

# Applications of computed microtomography at DSM Resolve X-ray tomography

Geleen, 2015

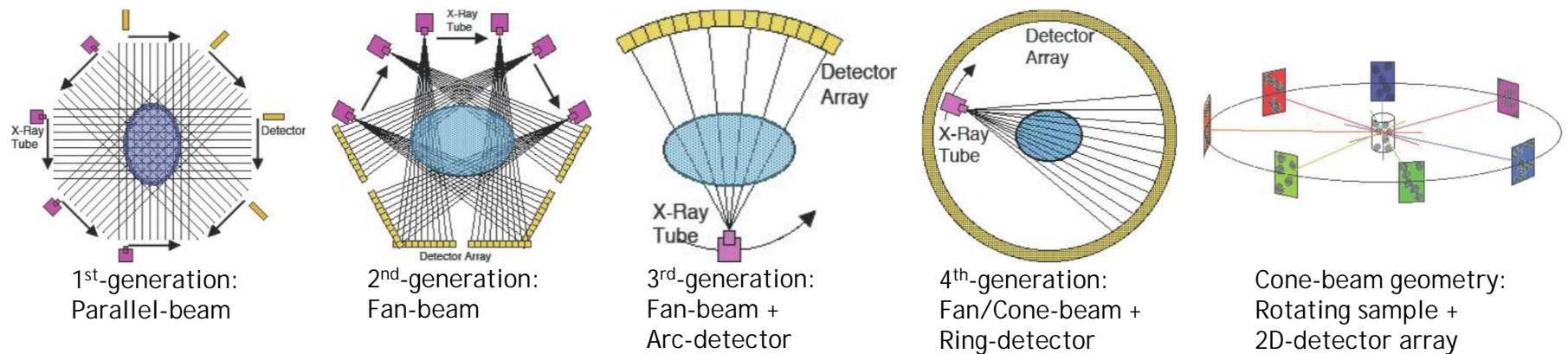
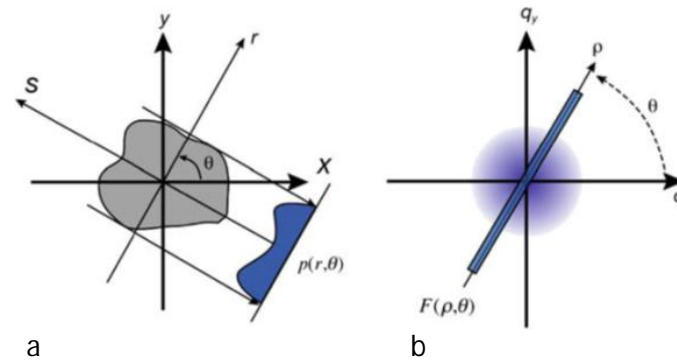
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06-12028252

# What is possible with X-ray tomography

- Visualize internal structure of relatively large specimen
  - Up to 7 cm height and 7.5 cm diameter
- Analyze
  - Particle features, pore features, homogeneity of distributions
- Size limitation
  - Smallest detectable size 0.45 micron (1 pixel)
  - Reconstructed volume 11840x11840x2150 pixels
- Density limitation
  - Attenuation is measured: combination of atomic number and density

# Tomographic acquisition

- Acquisition:
  - Projection = sum of absorptions
- Several modes:
  - Important for reconstruction

