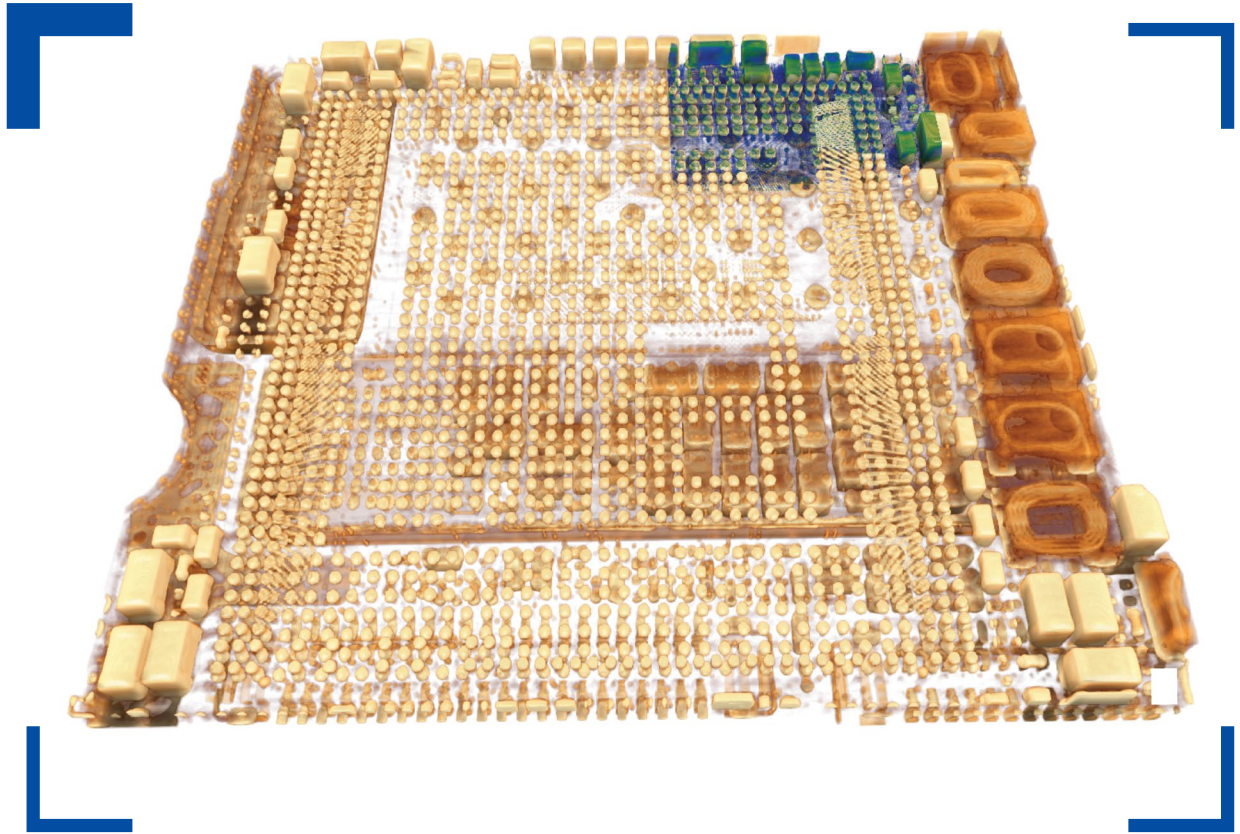


Enabling AI-based Reconstruction for Your ZEISS X-ray Microscope



ZEISS AI Supercharger

ZEISS DeepRecon Pro + ZEISS DeepScout



ZEISS AI Supercharger for Your X-ray Microscope

Expand Your Horizons and Accelerate Your Productivity

ZEISS Advanced Reconstruction Toolbox (ART) for ZEISS X-ray microscopes (XRM) enables you to accelerate productivity in ways never before possible. ART is an innovative platform on which you can continuously access state-of-the-art reconstruction technologies from ZEISS to enrich your research and increase the return on investment of your ZEISS Xradia 3D XRM.

