



# Introduction to Bruker MicroCT

SkyScan™ Instruments Line

RJL Micro & Analytic GmbH  
Distribution of Bruker microCT

# RJL Micro & Analytic GmbH

## Instruments Sales | Accredited Service Laboratory

### Exclusive Product Lines

X-ray micro-/nanotomography (Bruker microCT)

Automated SEM-EDX systems (FEI-Aspex)

Raman microscopy (Nanophoton)

Particle scanner (MicroQuick)

X-ray imaging (Kubtec)

### Analytical Services

With ISO-17025 Accreditation



# SkyScan Instruments

## X-Ray Energy and Field-Of-View Dimensions

desktop instruments



SkyScan 1174  
compact



SkyScan 1272  
high resolution



SkyScan 1275  
automated scan



SkyScan 1173  
big sample



SkyScan 2211  
multiscale nano-CT

**50 kV**  
**30 x 65 mm**

**100 kV**  
**75 x 75 mm**

**100 kV**  
**96 x 120 mm**

**130 kV**  
**140 x 160 mm**

**190 kV**  
**200 x 200 mm**



# SkyScan Instruments

## A Scanner for Every Resolution Requirement



SkyScan 2211  
multiscale nano-CT



SkyScan 1272  
high resolution



SkyScan 1275  
automated scan



SkyScan 1173  
big sample



SkyScan 1174  
compact

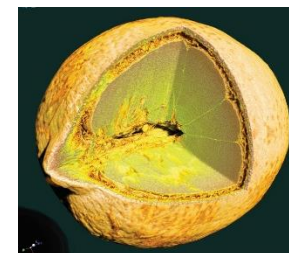
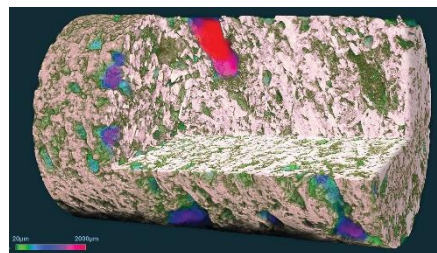
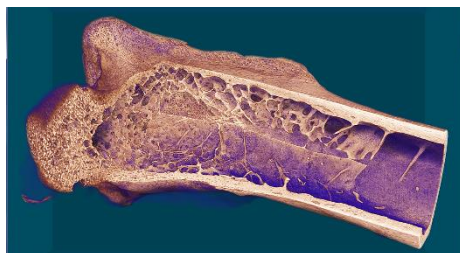
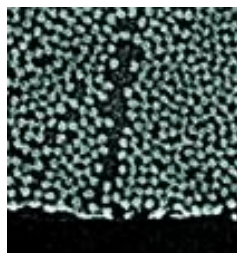
**0.1  $\mu\text{m}$**   
**CMOS + CCD**

**0.4  $\mu\text{m}$**   
**CCD**

**4  $\mu\text{m}$**   
**CMOS**

**5  $\mu\text{m}$**   
**CMOS**

**6  $\mu\text{m}$**   
**CCD**



# SkyScan 2211

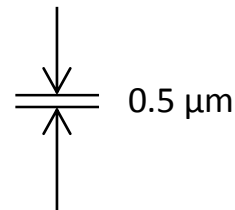
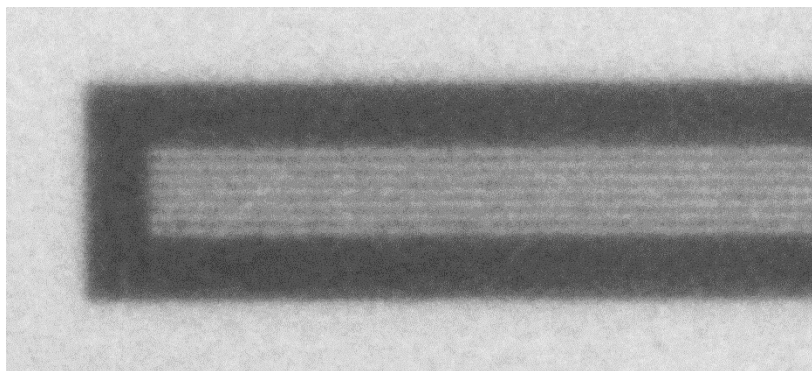
## Multiscale Nanotomography Instrument

### Specifications

- 20-190 kV, switchable nano and micro focus
- smallest voxel size 0.1  $\mu\text{m}$ , proven resolution 0.5  $\mu\text{m}$
- two detectors switchable, CMOS and CCD 4000 x 2670 px
- air bearing stage with 25 kg load
- XY micro positioning stage
- automatic X-ray filter changer



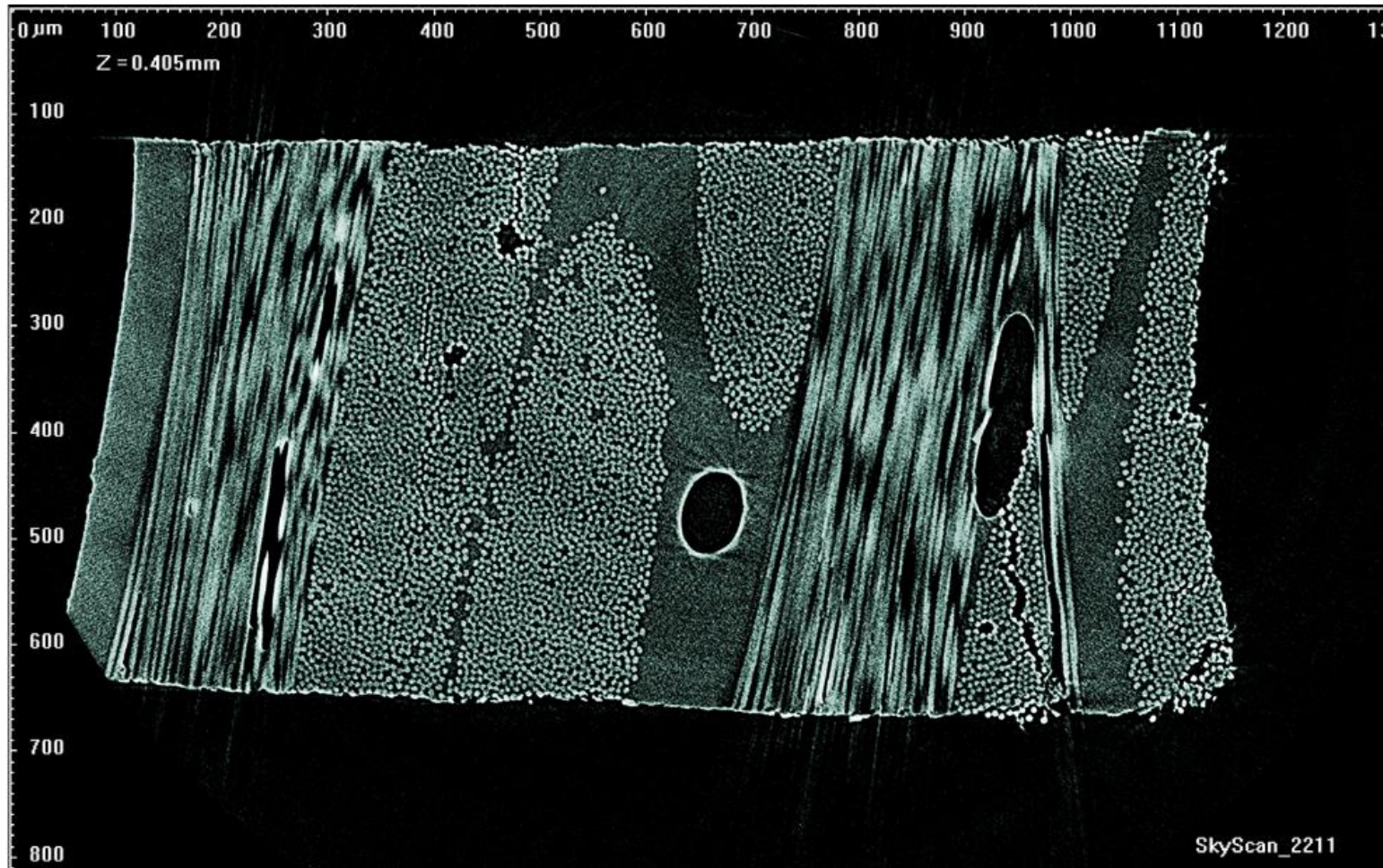
### Superior Resolution Proven by JIMA Standard





