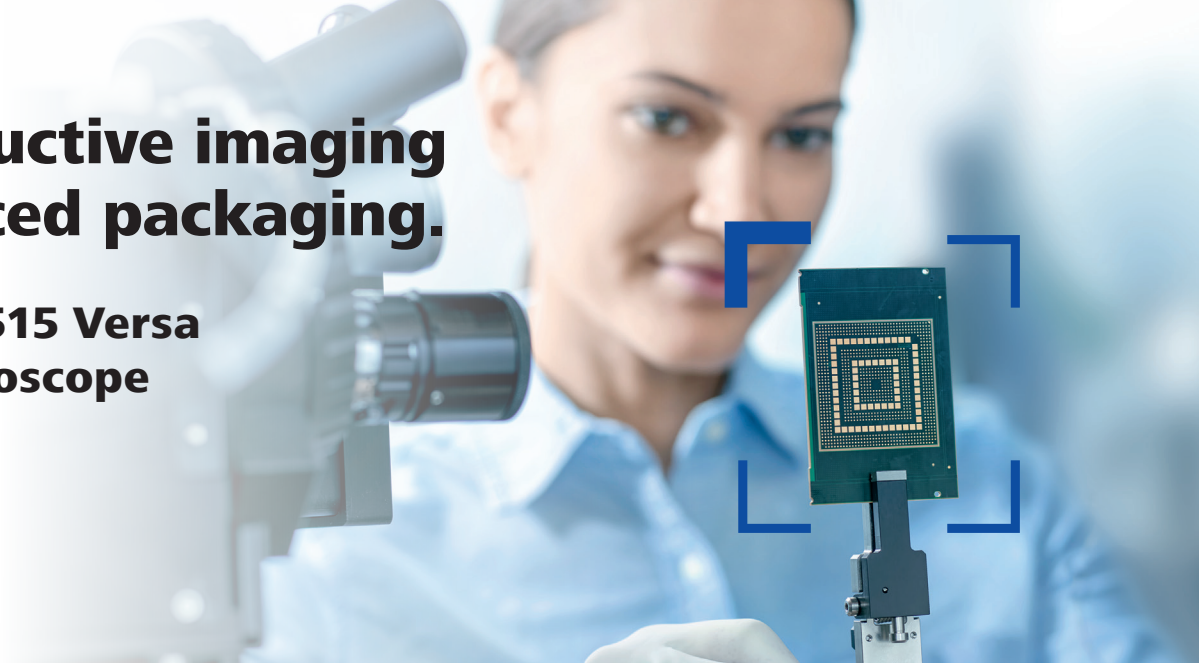# Non-destructive imaging for advanced packaging.

## ZEISS Xradia 515 Versa 3D X-ray Microscope


The workhorse for 3D imaging

ZEISS X-ray microscopes (XRM) remove major technical hurdles for 3D imaging, achieving high contrast and submicron resolution even for relatively large samples. Xradia 515 Versa uses a patented two-stage magnification technique that enables you to uniquely achieve Resolution at a Distance (RaaD). Combined with the flexibility and stability of the Xradia platform, this unparalleled versatility provides high-resolution, non-destructive imaging for the fastest time-to-results.

These non-destructive 3D imaging innovations empower a broad range of applications with diverse sample sizes, geometries and compositions. The versatility of the platform enables vital capabilities like interior tomography, phase contrast, *in situ* imaging and correlative FIB-SEM workflows. ZEISS 3D X-ray microscopes are built on upgradeable, extendable and reliable platforms that help protect your capital investment.

Xradia 515 Versa is the foundation of the Xradia Versa family for those who simply need the best 3D imaging capability.
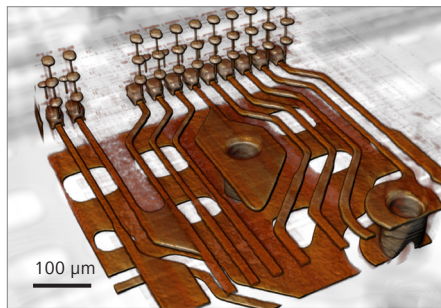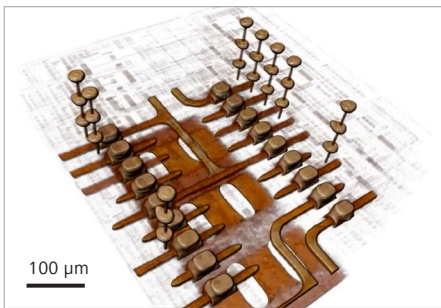
3D XRM images of stacked die package interconnects in a commercial DDR4 DRAM package.
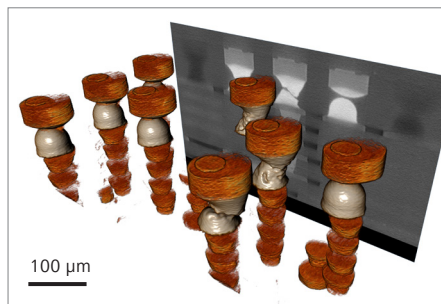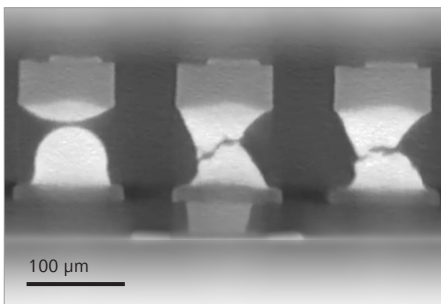
Solder non-wets and cracks in flip chip package visible in a 2D virtual slice (left) and extracted from a 3D XRM dataset (right).

