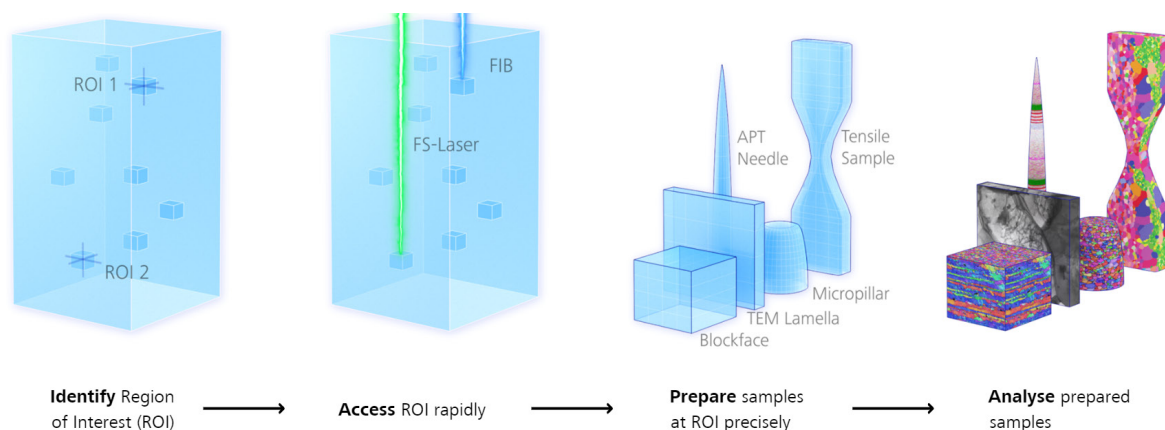


Identify, Access, Prepare, Analyze Your Sample with Precise Navigational Guidance

ZEISS Sample-in-Volume Analysis Workflow



Introducing the multi-scale challenges in microscopy

Advanced materials research is challenging. The challenge is based on our requirement as material scientists to understand structures, properties and processes across different length scales within a material. This requires a range of imaging and analysis technologies that enable us to understand our materials from macro-to-sub-nanometer scales. As we move from the macro-scale to sub-nanometer, we require a workflow that enables us to make the best decisions possible for the best experimental outcomes.

Introducing the Sample-in-Volume Analysis Workflow

The ZEISS Sample-in-Volume Analysis workflow comprises four major elements which include, Identify the Regions-of-Interest (ROI), Access the ROI rapidly, Prepare samples at ROI precisely and Analyze the prepared samples.

The workflow aims to provide navigational guidance to characterize samples within a large volume in order to present multi-scale and multi-modality experimental findings.

This workflow is enabled by ZEISS X-ray Microscopy, ZEISS Crossbeam laser FIB-SEM and correlative software solutions for 2D/3D imaging and analysis.

Workflow Highlights

- **Identify:** Your initial sample volume with ZEISS Xradia Versa family, a 3D X-ray Microscope (XRM) that perform high resolution, non-destructive 3D imaging of large sample volumes.
- **Access:** Your sample with the LaserFIB, a femtosecond (fs) laser, integrated on ZEISS Crossbeam FIB-SEM. The LaserFIB enables massive material removal to access deeply buried samples rapidly.
- **Prepare:** High quality surfaces and delicate structures for further analysis with the Ion-sculptor Gallium FIB column integrated on the ZEISS Crossbeam.
- **Analyze:** Your prepared samples and connect to other scales and modalities with ZEISS correlative software such as ZEISS Atlas 5 or ORS Dragonfly Pro.



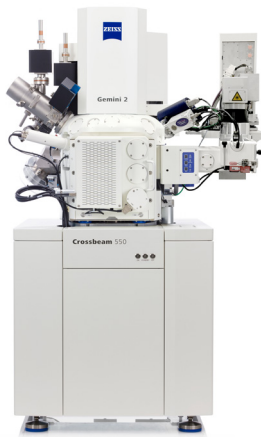
Seeing beyond

ZEISS Sample-in-Volume Analysis Workflow

The Correlative Enablers

Identify regions-of-interest with the ZEISS Xradia Versa X-ray Microscope:

- Resolution at a Distance (RaaD) architecture that enables high-resolution 3D imaging of large sample volumes
- High flux X-ray source to acquire tomography scans faster without sacrificing resolution and contrast
- Laboratory-based Diffraction Contrast Tomography (LabDCT) to unlock 3D crystallographic information, acquire non-destructive mapping of grain orientation and investigate microstructures in 3D



Precisely access and prepare surfaces and structures with the Focused Ion Beam SEM (FIB-SEM) of the ZEISS Crossbeam family:

LaserFIB:

- 515 nm green laser with burst pulsing that enable massive material removal with ablation rates up to 15 mio. $\mu\text{m}^3/\text{s}$ (for Si) and resolution $<2 \mu\text{m}$ on local areas
- Avoid contamination of your FIB-SEM main chamber by performing laser work in a dedicated integrated chamber to maintain column cleanliness

Ion-sculptor (Ga⁺ FIB column):

- Perform fine polishing and sample preparation with Ion-sculptor
- 100 nA probe current enable fast and precise preparation of sample without compromising on FIB resolution
- Low voltage Ion-sculptor capabilities enable ultra-thin samples like TEM lamellae while keeping amorphization damage to a minimum

Correlate 3D XRM data with the ZEISS Crossbeam for site-specific access, sample preparation and analysis with ZEISS Atlas 5:

- Combine multi-scale and multi-modal data from EM, XRM and 3D Diffraction Contrast Tomography for correlative workflow with ORS Dragonfly Pro software
- Perform 3D image processing and segmentation for multi-scale and multi-modal 3D visualization and analysis with ORS Dragonfly Pro software
- Correlating images from multiple sources to build the seamless multi-modal, multi-scale dataset with ZEISS Atlas 5 software
- Use the integrated 3D analysis for EDS and EBSD on ZEISS Atlas 5 and take advantage of the "True Z" slice thickness control
- Switch to other modalities such as such as ToF-SIMS for advanced chemical analysis workflows in the ZEISS Crossbeam



Contact your ZEISS Application Specialist to learn how the Sample-in-Volume Analysis Workflow can be used for your multi-scale material challenges.



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