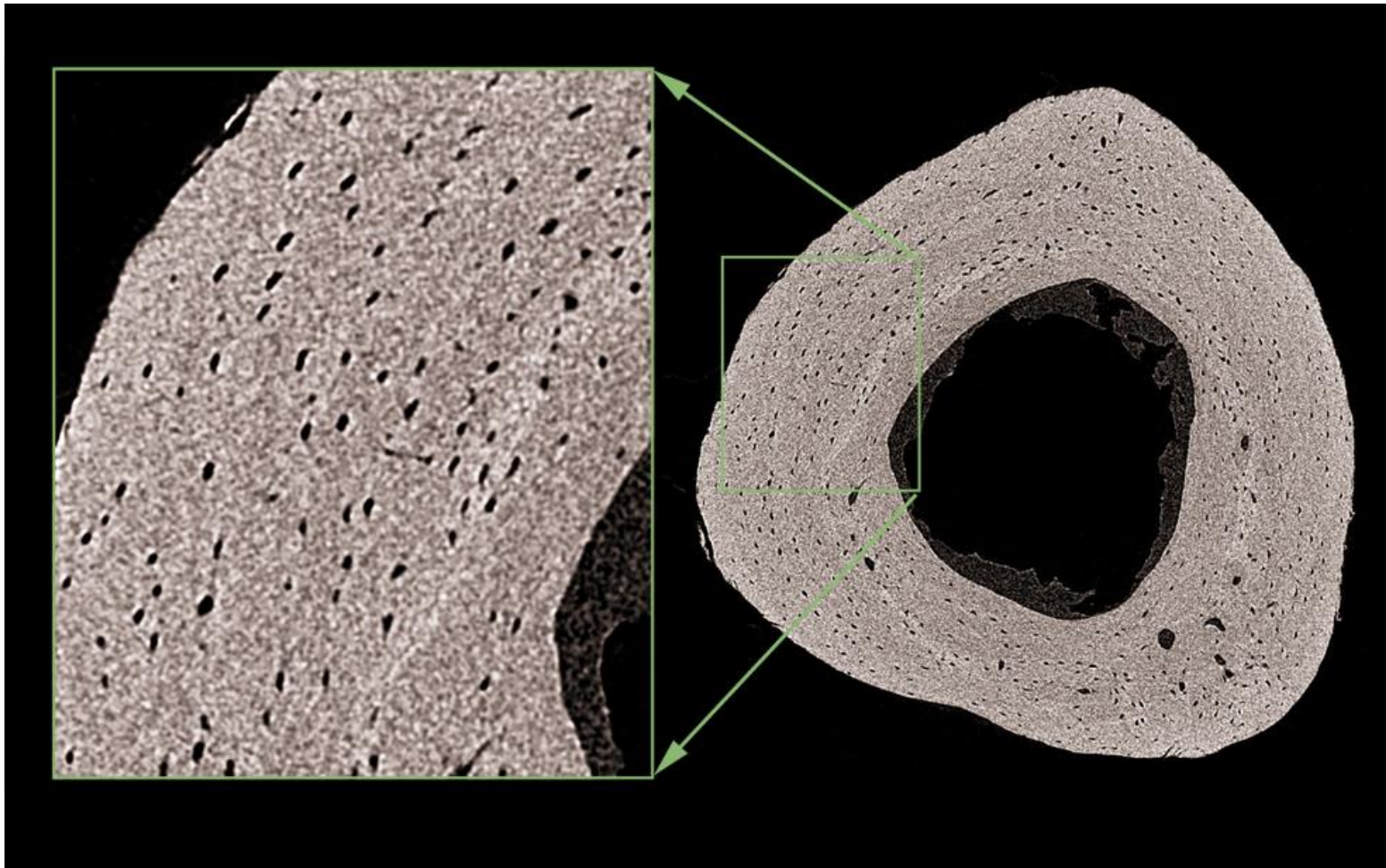
# SkyScan 2211

## Carbon Fibre Reinforced Plastic



# SkyScan 2211

## Osteocyte Lacunae in Mouse Bone





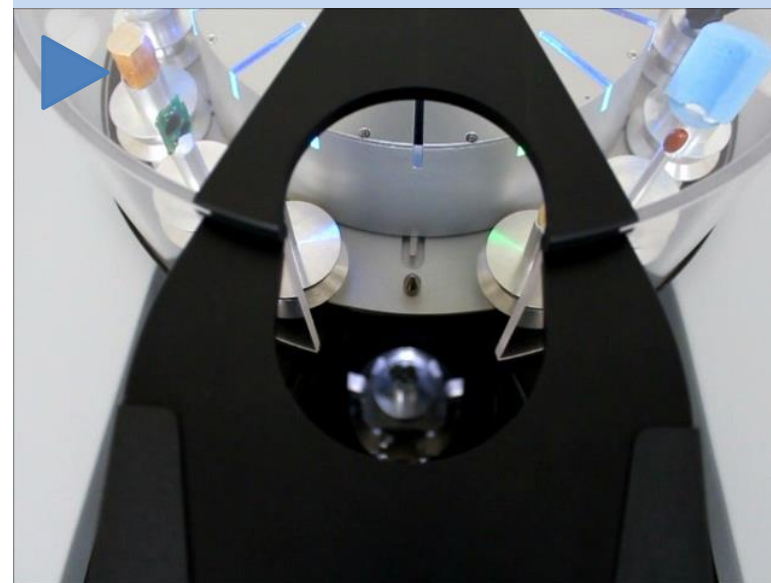
# High Throughput Scanning

## Automatic Sample Changer



### Features

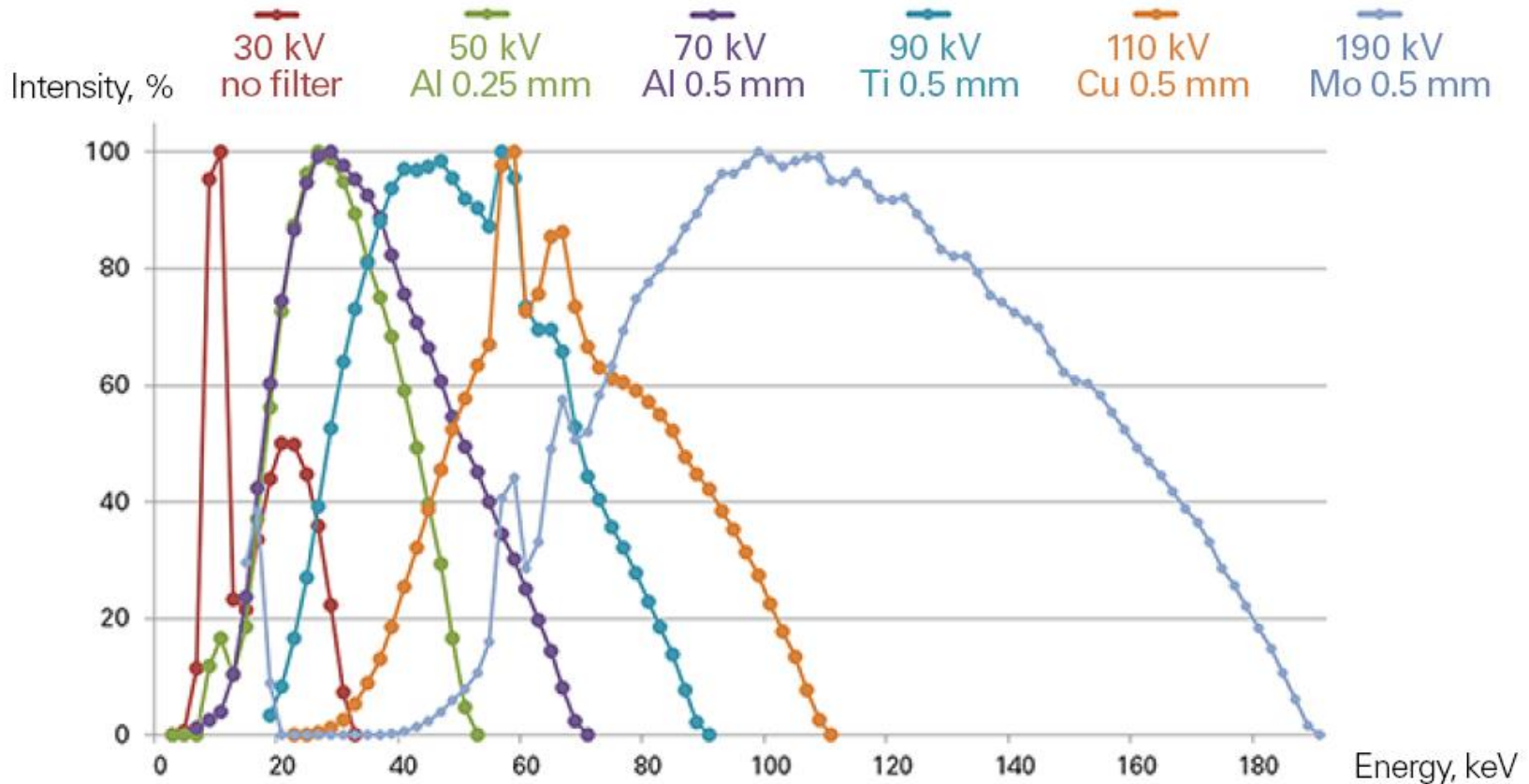
- up to 16 samples
- sample status indicated by light bars
- carousel outside X-ray safety cabinet





