

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 SMT'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.

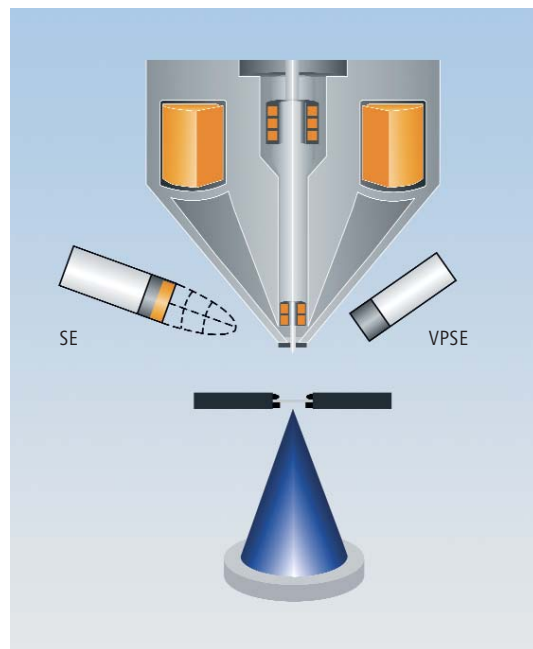


Fig. 1: EVO® detector positioning.
Showing ET, VPSE and STEM detectors

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

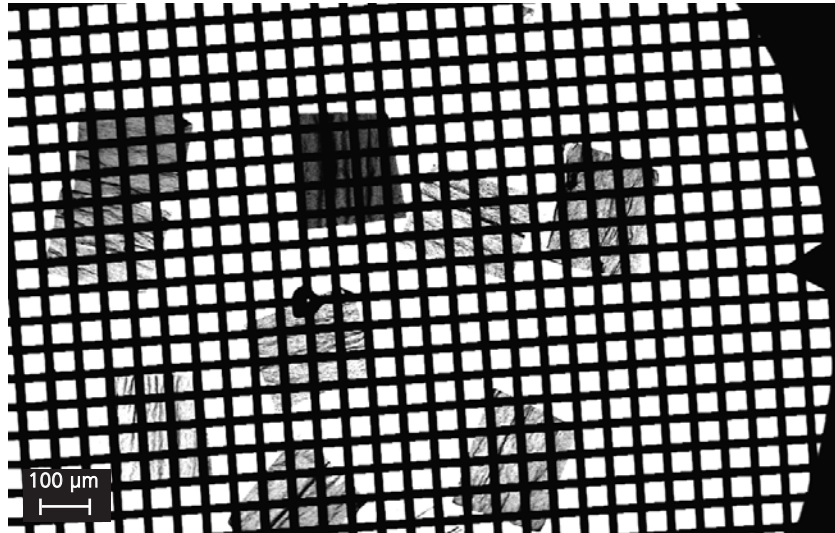


Fig. 3:
Natural rubber (25 kV)