Seeing beyond

Imaging	ZEISS Xradia 410 Versa	ZEISS Xradia 515 Versa	ZEISS Xradia 610 Versa	ZEISS Xradia 620 Versa
Spatial Resolution[a]	0.9 µm	0.5 µm	0.5 µm	0.5 µm
Resolution at a Distance (RaaD™)[a,b]	1.5 µm	1.0 µm	1.0 µm	1.0 µm
Minimum Achievable Voxel[c] (Voxel size at sample at maximum magnification)	100 nm	40 nm	40 nm	40 nm
X-ray Source				
Architecture	Sealed Reflection	Sealed Transmission	Sealed Transmission, Fast Activation	Sealed Transmission, Fast Activation
Voltage Range	20 – 90 kV	30 – 160 kV	30 – 160 kV	30 – 160 kV
Maximum Output	8 W	10 W	25 W	25 W
Detector System				
ZEISS X-ray microscopes feature an innovative detector turret with multiple objectives at different magnifications. Each objective features optimized scintillators that deliver the highest absorption contrast details.				
Standard Objectives	0.4x, 4x, 10x, 20x	0.4x, 4x, 20x	0.4x, 4x, 20x	0.4x, 4x, 20x
Optional Objectives	40x	40x, Flat Panel Extension (FPX)	40x, Flat Panel Extension (FPX)	40x, Flat Panel Extension (FPX)
Stages				
Sample Stage (load capacity)	25 kg	25 kg	25 kg	25 kg
Sample Stage Travel (x, y, z)	50, 100, 50 mm	50, 100, 50 mm	50, 100, 50 mm	50, 100, 50 mm
Sample Size Limit	300 mm diameter	300 mm diameter	300 mm diameter	300 mm diameter
Features				
Scout-and-Scan Control System	▪	▪	▪	▪
Scout-and-Zoom	▪	▪	▪	▪
Vertical Stitch	▪	▪	▪	▪
XRM Python API	▪	▪	▪	▪
ZEISS SmartShield		▪	▪	▪
Automated Filter Changer (AFC)				▪
High Aspect Ratio Tomography (HART)				▪
Dual Scan Contrast Visualizer (DSCoVer)				▪
ZEISS LabDCT for Diffraction Contrast Tomography				Optional
Wide Field Mode	0.4x	0.4x	0.4x	0.4x and 4x
GPU CUDA-based Reconstruction	Single	Single	Dual	Dual
ZEISS Autoloader	Optional	Optional	Optional	Optional
In Situ Interface Kit	Optional	Optional	Optional	Optional
ZEISS DeepRecon	Optional	Optional	Optional	Optional
ZEISS OptiRecon	Optional	Optional	Optional	Optional
ZEISS ZEN Intellesis	Optional	Optional	Optional	Optional
ORS Dragonfly Pro	Optional	Optional	Optional	Optional

[a] Spatial resolution measured with ZEISS Xradia 2D resolution target, normal field mode, optional 40x objective. [b] RaaD working distance defined as clearance around axis of rotation.
[c] Voxel is a geometric term that contributes to but does not determine resolution, and is provided here only for comparison. ZEISS specifies resolution via spatial resolution, the true overall measurement of instrument resolution.

Benefits

- Non-destructive 3D imaging
- Visualize buried defects and structures
- Reduce the need for physical cross-sections
- Guide correlated FIB and SEM workflows
- Achieve high failure analysis success rates
- RaaD for highest resolution at the largest working distance from source
- Proprietary ZEISS optics provide high contrast
- Motorized sample positioning for efficient multi-site imaging
- SmartShield for sample protection and setup optimization
- Industry-leading optional 4D and *in situ* capabilities for flexible sample sizes and types
- Scout-and-Scan control system for easy-to-use workflow set-up, ideal in multi-user environments
- Program up to 14 samples at a time to run sequentially with optional Autoloader
- XRM Python API for customized instrument control
- Continuous access to advanced reconstruction technologies such as OptiRecon and DeepRecon for enhanced performance (e.g., throughput, image quality)

Field of Applications

Semiconductor and Electronics
Image and characterize regions of interest during stuctural and failure analysis on intact samples before cutting or polishing.

Materials Research
Characterize materials in 3D, observe failure mechanisms and degradation, investigate properties at multiple length scales, quantify and analyze microstructural evolution with 4D and *in situ* studies.

Battery and Energy Storage
Failure analysis, quality inspection of separator and electrodes for defects and inclusions, track aging mechanisms.

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