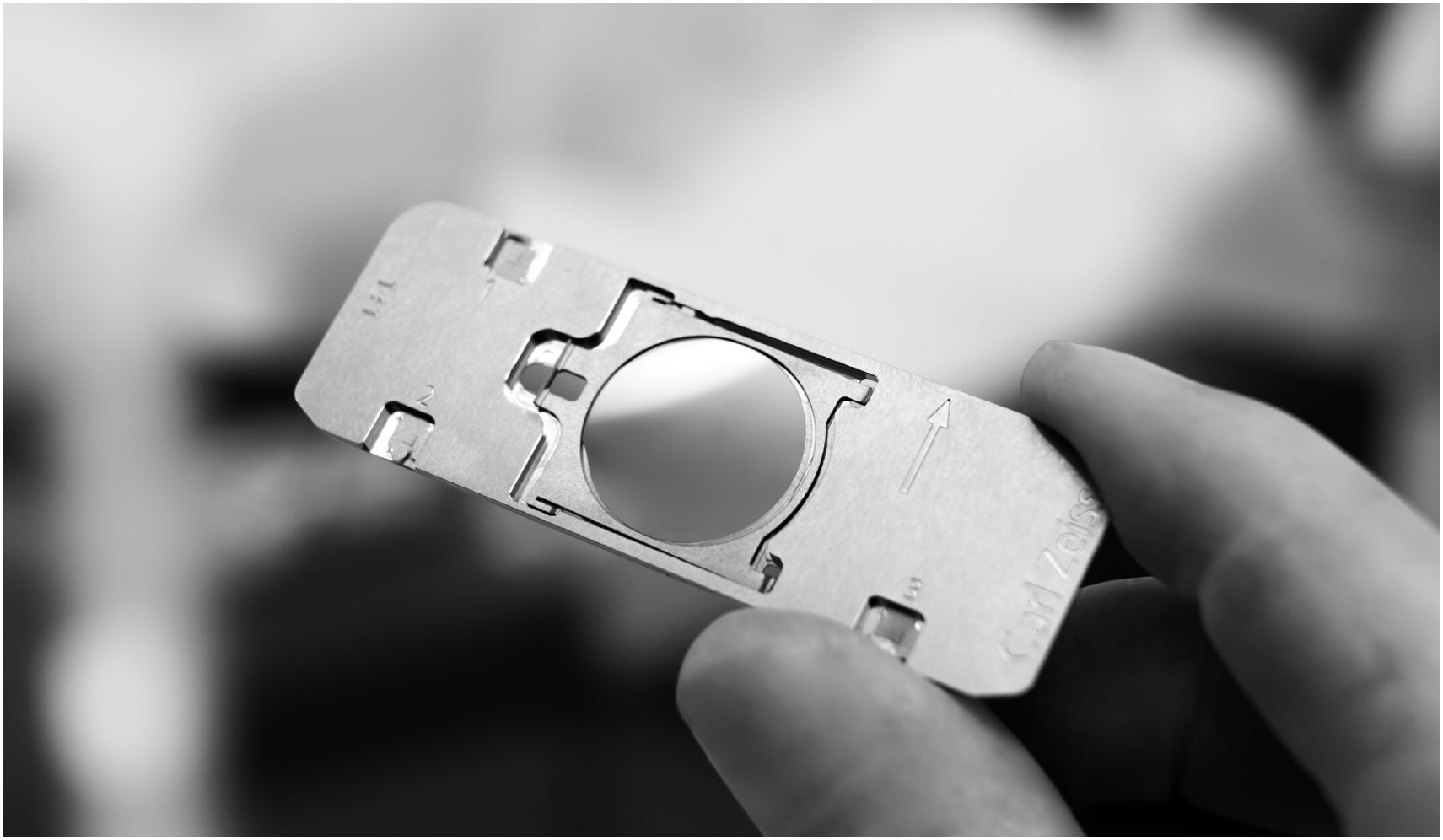


Product Information
Version 1.0

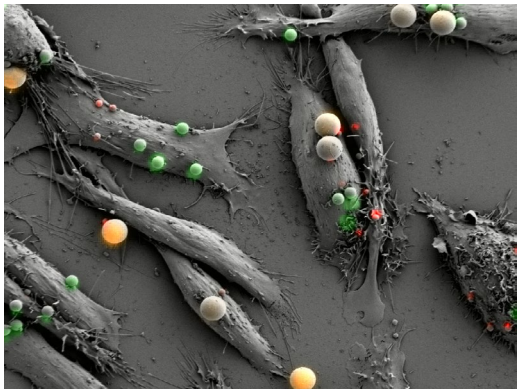
Shuttle & Find for ZEN Imaging Software

Speed Up Your Correlative Workflow

We make it visible.