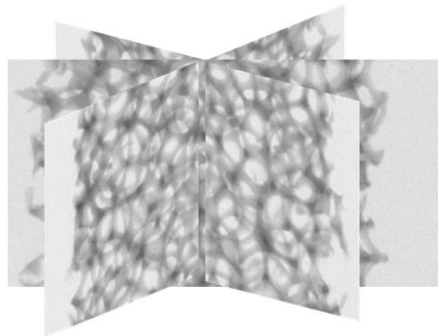
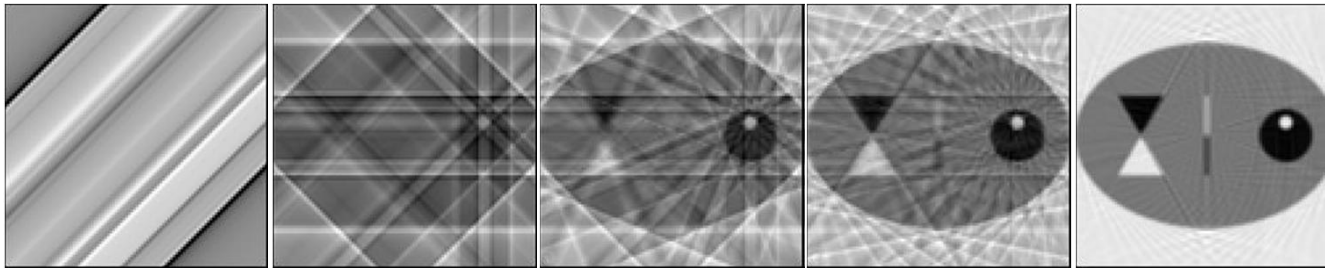


Life Sciences

Material Sciences/Industry

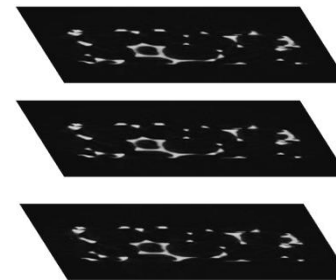
# Image reconstruction

- Back-projection reveals the original image:
  - Example of 2D-reconstructed image from 1D-projections



*\*Tilt increment of usually ~ 1° or less*

Tilt-series of Alu foam



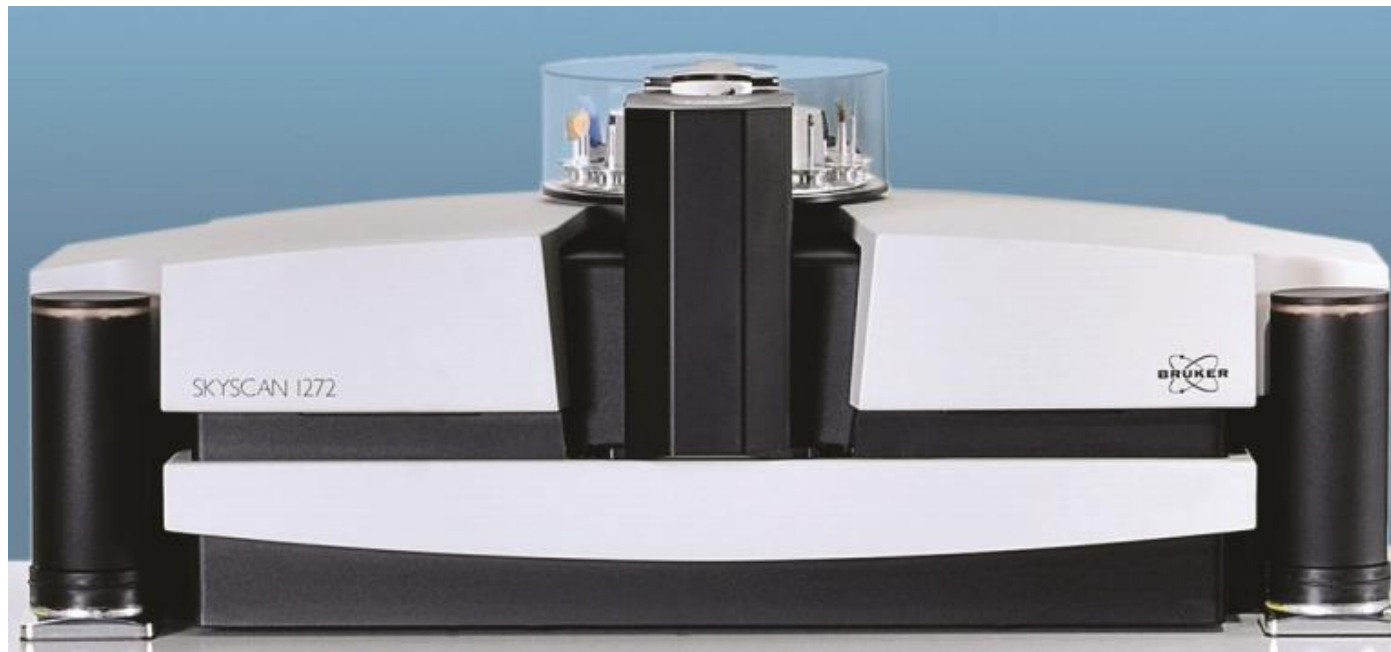
Stack of back-projected images of Alu foam