DeepScout is an advanced reconstruction technology based on the latest algorithmic developments in AI, aimed at upscaling large volumes, leveraging the powerful Scout-and-Zoom capability of ZEISS XRM. DeepRecon Pro is a deep learning-based technology that enables you to optimize for image quality or throughput gains.

DeepScout and DeepRecon Pro form the AI Supercharger package for the Advanced Reconstruction Toolbox.

The unique AI offerings from ZEISS leverage deep understanding of both X-ray physics and customer applications to solve some of the hardest imaging challenges in new and innovative ways. These optional modules are workstation-based solutions that provide easy access and usability.

DeepScout – Recover your full field of view at high resolution

Developed through continued algorithmic innovation enabled by the ZEISS AI infrastructure, DeepScout employs familiar ZEISS Scout-and-Zoom capability to acquire richer information at higher resolution, including for interior tomographies for large samples.

Now you can take your large overview Scout scan, feed it through the ZEISS DeepScout reconstruction algorithm, and get resolution that approaches that of a Zoom scan over a much larger field of view.

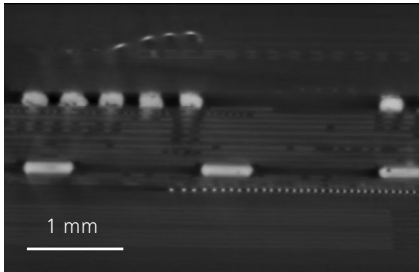
At its core, DeepScout relies on the ability of your XRM to generate multiscale, spatially registered datasets, and uses that ability to train neural networks to improve the reconstruction.

Because DeepScout provides you with high resolution over the field of view, you can upscale full FOV scans to much higher resolutions that are typically restricted to smaller fields of view using data uniquely accessible with ZEISS Xradia Versa RaaD 2.0.

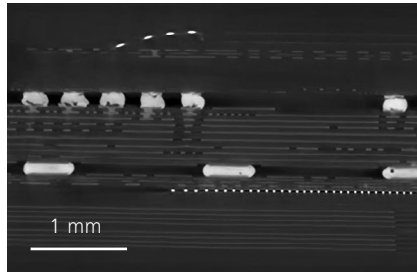
ZEISS DeepRecon Pro – Improve image quality, increase throughput

DeepRecon Pro uniquely harvests the hidden opportunities in big data generated by your XRM. This deep learning reconstruction technology enables you to improve image quality or increase throughput up to 10x without sacrificing image quality by reducing the amount of data required for high quality 3D reconstructions.

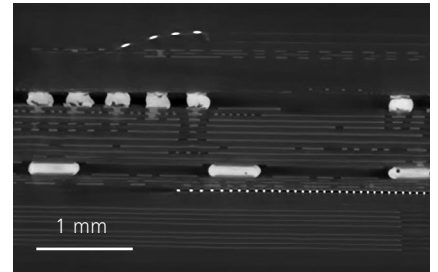
ZEISS DeepRecon Pro is applicable to both unique samples as well as semi-repetitive and repetitive workflows. Users can self-train new machine learning network models on-site with an extremely easy-to-use interface. The one-click workflow of ZEISS DeepRecon Pro eliminates the need for a machine learning expert and can be seamlessly operated by even a novice user.