# Variable X-Ray Spectrum

## Automatic Filter Changer



# Metrology Application

## Nine-Ball-Phantom for Precise Voxel Size Calibration



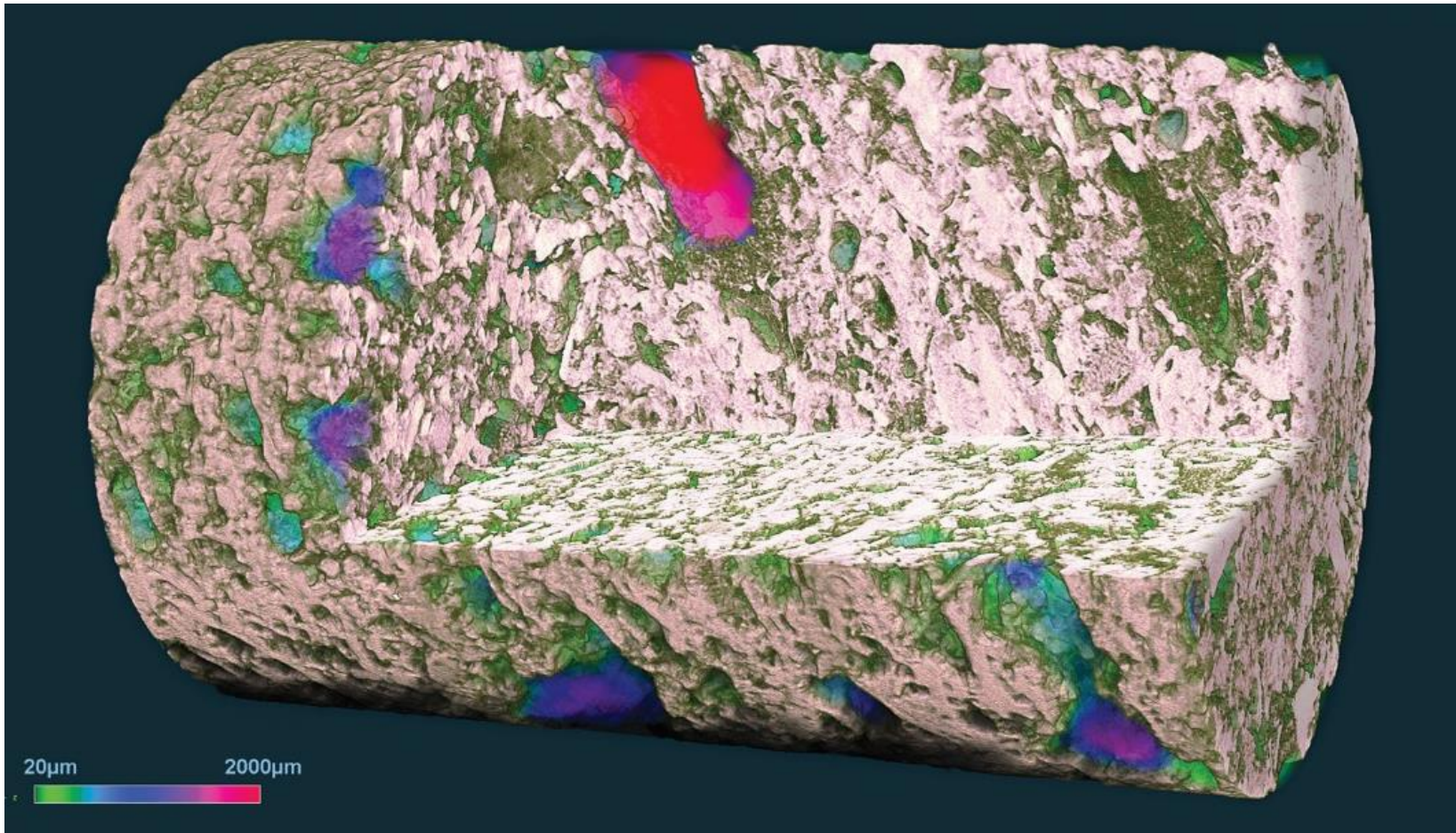
### Features

- Mounting plate compatible with all SkyScan stages
- Nine tungsten carbide balls,  $\varnothing$  2 mm
- Balls mounted on carbon fibre tubes
- Distances between ball centres and ball diameters are precisely measured and qualified by an external lab (DKD certification)



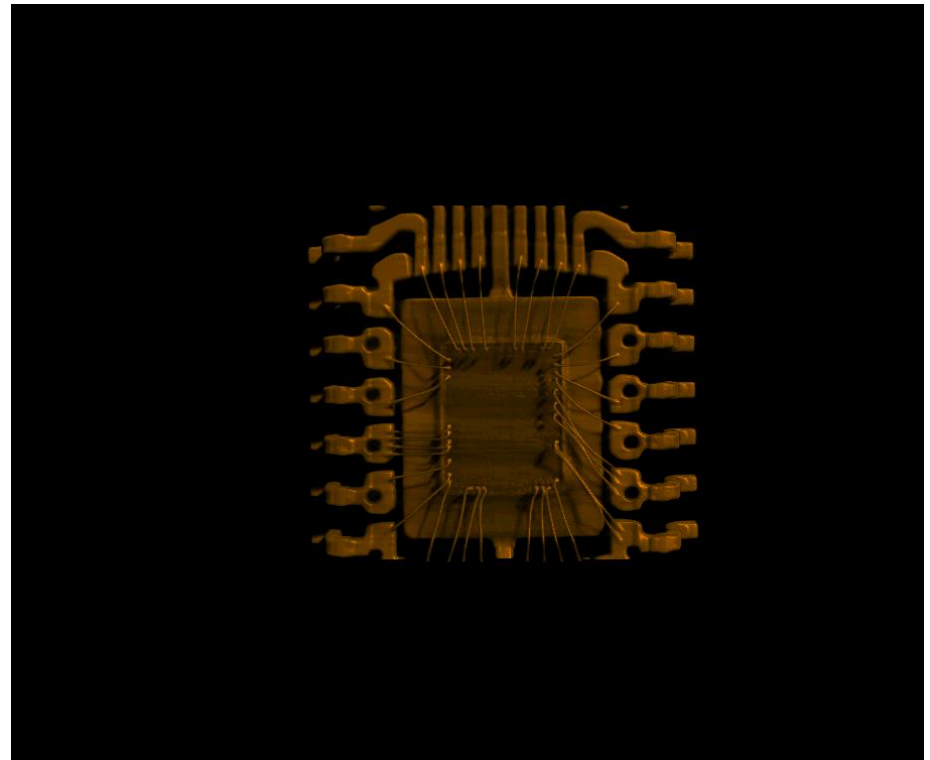
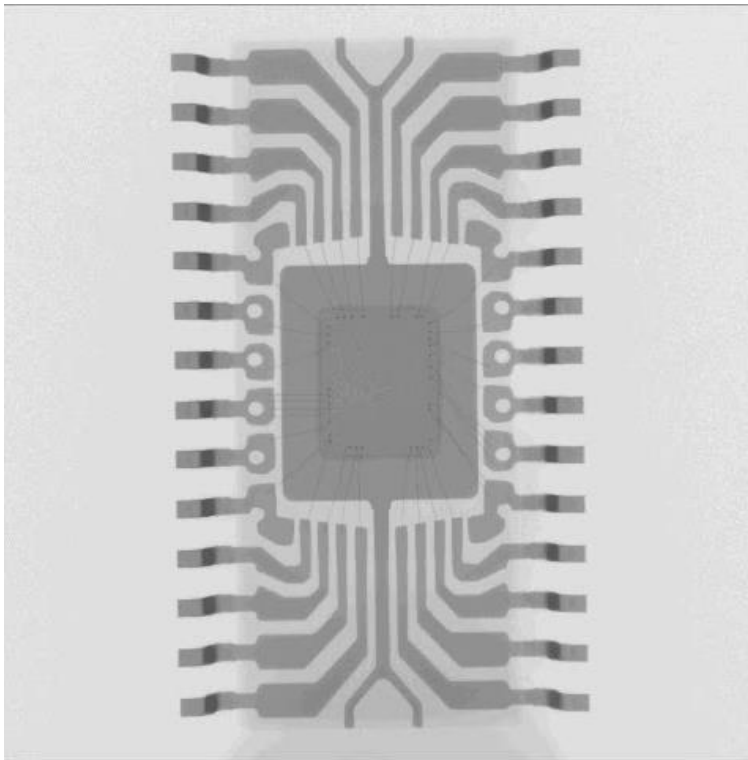
# Selected Applications