# Materials

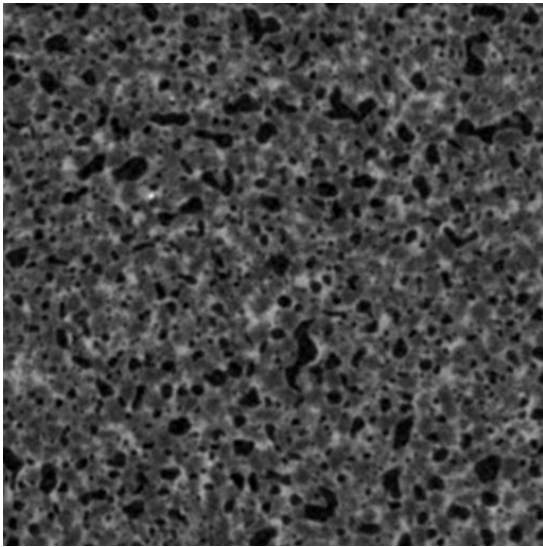
## Equipment and Materials

### Equipment:

- SkyScan 1272, High-Resolution Micro-CT equipped with an 11MP camera and a sample changer (16 items)

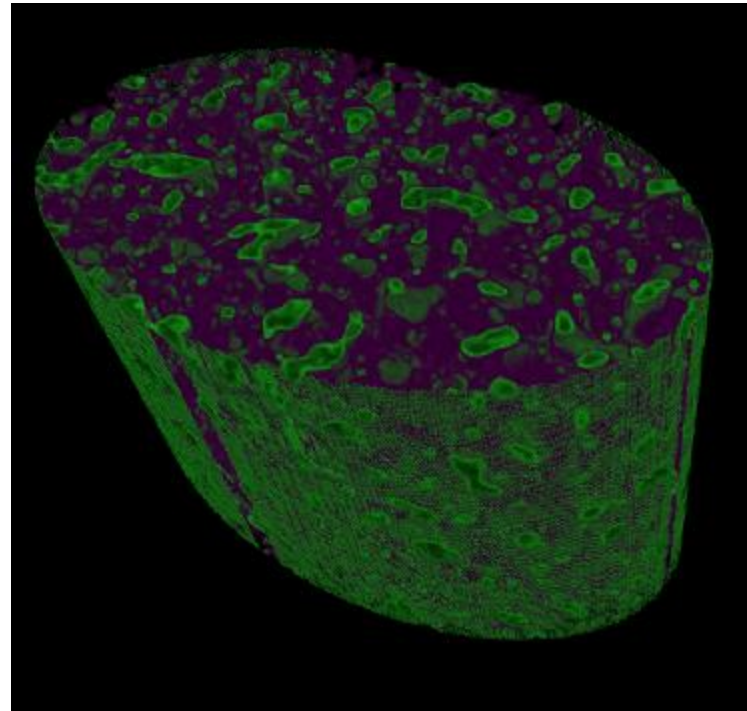


# Example: Porous graphite

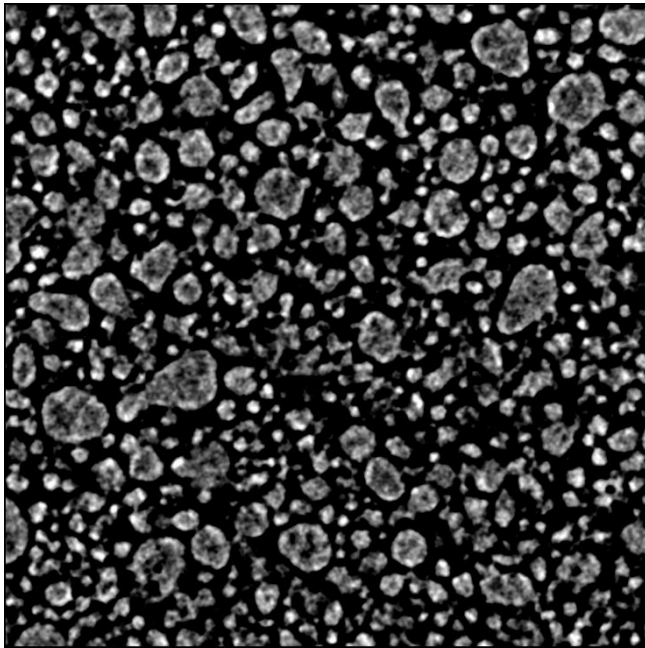


Rendered image of raw data:

- Pore size distribution
- Total porosity (closed and open)