Bring Your Light and Electron Microscopes Together

Now you can link functional data from light microscopy with information about the ultrastructural context revealed by electron microscopy. Exploit the full potential of each system and enjoy maximum flexibility between the two techniques. Shuttle & Find is the correlative interface that makes this happen. Fully integrated into ZEN imaging software, it controls all required functions of both the light and electron microscopes, enabling you to achieve an easy and intuitive workflow from instrument to instrument. Capture more information in less time. Use Shuttle & Find to connect your laser scanning microscope such as LSM 780 or superresolution system such as ELYRA PS.1 to your scanning electron microscope. By combining light and electron microscopy, you will release the full power of both – and more.



Macrophages feeding on fluorescent beads

Shuttle & Find: Modular. Flexible. Overarching.

Take the Modular Approach to Full Flexibility

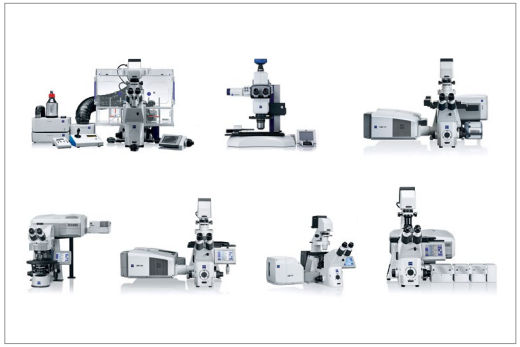
Widefield, laser scanning or superresolution: now you can combine your advanced imaging techniques with your scanning electron microscope. Choose from the ZEISS portfolio to build flexible systems tailored to your applications.

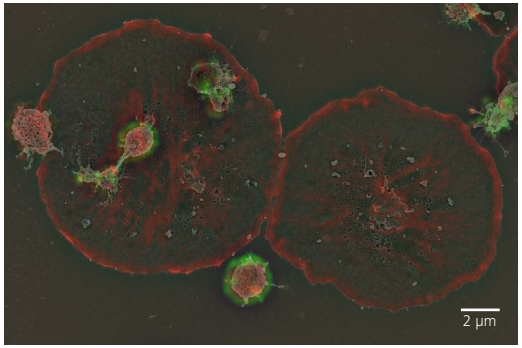
More Information with High Resolution

Use Shuttle & Find to correlate superresolution images with data from your scanning electron microscope. With superresolution methods you improve the localization of details beyond the diffraction limit, enabling you to locate cellular components with greater precision. Gain additional information by correlation with ultrastructural data from electron microscopy.

Fully Integrated in ZEN

Shuttle & Find is an integrated module within ZEN imaging software. Use this powerful and user-friendly package for your correlative applications. You control all necessary functions of your light and electron microscopes and benefit from a smooth workflow spanning the different imaging platforms.

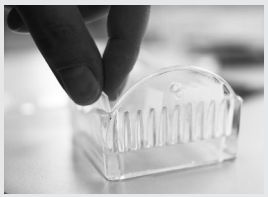




Correlative image of a multi color SIM and SEM image of human platelets. (red: actin filaments, green: cellular platelet protein) Courtesy of D. Woulfe, K. Czymmek and J. Caplan, University of Delaware

Your Insight into the Technology Behind It

Your Correlative Workflow

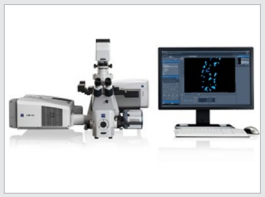


Sample Preparation

- Fixation
- Embedding
- Labeling

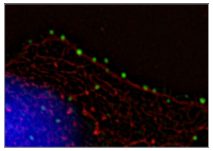
Mounting into Correlative Holder

- Specimen holder for TEM grids
- Specimen holder for cover glasses
- Or use any holder with 3 calibration markers



Light Microscopy

- Widefield
- LSM
- Superresolution

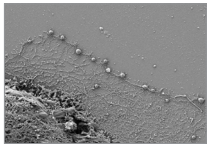


Sample Transfer

- Optional: Sample preparation

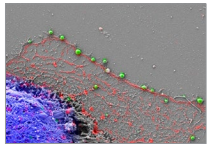
Electron Microscopy

- SEM
- FIB-SEM



Evaluation & Analysis

- Correlation
- Image processing



Expand Your Possibilities

Get One-Stop Service

Profit from application support and full service from ZEISS, the sole provider of both light and electron microscopes.