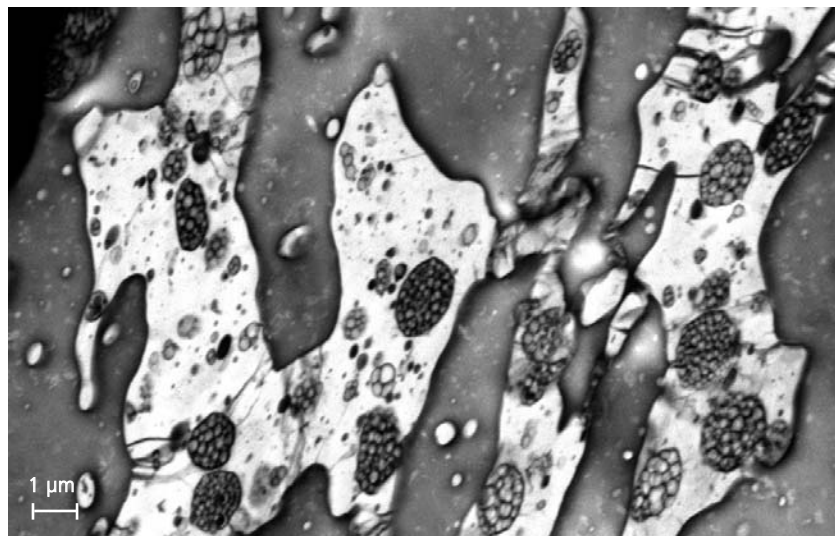
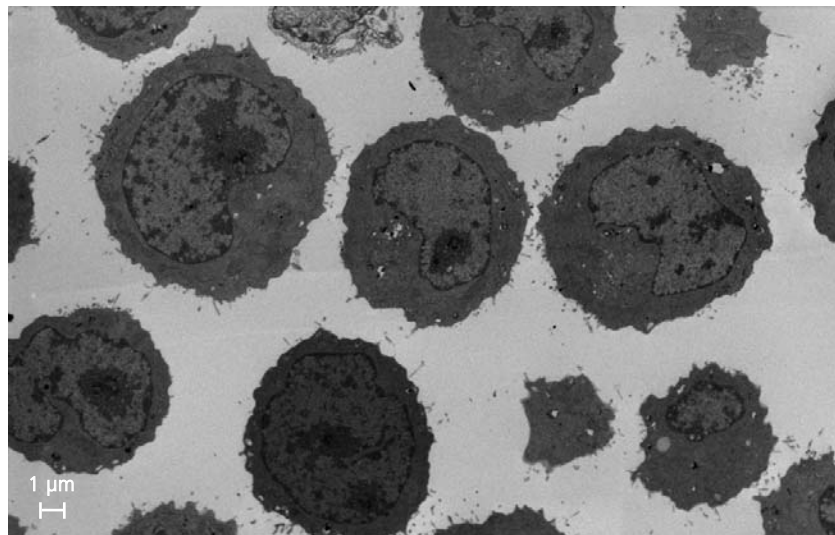


Fig. 4:
Thin section of Hela cells
(25 kV)



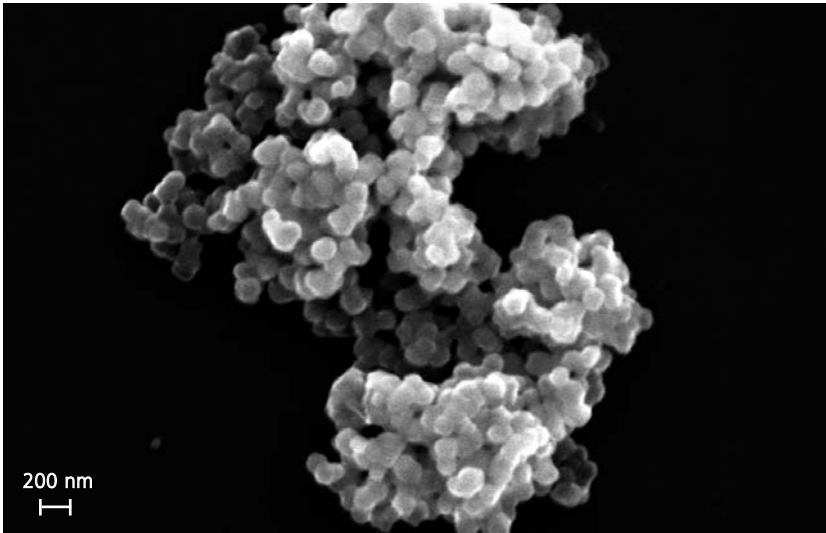


Fig. 5:
TiO₂ particles

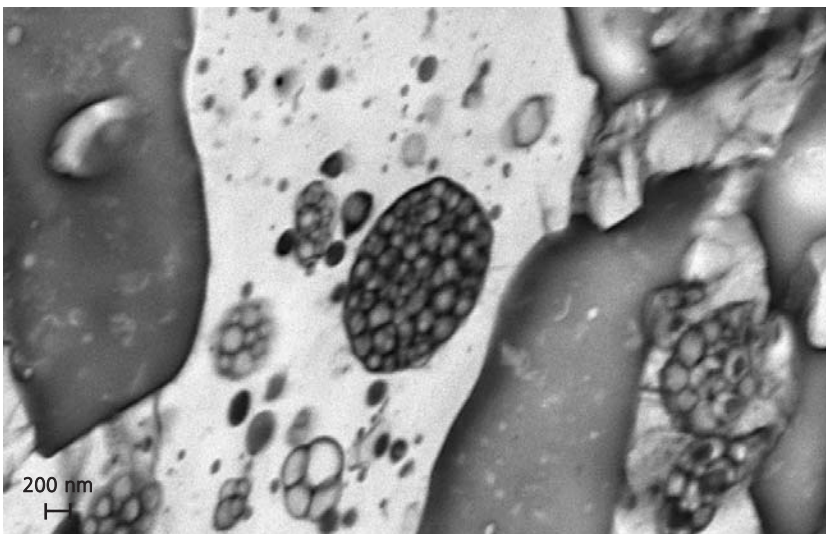


Fig. 6:
Natural rubber (25 kV)