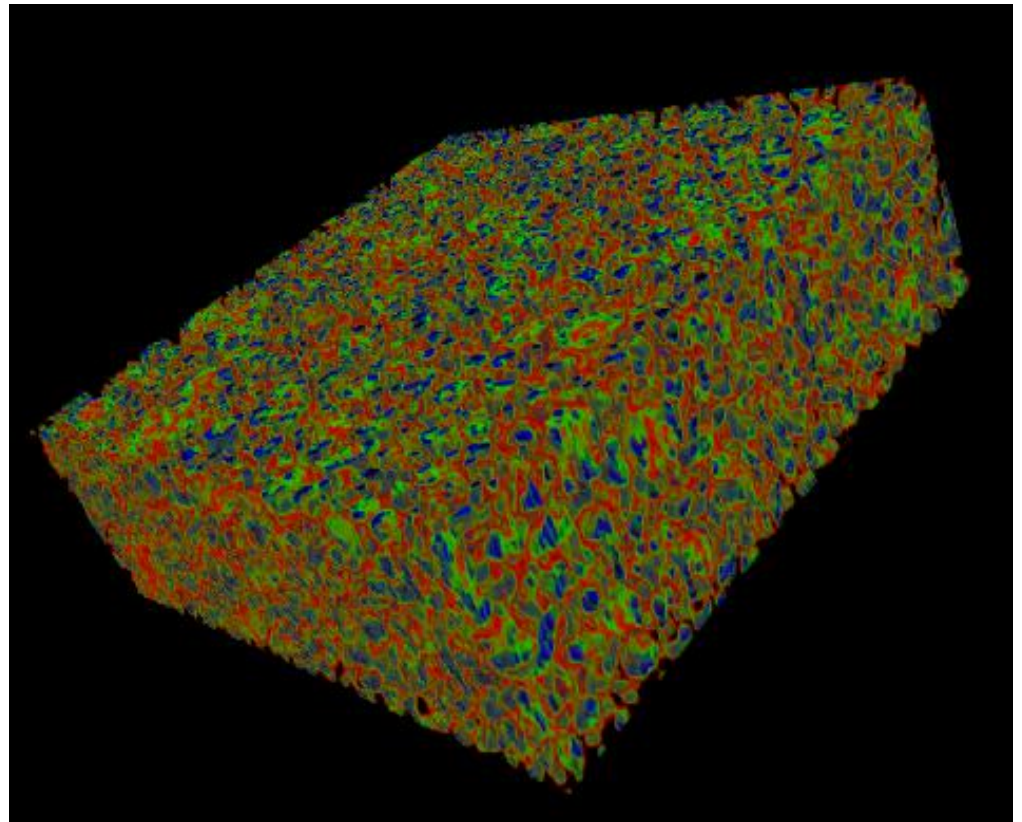


# Example: particles

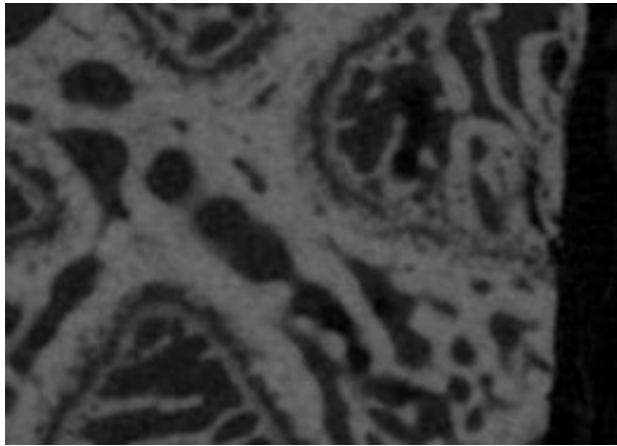


Rendered image of raw data:

- Particle size distribution
- Nearest neighbor distances (homogeneity)