Accept No Compromise

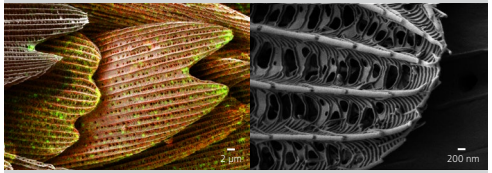
Use the modular concept to combine your light and electron microscope and get the best of both worlds.

Shuttle & Find for Life Sciences

Enabling Productivity in Correlative Microscopy

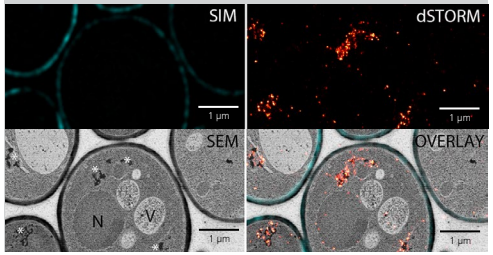
Zoom in from Micro to Nano

Visualize your sample from widefield, confocal or superresolution to finest ultrastructural details.



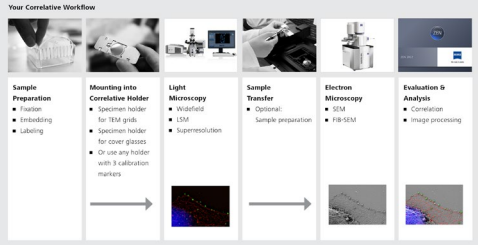
Simply Get More Information

Correlate the functional and ultrastructural information of your sample.



Speed up Your Workflow

Ask your ZEISS contact about a field upgrade of your systems and profit from the fast retrieval of your Regions of Interest.

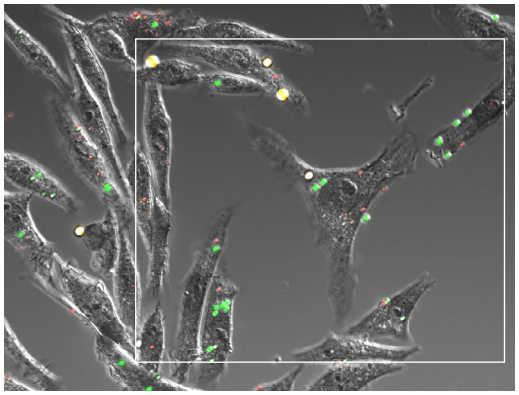


Your Insight into the Technology Behind It

Fast Calibration
Define any holder you like or simply mount your sample in the Shuttle & Find holder, using ZEN to perform a 3-point calibration. Now you are ready to investigate your sample and capture image data. Then transfer your sample along with the holder into the scanning electron microscope.

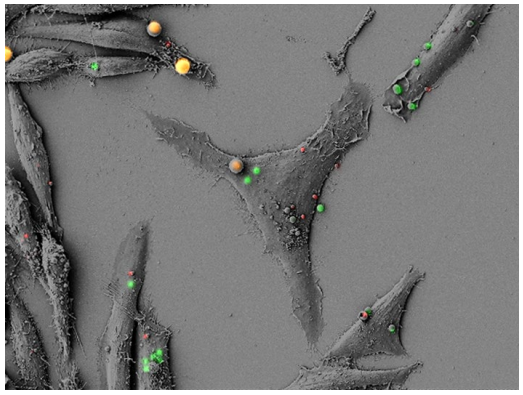
Easy Relocation
Perform the same fast calibration in your electron microscope. Open the images from your light microscope. Then, with the click of a button, relocate the corresponding positions: you do not waste time with tedious searching.

