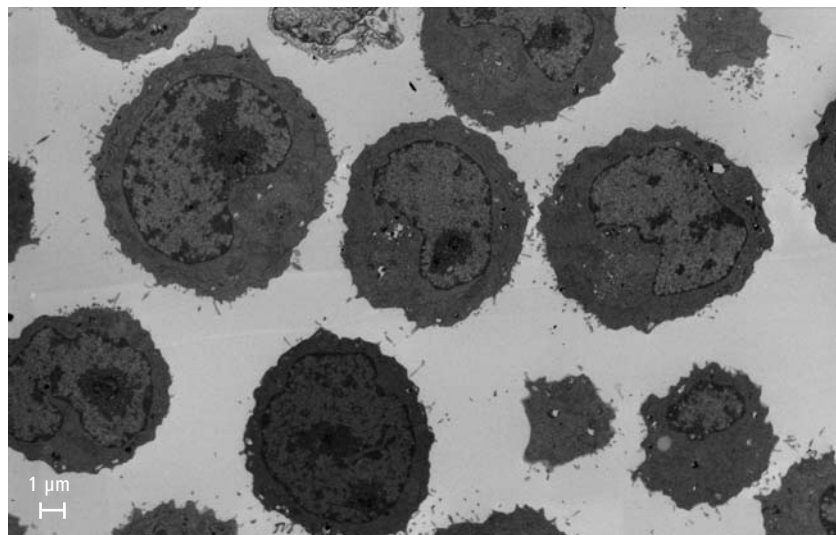


Fig. 4:
Thin section of HeLa cells
(25 kV)



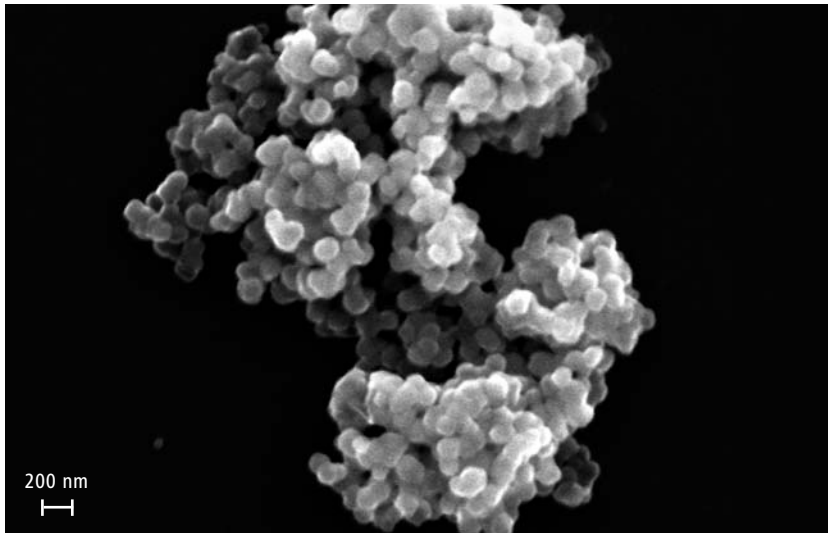


Fig. 5:
TiO₂ particles

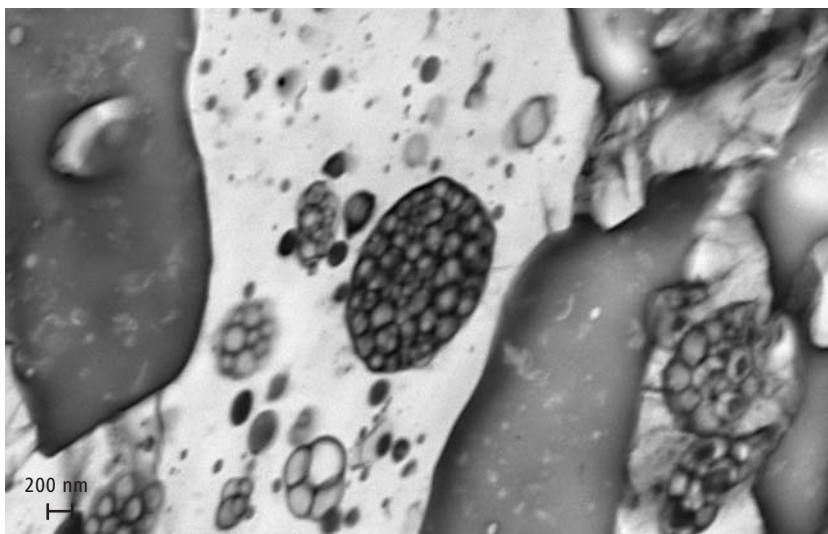


Fig. 6:
Natural rubber (25 kV)