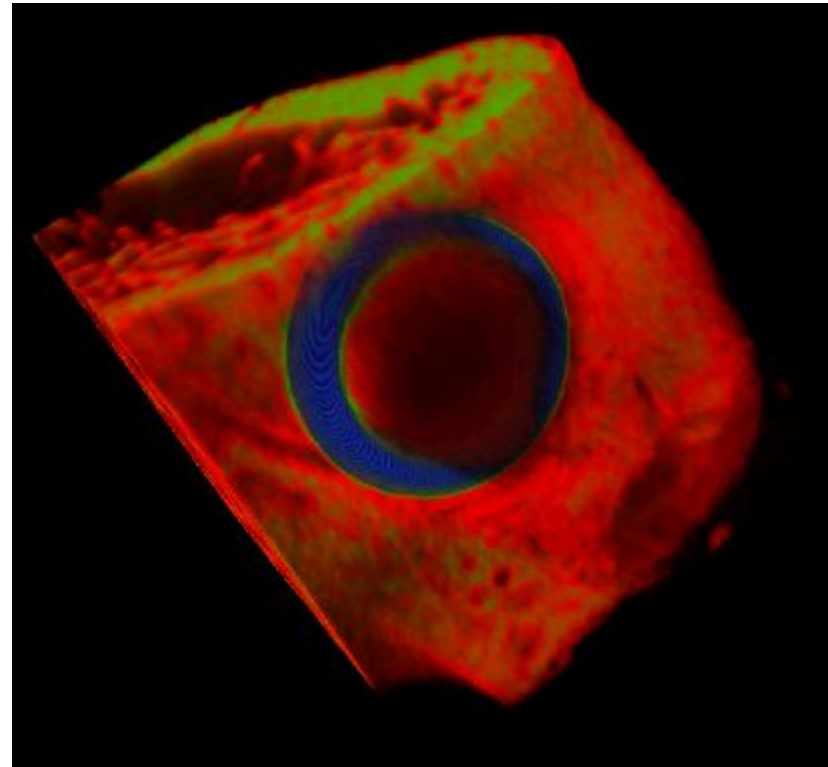


# Example bone implant



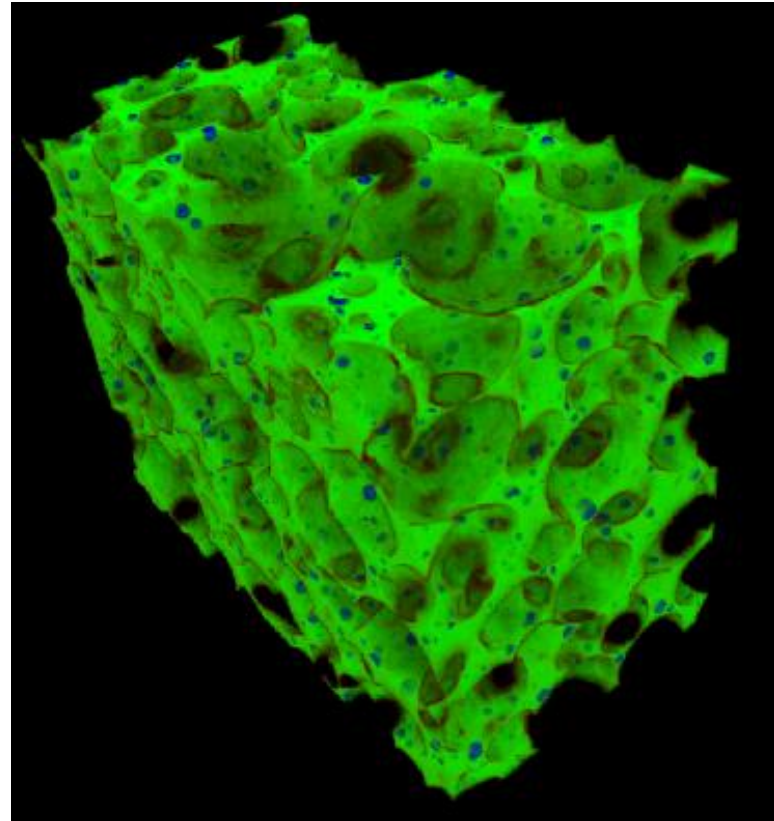
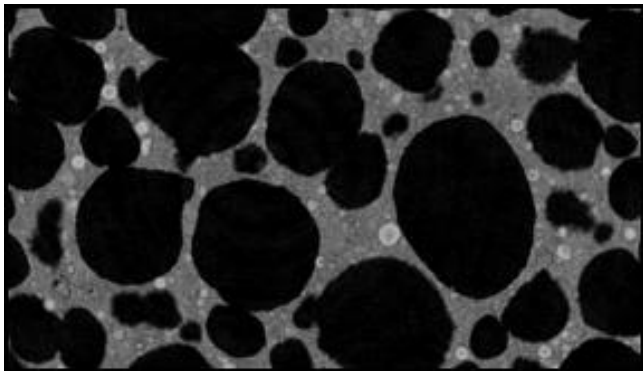
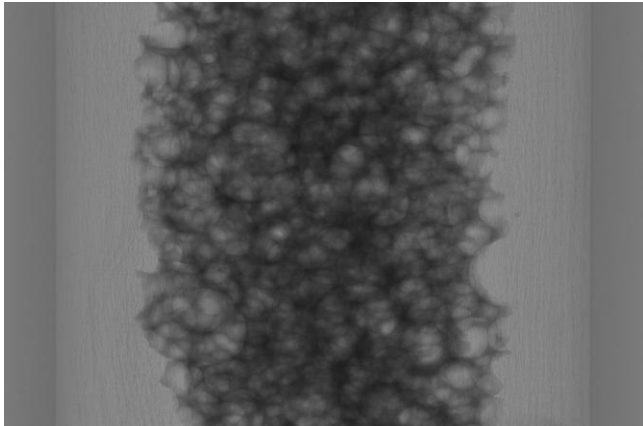
Rendered image of raw data:

- Connection to surrounding material
- integrity





# Triphosphate scaffold



Rendered image of raw data:

- PSD of particles
- Pore size distribution
- Open vs. closed pores



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