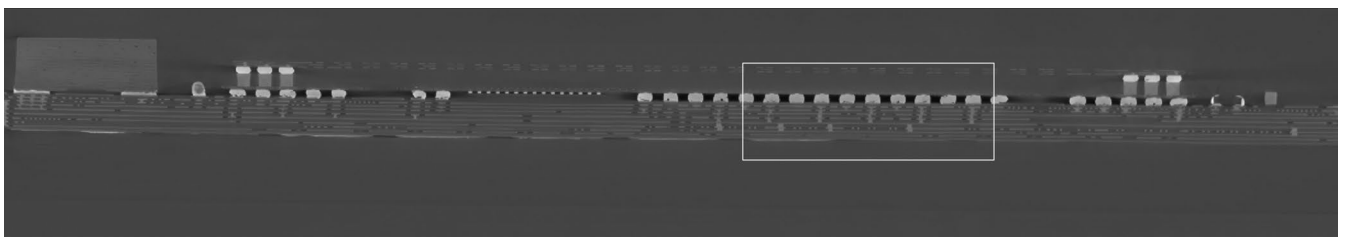
Low resolution digital scout



High resolution scan

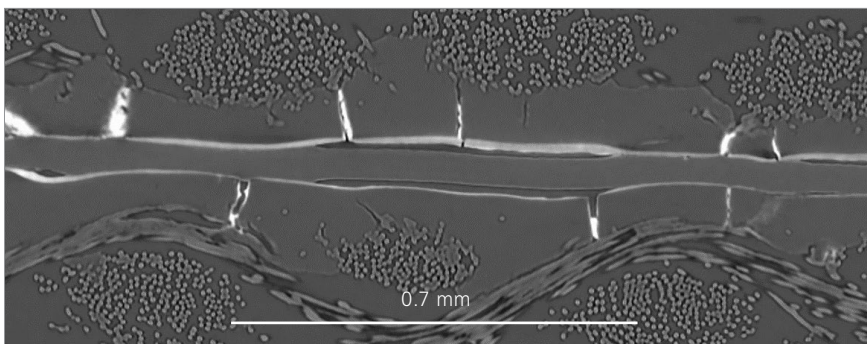
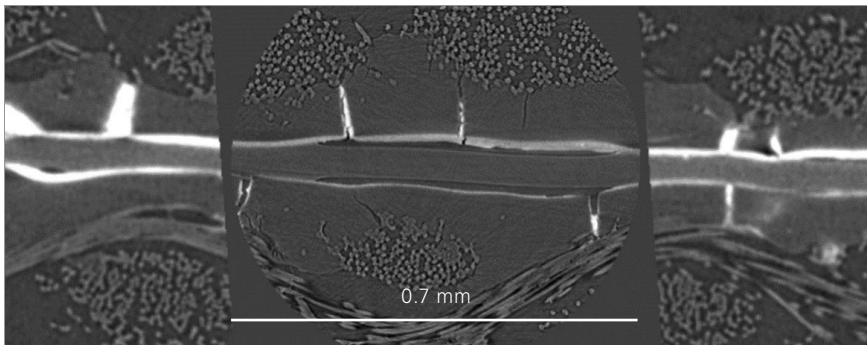


Zoomed-in region of DeepScout recovered image for comparison



Full extent of DeepScout recovered image.

ZEISS DeepScout enables high resolution everywhere in a large FOV volume. Capture a large field of view at low resolution and target a small region. Scan target at high resolution. Use DeepScout to recover full volume at high resolution. You can now inspect the entire sample at the required resolution to identify, quantify, and even segment the defects across multiple regions of the sample.

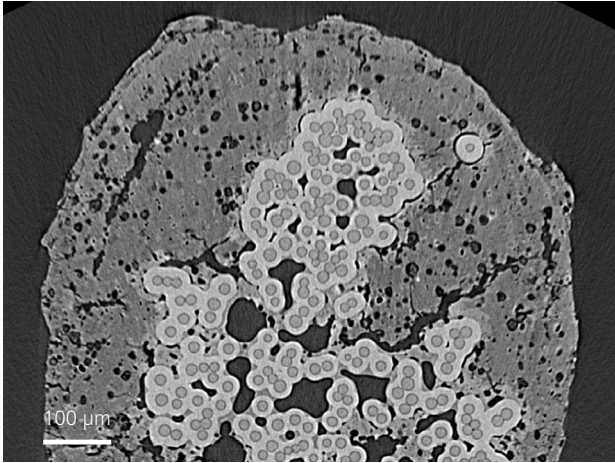


Above: Polymer electrolyte fuel cell (PEFC) membrane electrode assembly imaged without ZEISS DeepScout. Below: ZEISS DeepScout: Generate high resolution data across entire sample image for a clear view of critical microstructural features that influence water formation and fuel cell performance.