Precise Correlation
Generate correlative overlay images with the help of Shuttle & Find's built-in functions for superimposing data from your light and electron microscopes. You can combine both functional and structural information by correlating fluorescence images from widefield, laser scanning or superresolution microscopes with data from your electron microscope.



a) Overview image from the light microscope with one marked region of interest, overlay image of DIC image and fluorescence image with 3 channels

b) SEM image from the region of interest marked in Fig.a



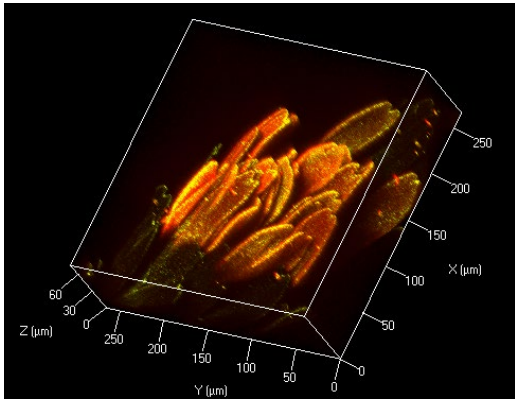
c) Overlay of fluorescence and scanning electron microscope images from the region of interest

Tailored Precisely to Your Applications

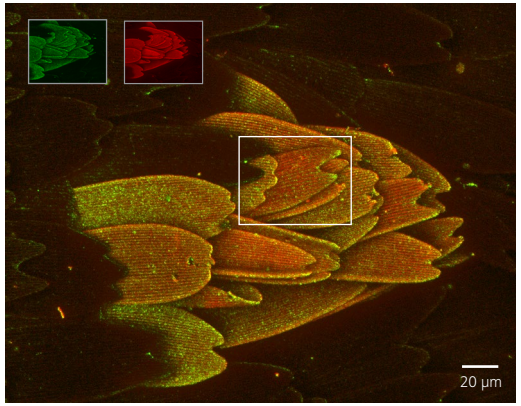
Correlation of a Butterfly Wing's Optical and Structural Characteristics

What is the structural background for different optical properties of butterfly scales? A tough question – without correlative microscopy. Use a laser scanning microscope to detect different fluorescent and reflective areas of the scales. Collect a stack of optical slices and calculate a three-dimensional reconstruction. Then use your scanning electron microscope to complement this information by resolving the fine structure of the scales. After correlating both sets of information you will be able to correctly assign optical properties of the scales (reflecting structures [green] and auto-fluorescence [red]) to ultrastructural features.

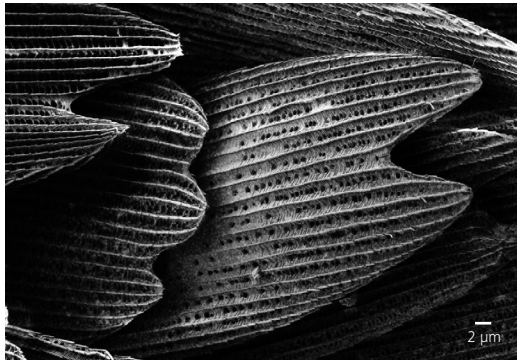
Butterfly wing of the Squinting Bush Brown butterfly, *Bicyclus anynana*.



3D reconstruction of LSM Z-stack showing reflection (green) and auto fluorescence (red)



Maximum intensity projection of the Z-stack



Magnified SEM image of section marked in the maximum intensity projection

Overlay image. Only parts of the scales show auto-fluorescence. Images were taken with LSM 780 and AURIGA 60

Courtesy of Kathleen L. Prudic, Department of Ecology and Evolutionary Biology, Yale University, Kirk J. Czymmek and Jeffrey L. Caplan, Delaware Biotechnology Institute, University of Delaware

Tailored Precisely to Your Applications

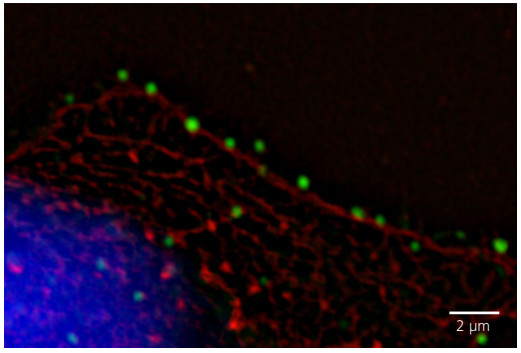
Examination of Cellular Processes using Structured Illumination and Scanning Electron Microscopy

Only fluorescence microscopy techniques can detect cellular components that have been labeled with fluorescence markers. Superresolution structured illumination microscopy (SR-SIM) will improve resolution while scanning electron microscopy (SEM) is used to image the topography of your sample. Combining SR-SIM with SEM offers you the ability to assign precise fluorescent signals to sub-cellular structures.