## Colour-Coded Pore Size Distribution in Sandstone



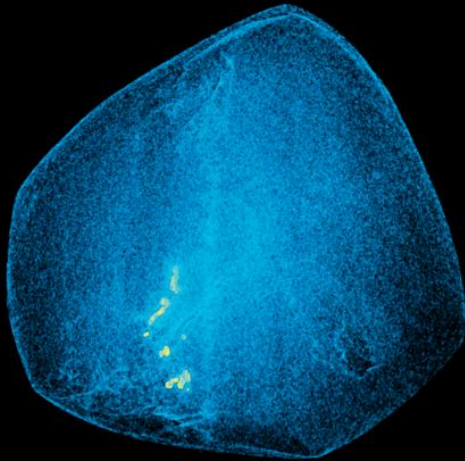
# Selected Applications

## Micro Chip Scanned at 1.6 $\mu\text{m}/\text{voxel}$

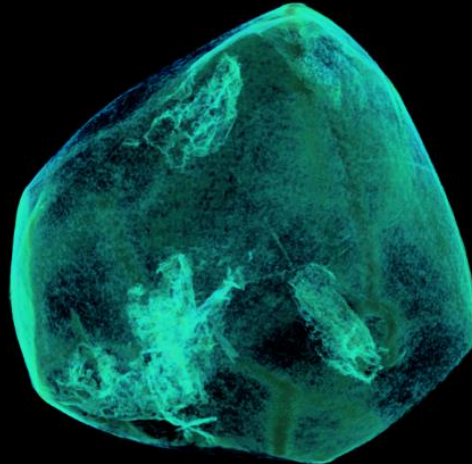




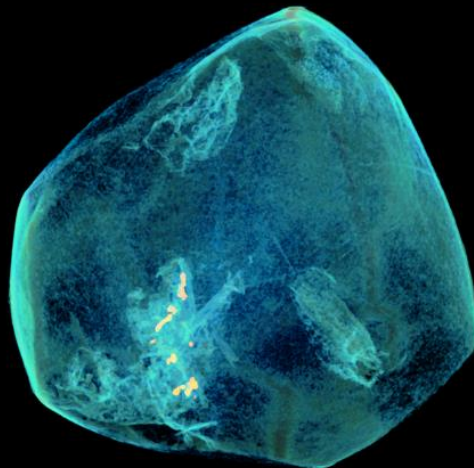
# Gemstone Defect Analysis



absorption

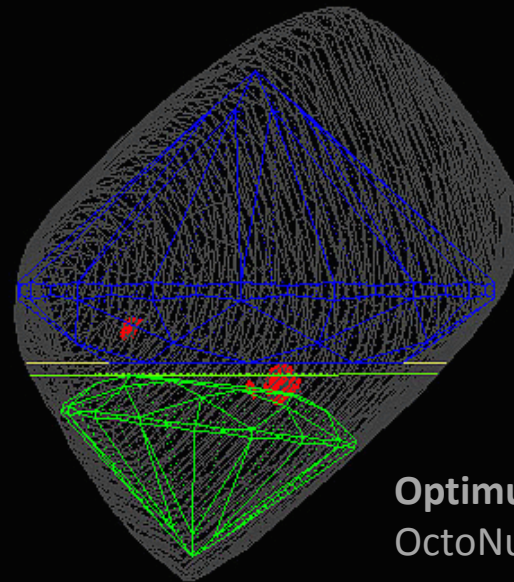


dark-field (scattering)



combined

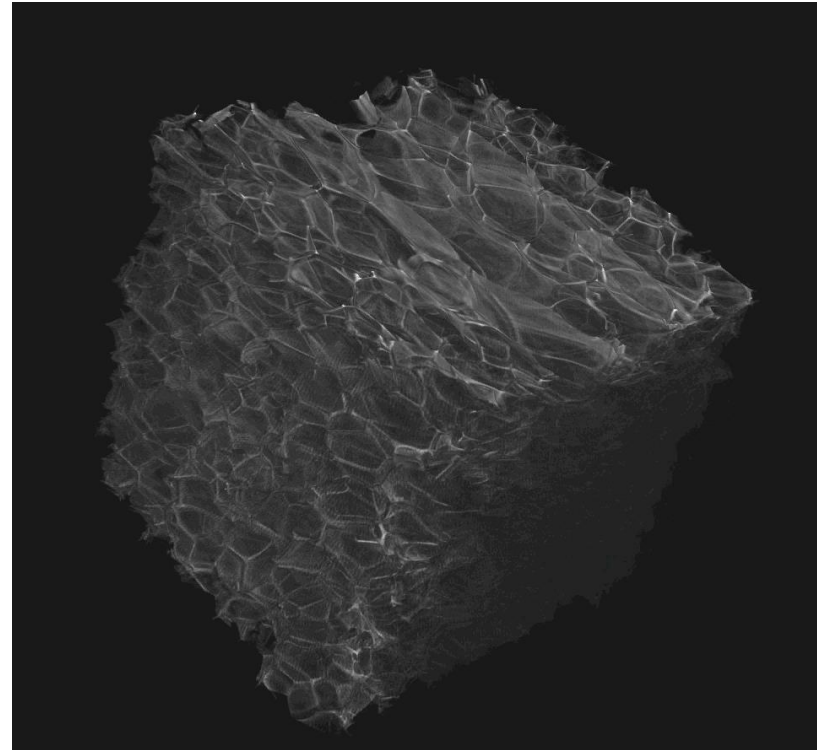
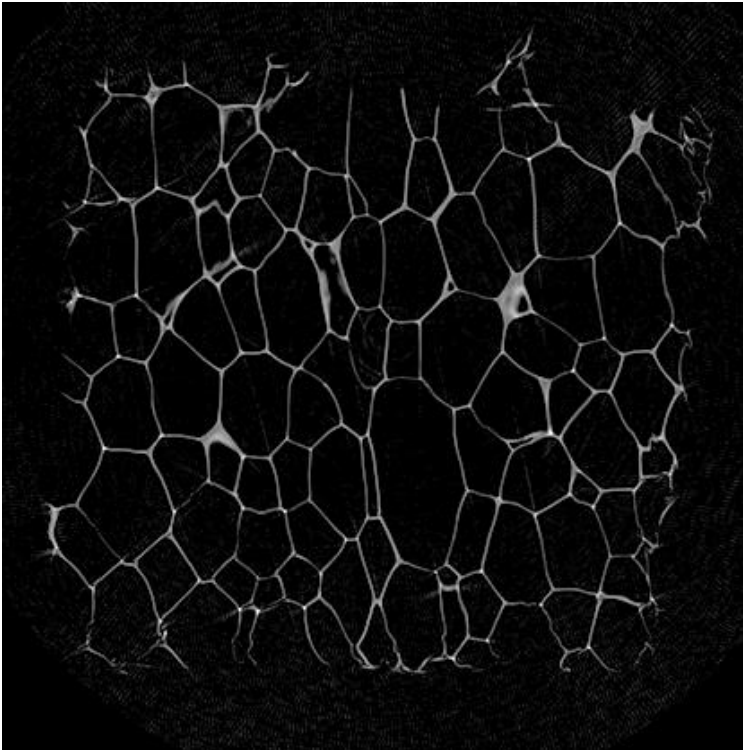
**Rough diamond**  
SkyScan 1294  
6  $\mu\text{m}$ /voxel, 65 kV