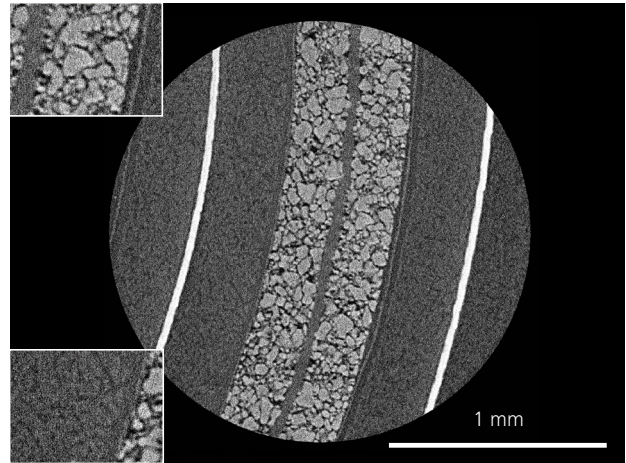
ZEISS DeepScout

- High resolution with a larger field of view (FOV)
- Upscale interior tomographies at speed to full FOV scans
- Upscale volume scout scans using information uniquely possible with ZEISS Xradia Versa RaaD 2.0 (Resolution at a Distance)
- Employs the familiar Scout-and-Zoom capability to acquire richer information at higher resolution
- Provides rapid access to new capabilities enabled by unique ZEISS AI infrastructure

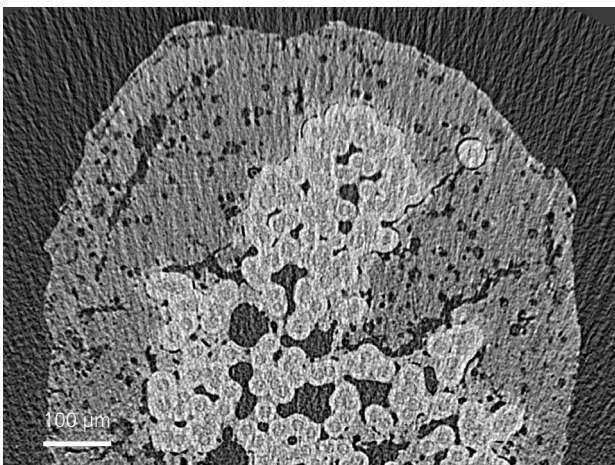
ZEISS DeepRecon Pro



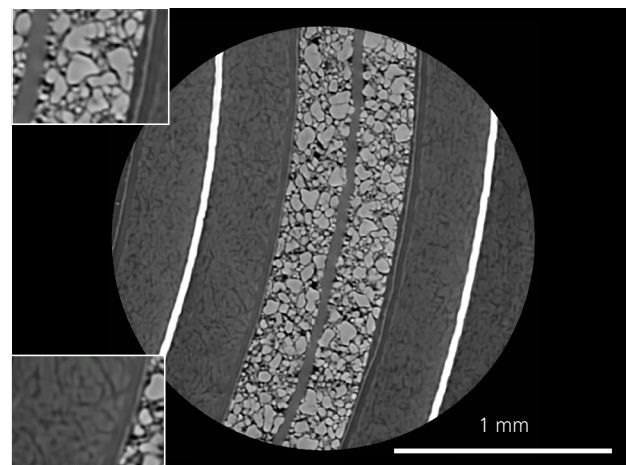
Standard reconstruction (FDK): Scan time 9 hrs (3001 projections)



Standard Reconstruction (FDK)