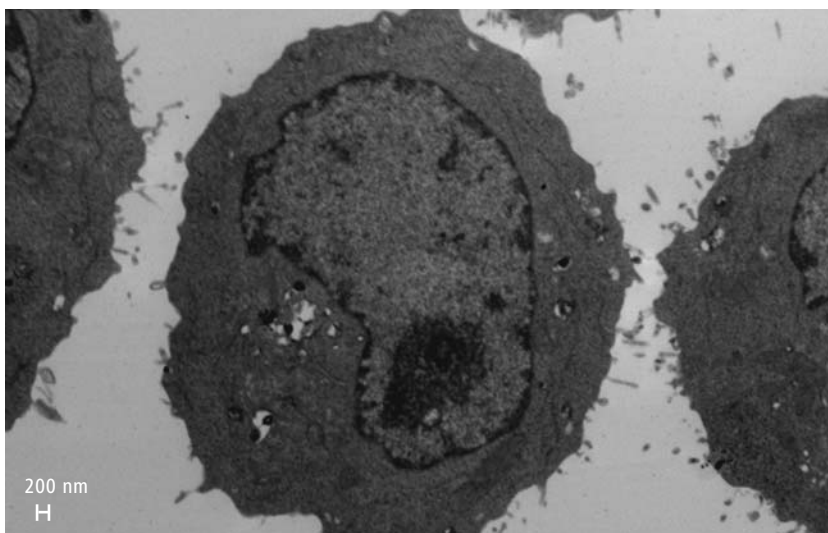


Fig. 7:
Thin section of HeLa cells
(25 kV)

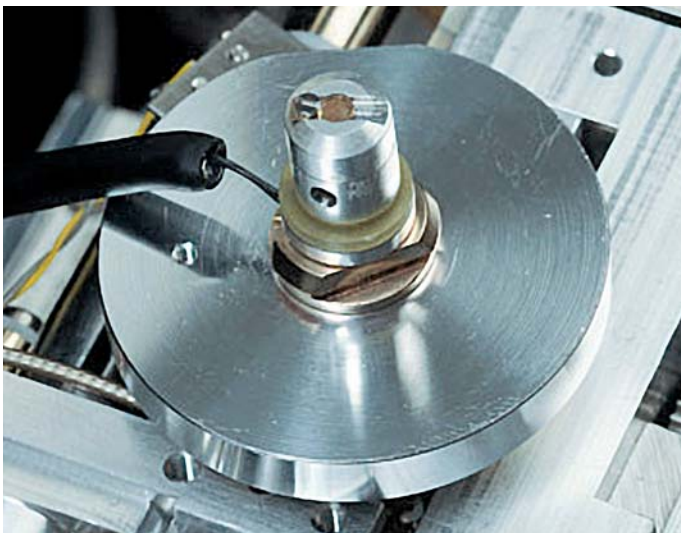


Fig. 8: EVO® STEM holder on cartesian stage

Maximum Information – Maximum Insight

More than 160 years of experience in optics has laid the foundation for pioneering electron and ion beam microscopes from Carl Zeiss. Superior integration of imaging and analytical capabilities provides information beyond resolution, unlocking the best kept secrets of your sample.

With a broad technology portfolio Carl Zeiss provides instruments both tailored to your requirements and adaptable to your evolving needs. With our highly versatile application solutions we endeavor to be your partner of choice.

Superbly equipped, regional demo centers provide you with access to our applications expertise developed in collaboration with world-class partners in industry and academia. Global customer support is provided by the Carl Zeiss Group together with an extensive network of authorized dealers.

Our mission at all times: Maximum Information – Maximum Insight.

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