**Optimum cut**  
OctoNus Software Ltd.

# Selected Applications

## Technical Foams from Polymer or Metal

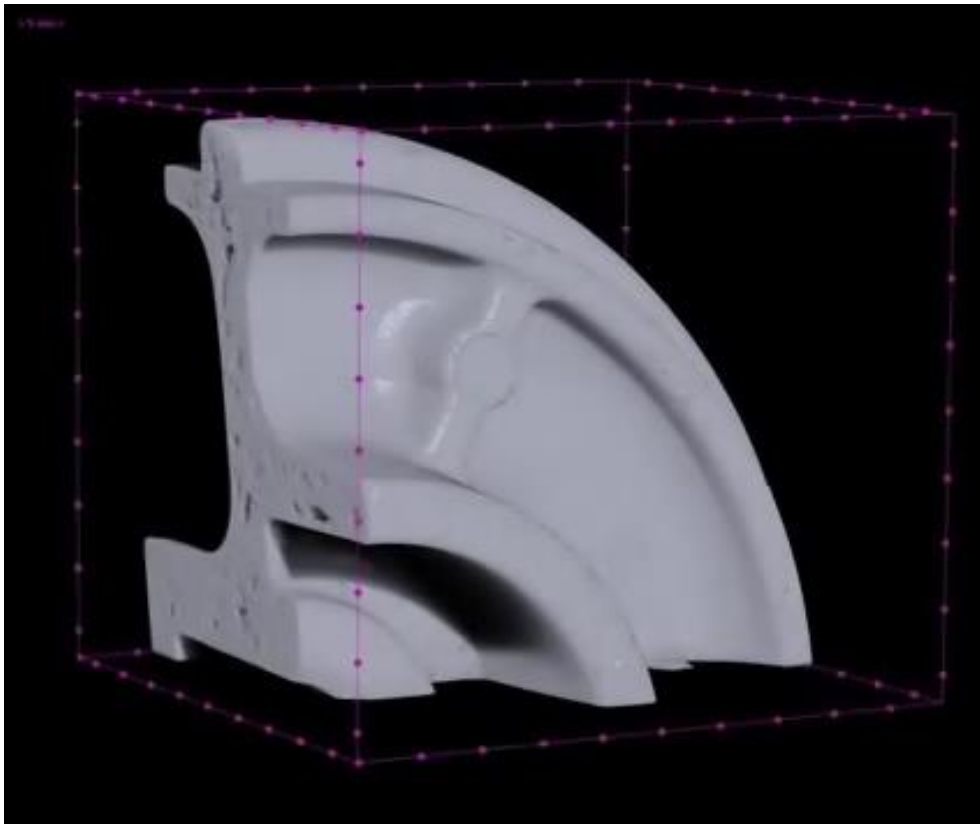


**Polyurethane foam**

SkyScan 1172, 2  $\mu\text{m}$ /voxel, 65 kV

# Selected Applications

## Cracks, Pores and Inclusions in Casted Parts



### Casted Aluminium

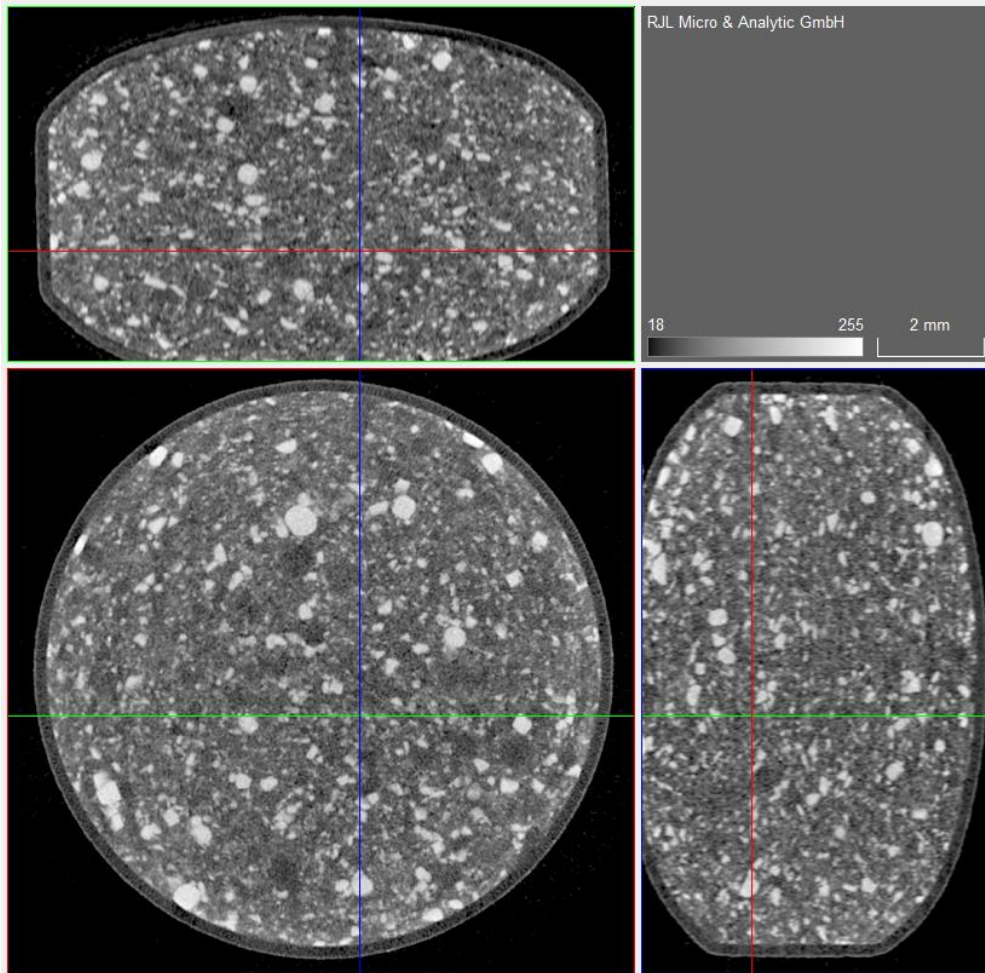
SkyScan 1173

20  $\mu\text{m}/\text{voxel}$

130 kV

# Selected Applications

## Pharmaceutical Formulation Development



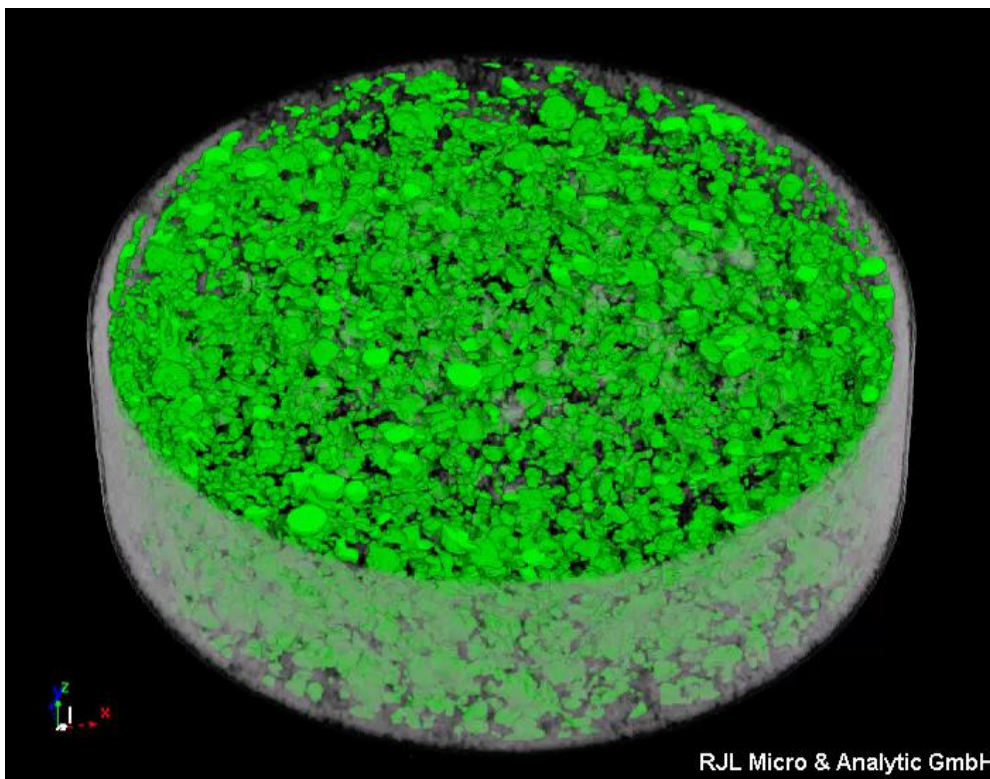
### Typical Tasks

- Thickness, coverage of coating
- Spatial distribution of substances
- Homogeneity of formulation
- Volumetric substance analysis
- Density total and local profile
- Cracks and pores
- Defects in functional layers
- Metallic impurities



# Selected Applications

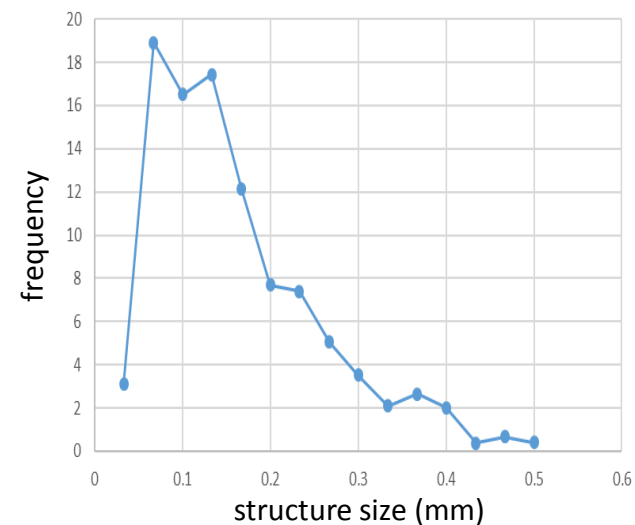
## Tablet Active Ingredient Size and Distribution