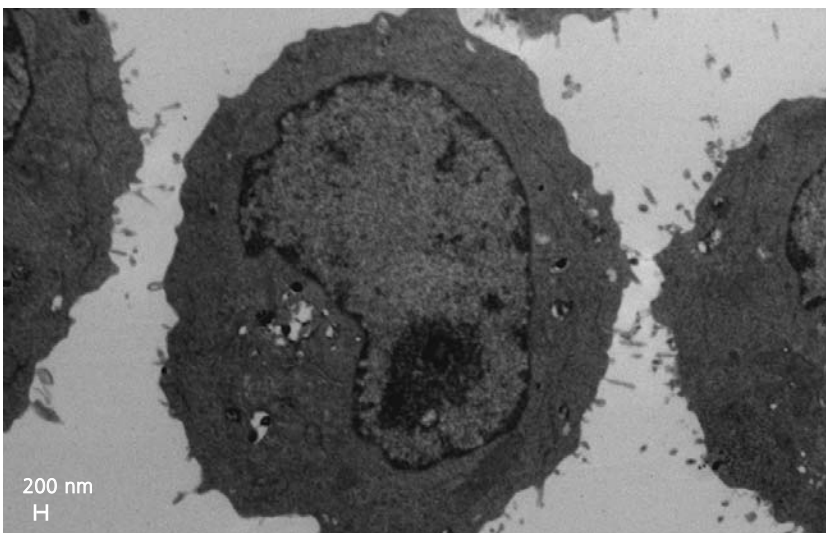


Fig. 7:
*Thin section of HeLa cells
(25 kV)*

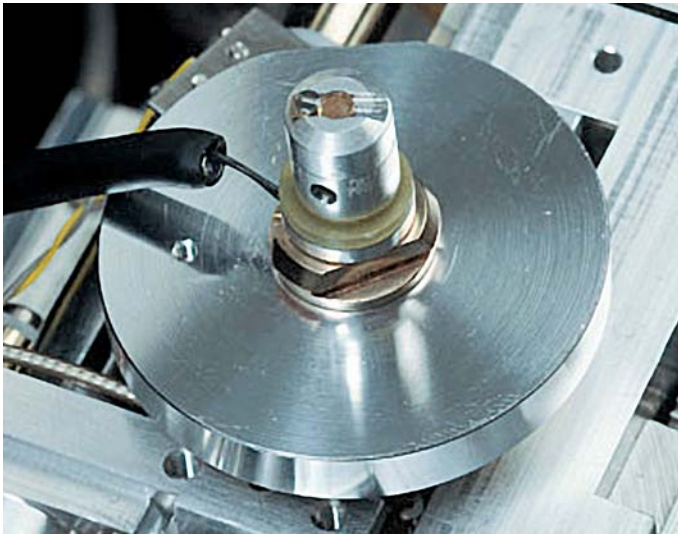


Fig. 8: EVO® STEM holder on cartesian stage



Global Solution Provider

The Nano Technology Systems Division of Carl Zeiss SMT provides its customers with complete solutions featuring the latest leading-edge EM technology. The company's extensive know-how, meticulously acquired over 60 years in the field of e-beam technology, has brought many pioneering innovations to the market. Our global applications and service network ensure fast, reliable and high quality support sharply focused on customer requirements. Combined with dedicated upgrade strategies, this will protect your investment for its entire lifetime. The core technology embedded in our innovative products enables us to provide solutions which add value to our customers' businesses.

Customer feedback is always welcomed and gathered by collecting valuable information at trade shows, in workshops, in user meetings and upon instrument installation. The Division's business services also include outstanding support from sales consultancy to technical service options even when the warranty has expired.

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