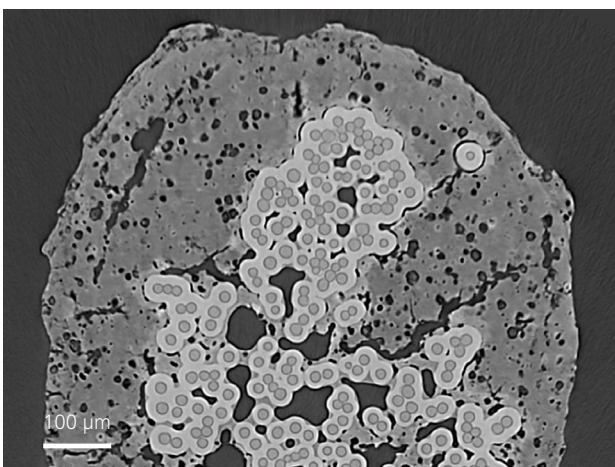


Standard reconstruction (FDK): Scan time 53 mins (301 projections)



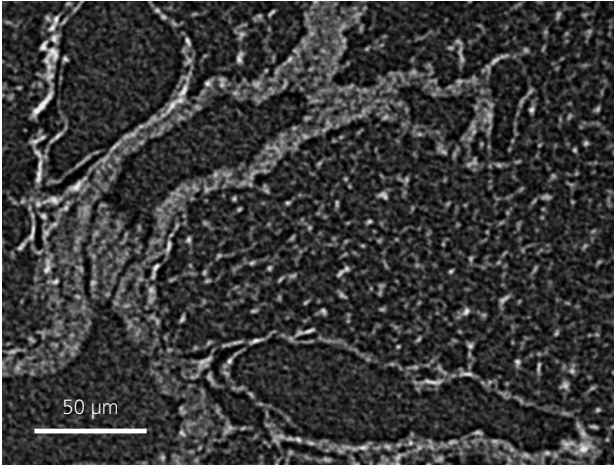
DeepRecon Pro

DeepRecon Pro used for image quality improvement for a smartwatch battery. DeepRecon Pro both improves the clarity of cathode grains and polymer separator. It also allows for the recovery of features otherwise obscured by image noise, such as the electrolyte saturated anode.

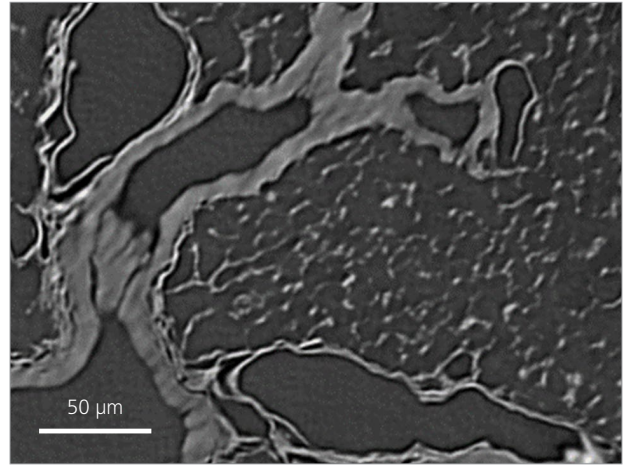


DeepRecon Pro: Scan time 53 mins (301 projections)

DeepRecon Pro used for throughput improvement for Ceramic Matrix Composite (CMC) sample, achieving 10x throughput improvement without sacrificing image quality. This would allow for much higher temporal resolution for in situ studies.



Mouse lung imaged with standard FDK



Mouse lung imaged with DeepRecon Pro. Improved image quality on same number of projections (3001 each)

DeepRecon Pro

- Up to 10X throughput
- Superior image quality
- Repetitive and non-repetitive applications
- Seamless one-click workflow

Other Advanced Reconstruction Toolbox Packages

- Artifact Reduction Package
 - PhaseEvolve to enhance image quality by removing phase fringes
 - Materials Aware Reconstruction Solution (MARS) to enhance image quality by reducing beam hardening artifacts
- Recon Package
 - OptiRecon, iterative reconstruction for enhanced throughput (up to 4X) or image quality
 - DeepRecon Pro