### Results

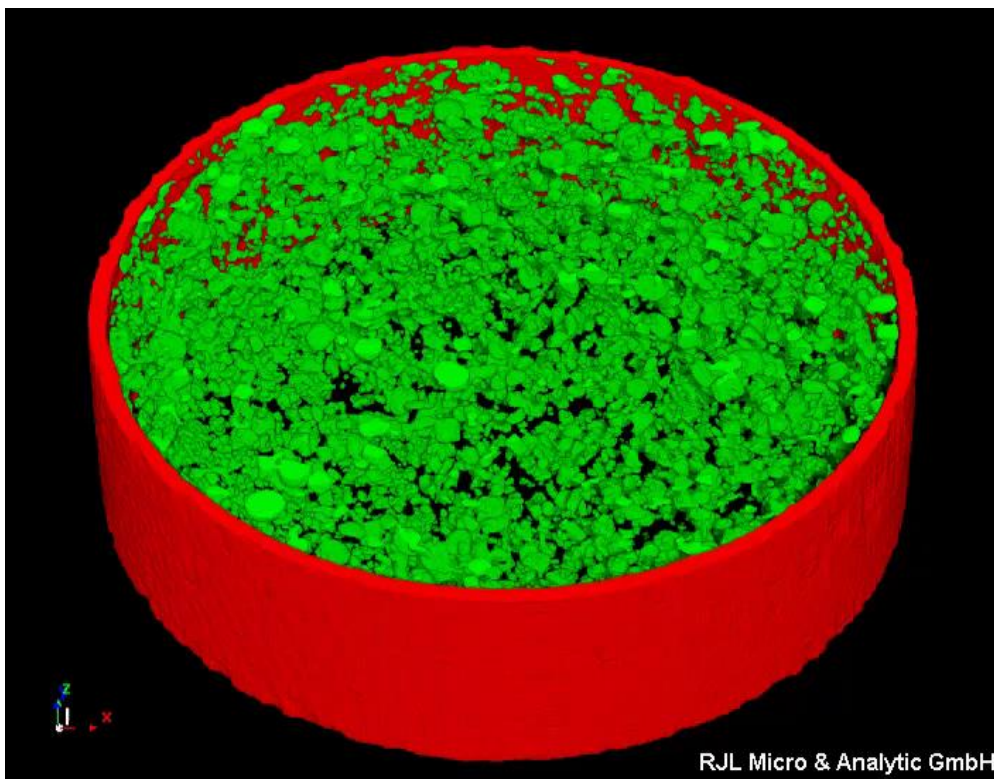
Relative volume = 10.9 vol.-%

Mean structure size = 0.16 mm



# Selected Applications

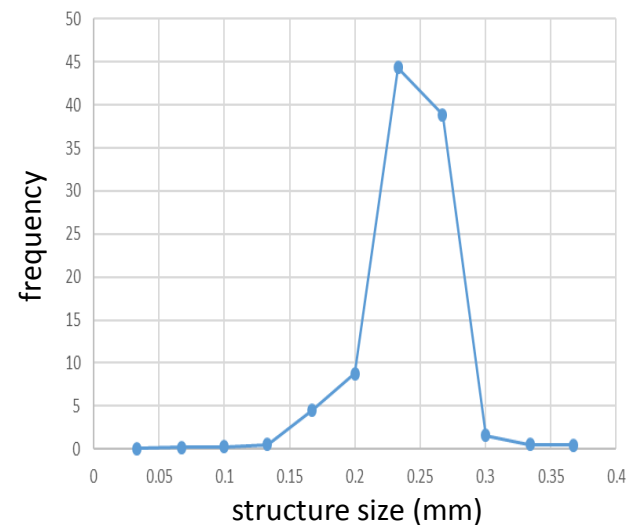
## Tablet Coating Thickness



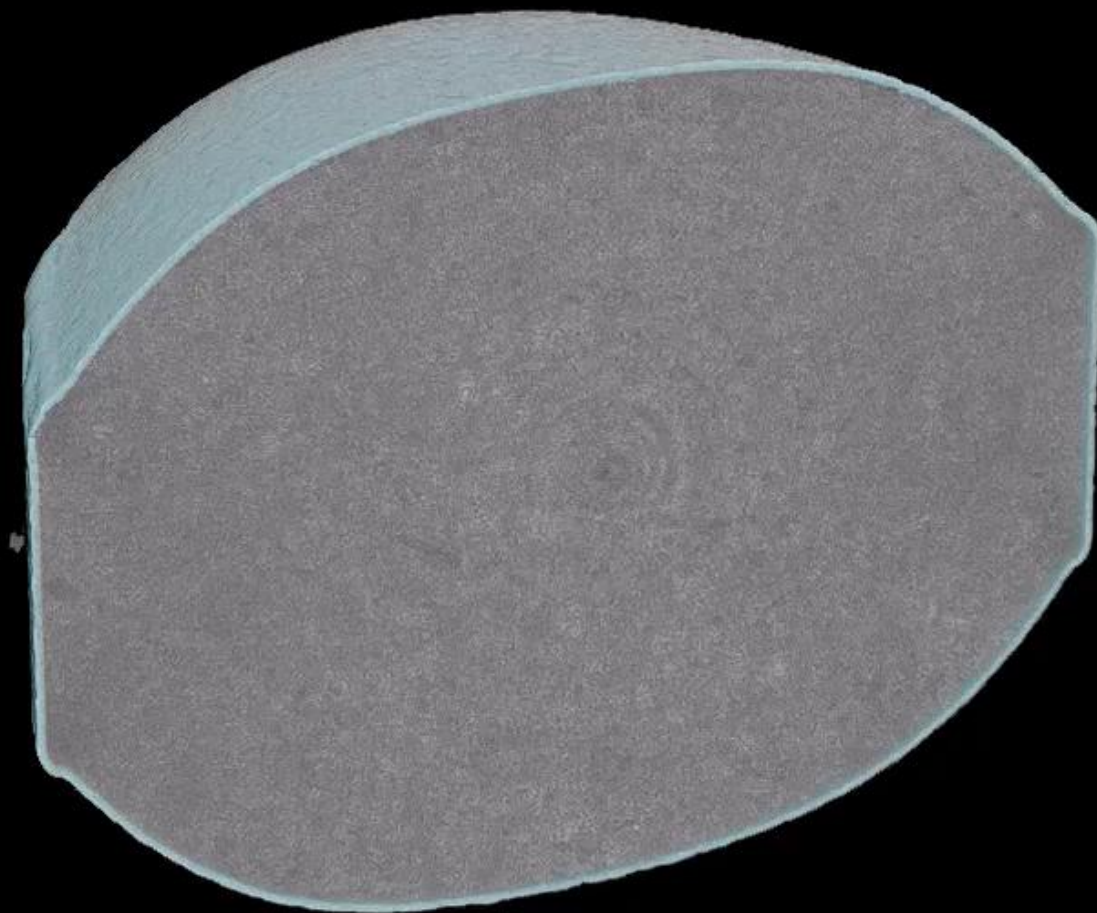
### Results

Total volume = 21.74 mm<sup>3</sup>

Mean structure size = 0.24 mm

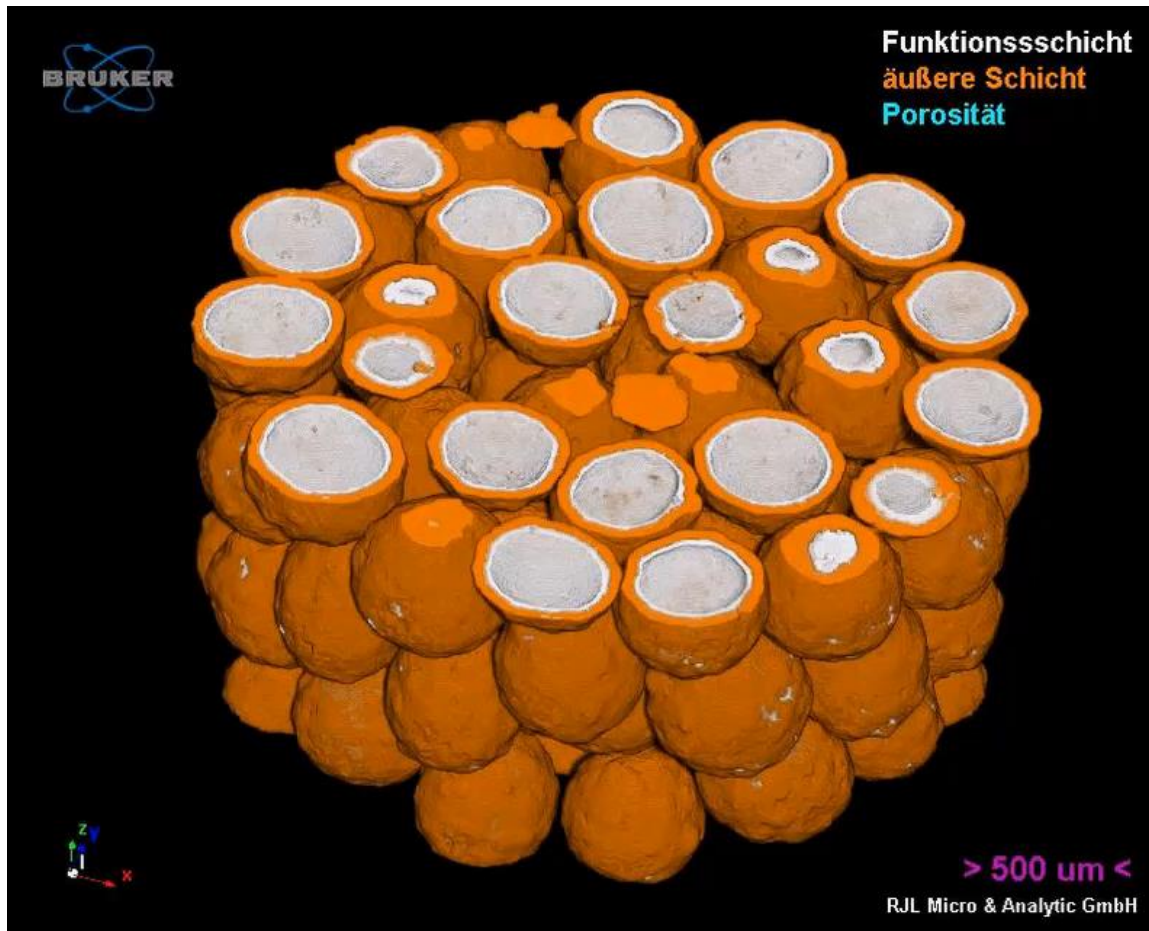


# Defects in Tablet Coating



# Selected Applications

## Micro Pellet Defect Analysis in Hard Capsules



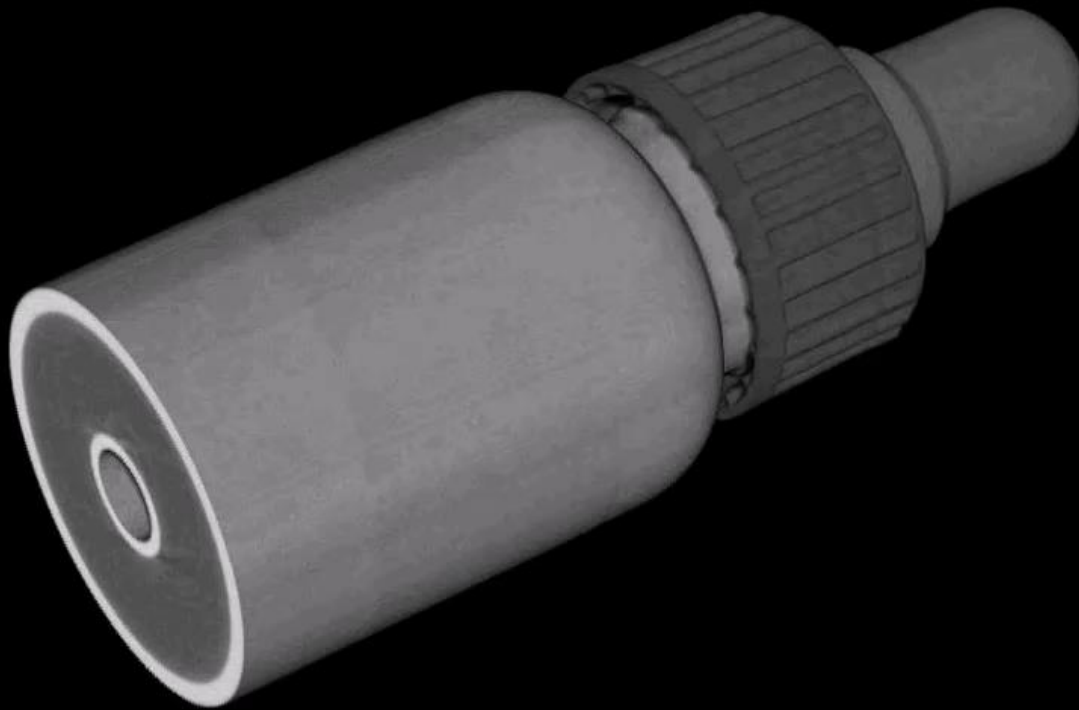