Visualization of Endocytosis

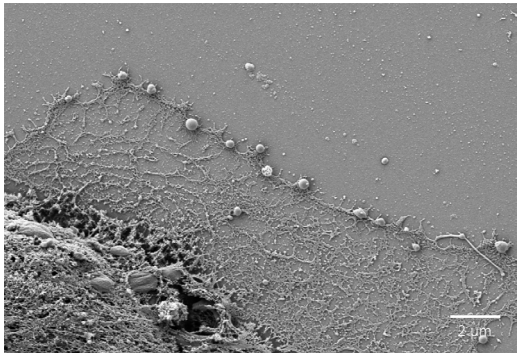
Macrophages were incubated in a culture medium containing Bodipy-488 labeled dextran for 5 minutes (green). The cells were fixed and actin filaments were stained with Bodipy-561-Phalloidin (red). DAPI (blue) was used to stain the nucleus. The actin network with attached endosomes was made visible by extracting the cell membrane. The correlative overlay of both images shows dextran in endosomal vesicles that move along actin filaments, confirming the participation of actin filaments in endocytosis.

Investigation of Endocytosis

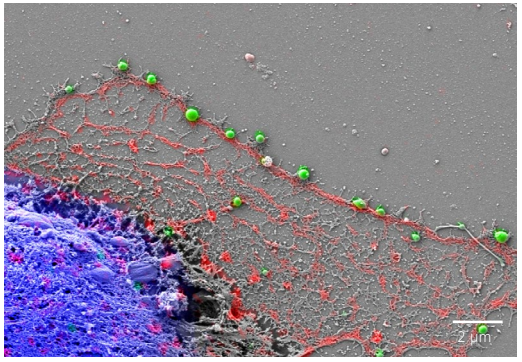


Overlay of a widefield and SIM image (red: actin, green: endosomes, blue: nucleus)

Images were taken with ELYRA PS.1 and AURIGA 60
Courtesy of Kirk J. Czymmek and Jeffrey L. Caplan, Delaware Biotechnology Institute, University of Delaware