### Results

191 micro pellets scanned  
174 defective / 17 intact

- **more than 90% defective**
- **reproducible drug release impossible**

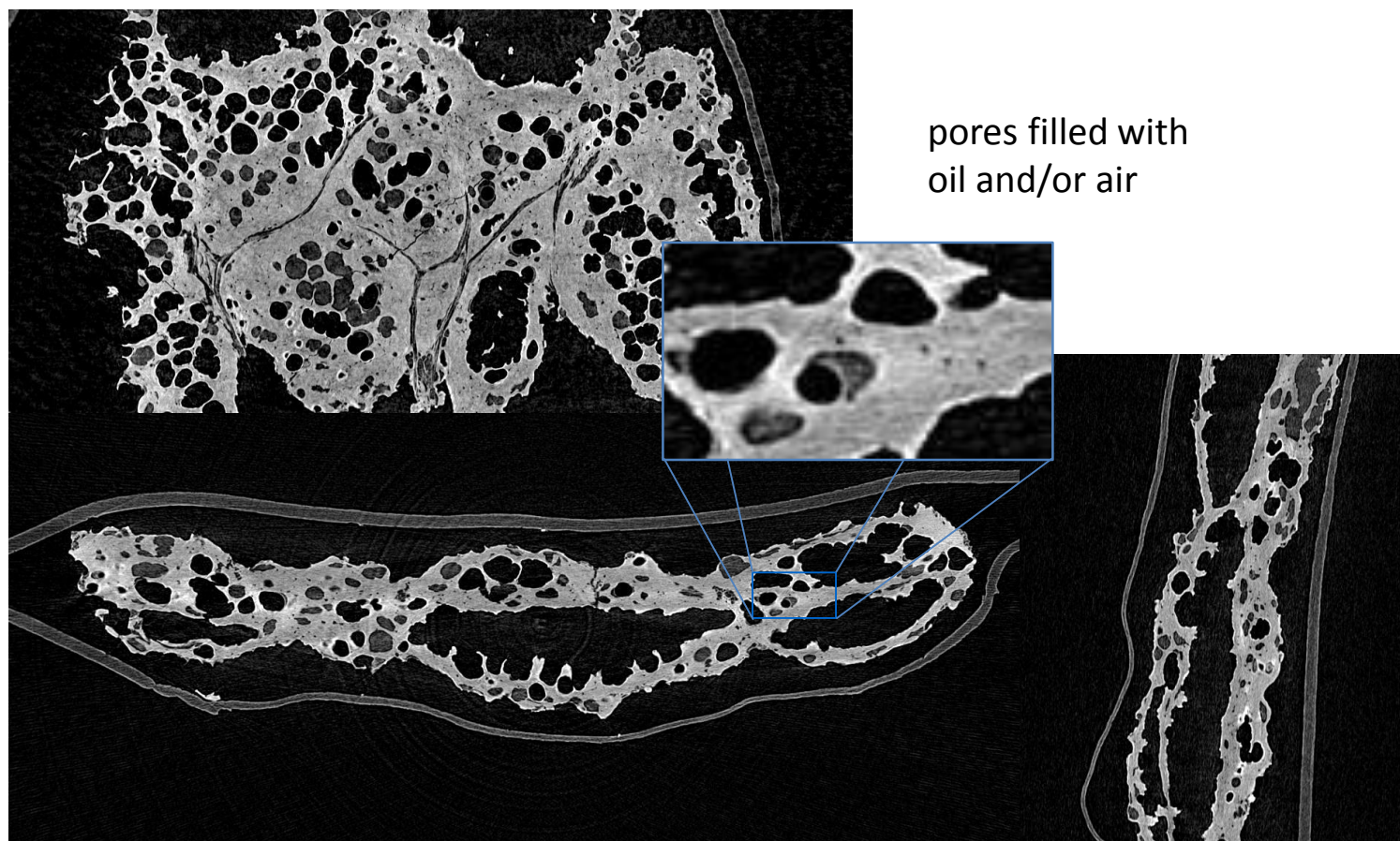


# Dropping Pipette with Bottle



# Selected Applications

## Development of Fat Reduced Potato Crisps



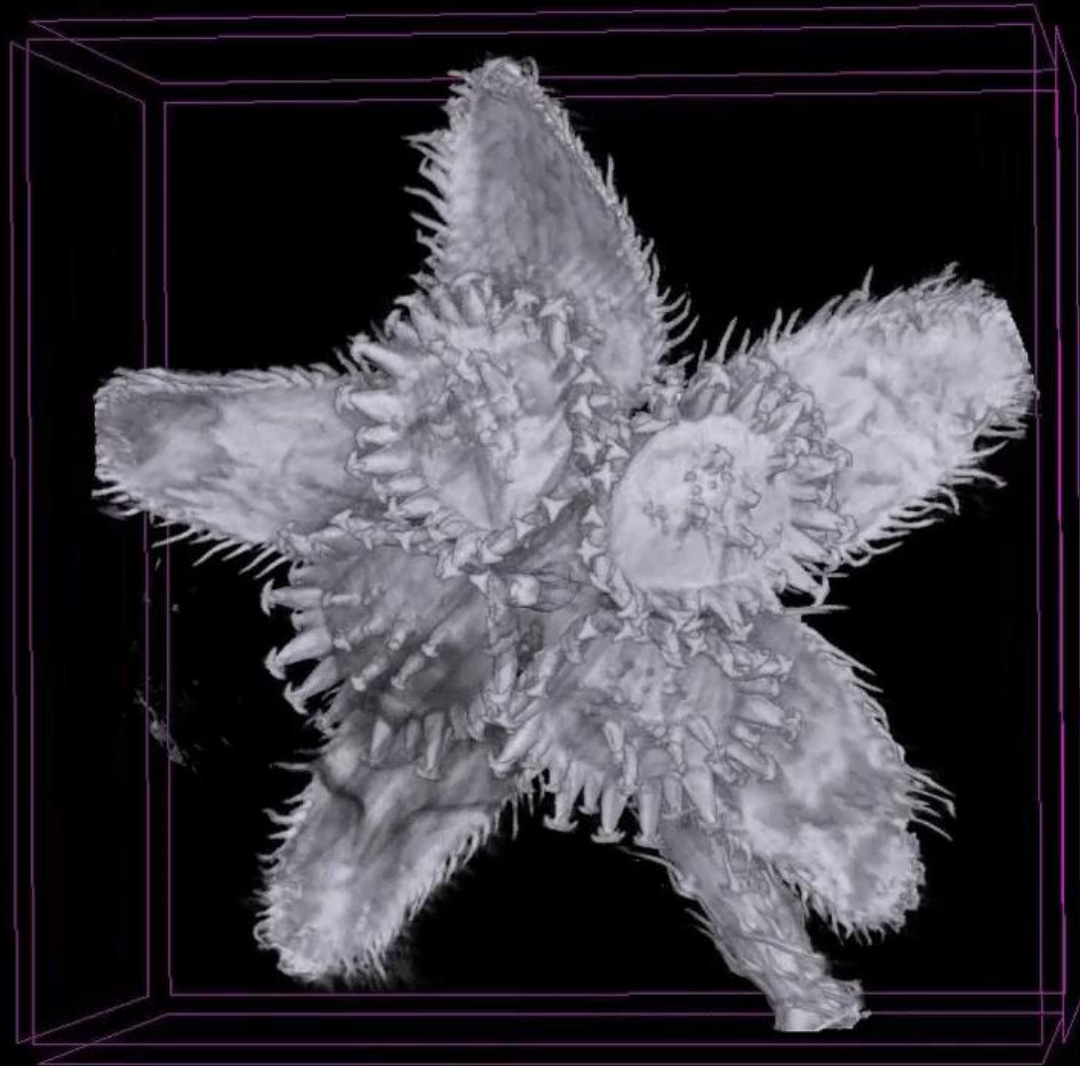
Potato crisp, SkyScan 1172, 3  $\mu\text{m}/\text{voxel}$ , 70 kV

# Insect-Eating Plant

SkyScan 1272

6  $\mu\text{m}/\text{voxel}$

40 kV



# Coloburiscus Insect

SkyScan 1272

1  $\mu\text{m}/\text{voxel}$

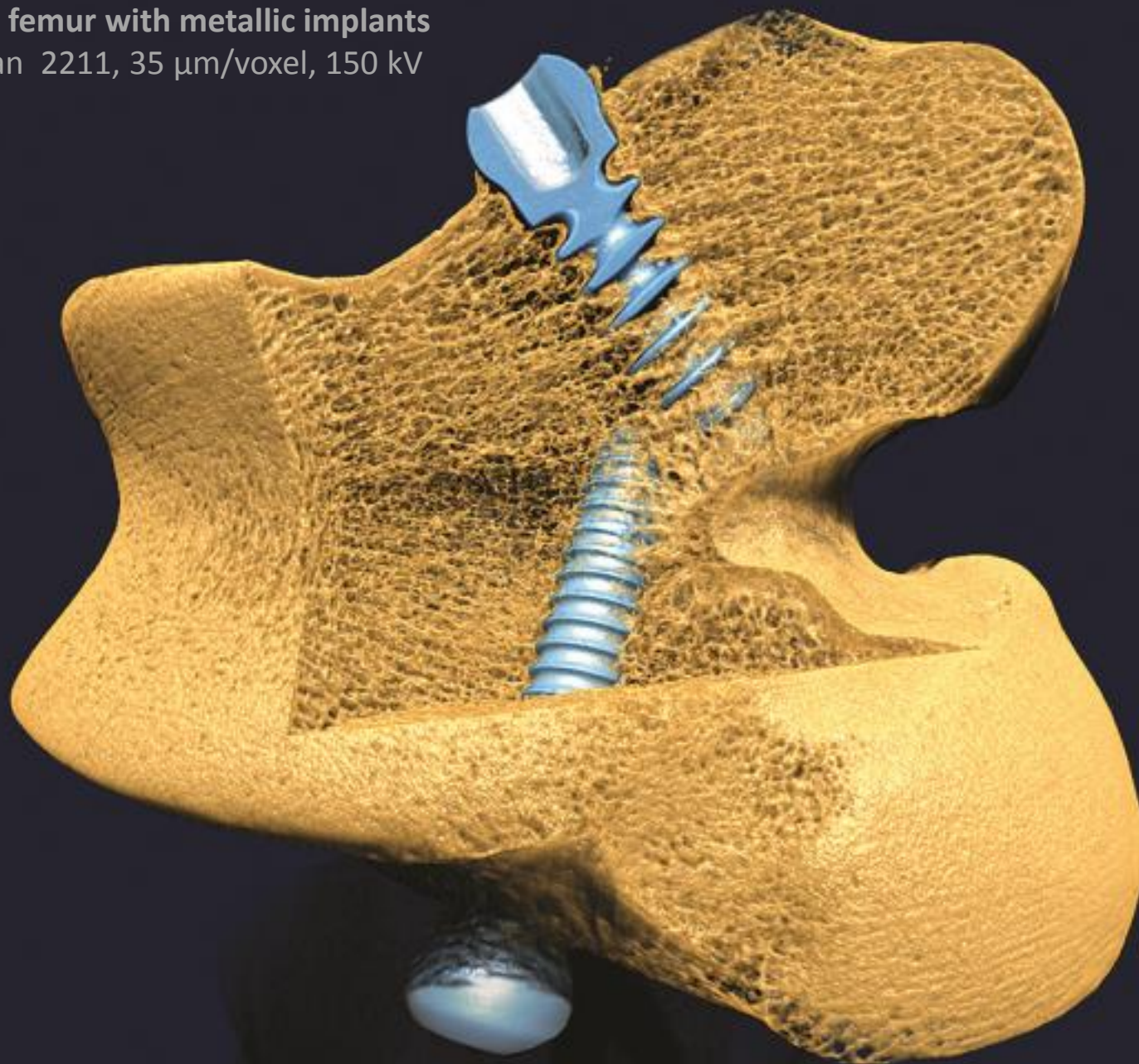
40 kV



> 250  $\mu\text{m}$  <

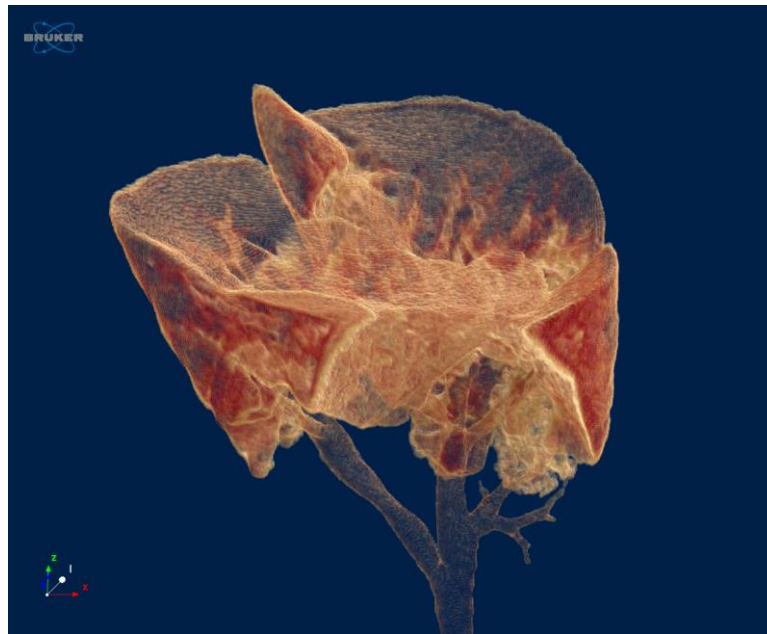


Sheep femur with metallic implants  
SkyScan 2211, 35  $\mu\text{m}/\text{voxel}$ , 150 kV



# Further Information

RJL Micro & Analytic GmbH  
76689 Karlsdorf-Neuthard, Germany  
[www.rjl-microanalytic.de](http://www.rjl-microanalytic.de)



breathing mouse lung (in-vivo scan)