SEM image



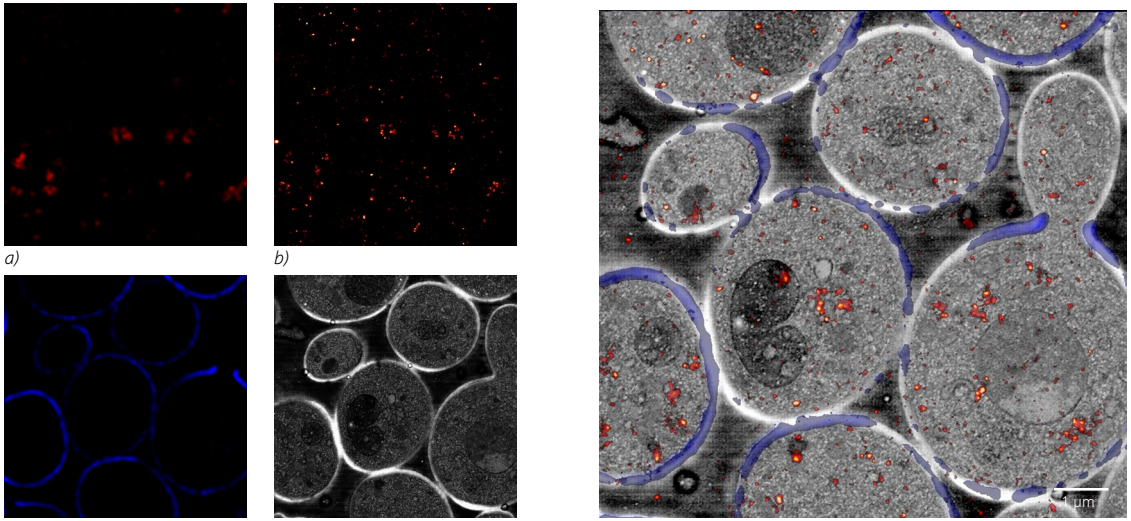
Correlative overlay image

Tailored Precisely to Your Applications

Localization of Proteins in Yeast Cells with Correlative Microscopy

Superresolution methods such as PALM or dSTORM achieve resolutions down to 20 nm. This enables precise localization of proteins in their cellular environment, especially when combined with ultrastructural information captured by scanning electron microscopes. The example shows ultrathin sections of yeast cells that express a recombinant G-protein coupled receptor (red). The cell walls were stained with Calcofluor (blue). The SEM images were taken with the ESB (energy selective backscattered) detector. A black-white inversion causes their TEM-like appearance. After superimposing all acquired images, the protein can be assigned to specific cell compartments of the endocytotic pathway within the yeast cells. Given the small size of yeast cells, you will only get results of this type by combining superresolution methods with the resolving power of electron microscopy.

Ultrathin sections of yeast cells



a) *b)* *c)* *d)* *e)*

SIM image (a) and dSTORM image (b) showing a G-protein coupled receptor (red); c) SIM image of yeast cell walls (Calcofluor); d) SEM image; e) Overlay image of the SIM image shown in c) the dSTORM image and the SEM image. The G-protein coupled receptor is mainly localized to electron dense cisternal compartments. Courtesy of Kirk J. Czymmek and Jeffrey L. Caplan, Delaware Biotechnology Institute, University of Delaware

Your Flexible Choice of Components

1 Microscopes

Light Microscopes

- Stemi 2000
- SteREO Discovery
- Axio Zoom.V16
- Axio Scope.A1
- Axio Imager
- Axio Examiner
- Axio Observer
- LSM 7 series
- ELYRA series

Electron Microscopes

- EVO
- ULTRA
- SUPRA
- SIGMA
- MERLIN Compact
- MERLIN
- AURIGA Compact
- AURIGA

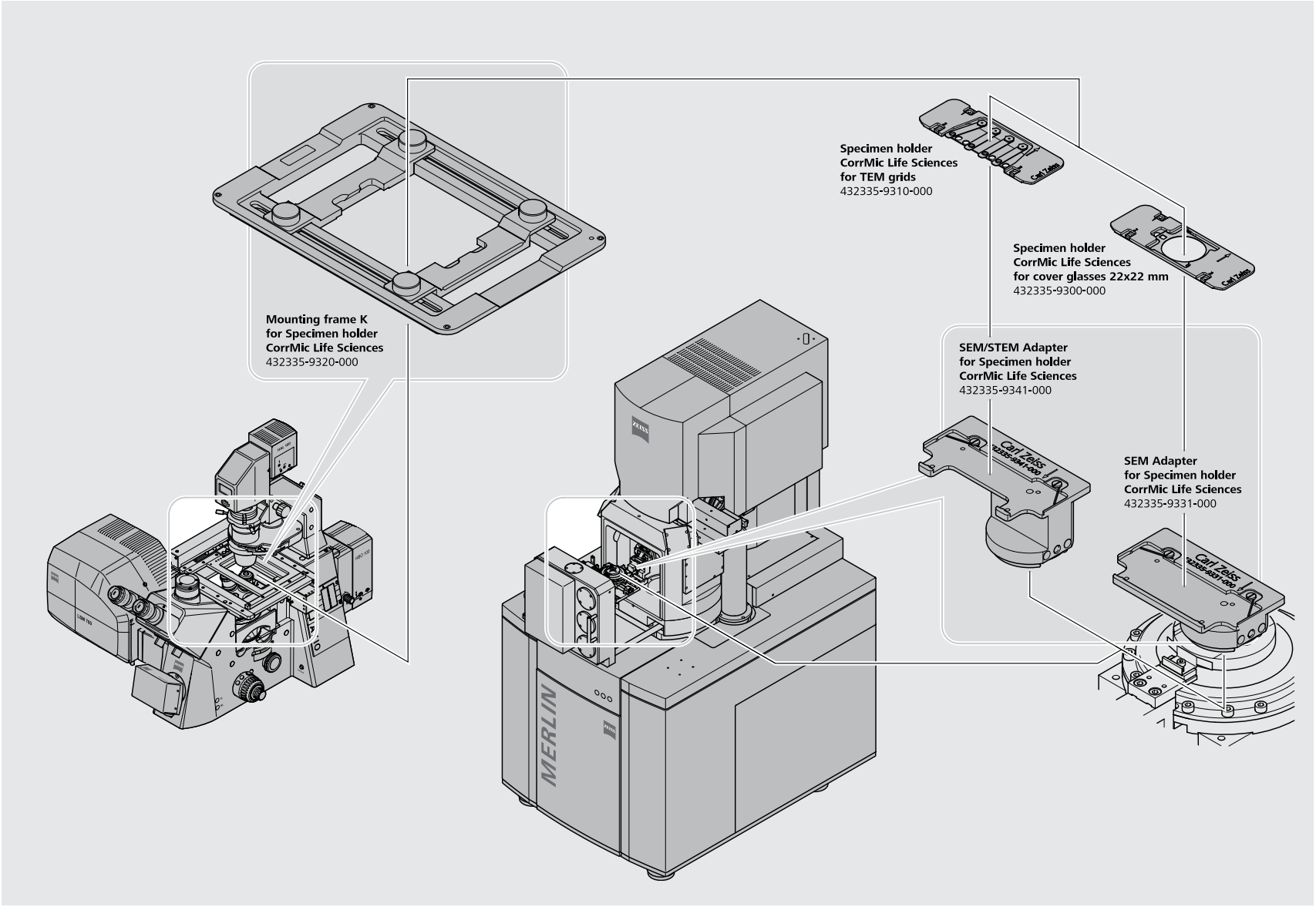
2 Software

- ZEN imaging software (from ZEN 2012)
- Module Shuttle & Find
- ZEN SEM 2012
- SmartSEM (from V05.04)

3 Accessories

- Specimen holder CorrMic Life Sciences for cover glasses
- Specimen holder CorrMic Life Sciences for TEM Grids
- SEM Adapter for Specimen holder CorrMic Life Sciences
- SEM/STEM Adapter for Specimen holder CorrMic Life Sciences

System Overview



Technical Specifications

Feature	
Correlative Sample Holder	■ For Coverslips (22 mm x 22 mm) ■ For TEM grids (3 mm), up to 4 grids per correlative holder
Repositioning Accuracy	■ < 25 µm (initial accuracy, depending on stage specification) ■ < 5 µm (using software option for fine calibration)
Calibration	■ Manual or semi-automatic calibration based on three reference markers on the correlative sample holder ■ Definition of user-defined sample holders
Relocation	■ Definition of multiple regions of interest per image, ZEN (blue edition) only ■ Field of view in the SEM is automatically adjusted, ZEN (blue edition): to the selected region of interest, ZEN (black edition): to the field of view
Correlation	■ Image correlation function with correction of scaling, translation and rotation

Count on Service in the True Sense of the Word

Because the ZEISS microscope system is one of your most important tools, we make sure it is always ready to perform. What's more, we'll see to it that you are employing all the options that get the best from your microscope. You can choose from a range of service products, each delivered by highly qualified ZEISS specialists who will support you long beyond the purchase of your system. Our aim is to enable you to experience those special moments that inspire your work.

Repair. Maintain. Optimize.

Attain maximum uptime with your microscope. A ZEISS maintenance contract lets you budget for operating costs, all the while avoiding costly downtime and achieving the best results through the improved performance of your system. Choose from service contracts designed to give you a range of options and control levels. We'll work with you to select the service program that addresses your system needs and usage requirements, in line with your organization's standard practices.

Our standard preventative maintenance and repair on demand contracts also bring you distinct advantages. ZEISS service staff will analyze any problem at hand and resolve it – whether using remote maintenance software or working on site.

Enhance Your Microscope System

Your ZEISS microscope system is designed for a variety of updates: open interfaces allow you to maintain a high technological level at all times. As a result you'll work more efficiently now, while extending the productive lifetime of your microscope as new update possibilities come on stream.

Please note that our service products are always being adjusted to meet market needs and may be subject to change.

Profit from the optimized performance of your microscope system with a ZEISS service contract – now and for years to come.

>> www.zeiss.com/microservice

The moment your data change scientific minds.

This is the moment we work for.

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BioSciences
microscopy@zeiss.com
www.zeiss.com/shuttle-find

We make it visible.