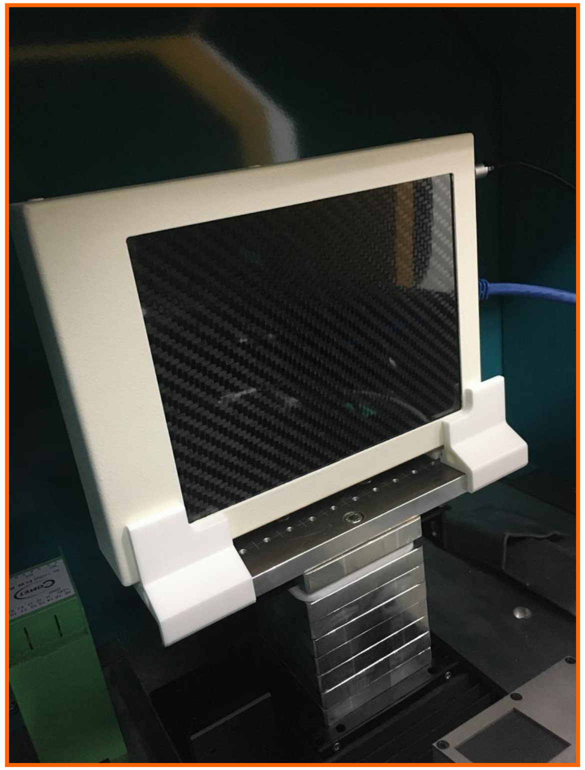
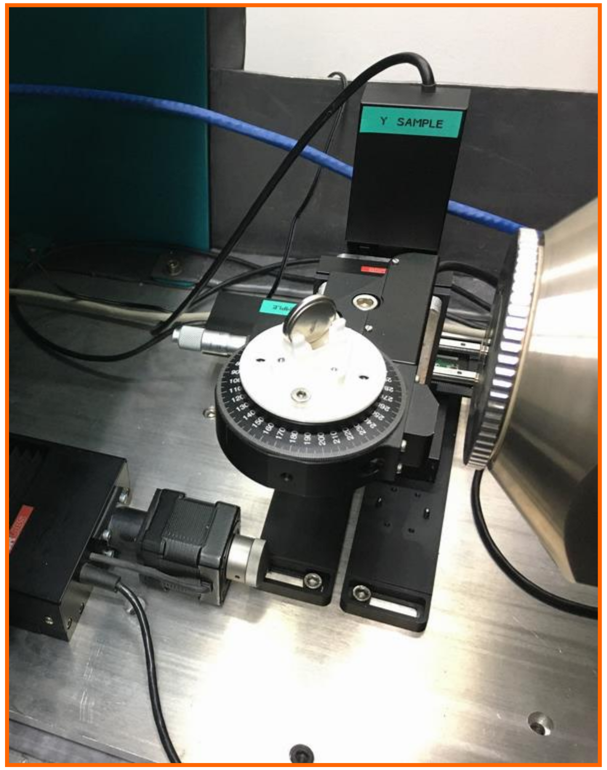
# T07 Computed X-Ray Microtomography - CERTH

TEESMAT
Open Innovation Test Bed for Electrochemical Energy Storage Materials

## How it works

A very small x-ray source (diameter ≈ 1 μm) projects a beam through the sample onto a high resolution sensor which can records a digital radiograph on a computer. A large number of radiographs is recorded while the sample is rotated in small increments about an axis normal to the projection direction. Back-projection computations are used to combine the radiographs into a 3-D tomographic representation of the sample.






## What kind of sample ?

- **Coin cells** (max. ∅25 mm, approx. 80% sample imaged)
- **Cylindrical cells** (up to ≈ ∅ 30 mm, 50 mm length)
- **Pouch cells** (width × thickness up to ≈ 50 mm × 5 mm)
- **“Swagelok” type cells** or similar (preferably < ∅12 mm)
- **Electrode material** (circular coupons ≈ ∅4 mm, near 1 μm resolution possible)
- **Anode powder** (deployed as a cylindrical plug ≈ ∅4 mm in a plastic tube)

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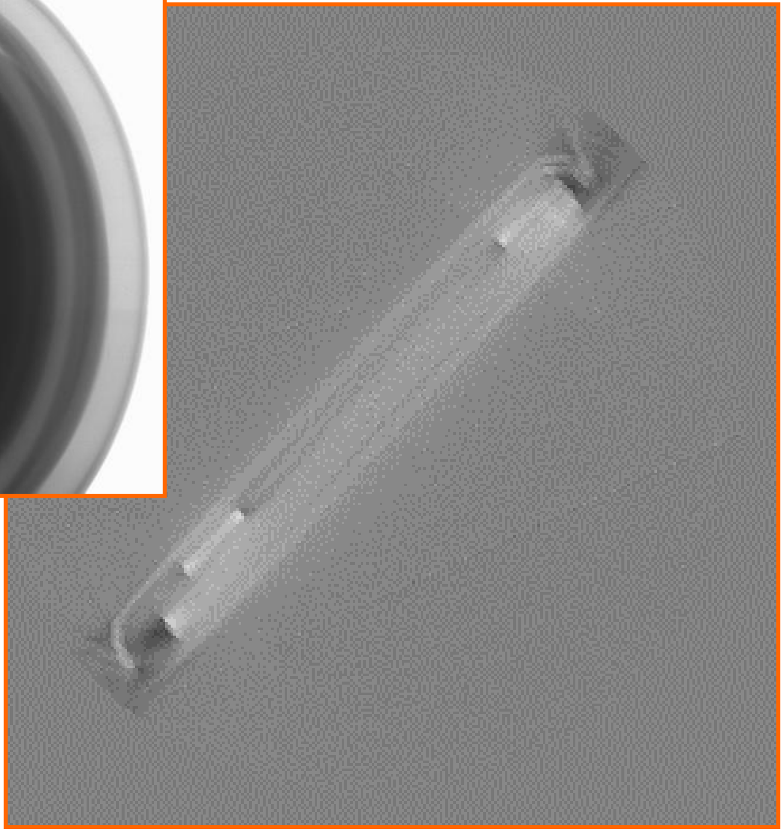

## What can be seen

Virtual sections (tomographs) through the sample.
Geometric features / pore morphology (as long as there is adequate density contrast)
Cracks, voids, deformation, homogeneity of packed powder material.

## Why is it useful ?

- Production control (verify geometric features, homogeneity)
- Non-destructive inspection
- In-situ cycling – correlate charge state to internal deformations or dendrites
- Understaning  failure mechanisms (post-mortem internal deformations, voids, etc.)

**Investigation time-scale** : 1 – 3 days per sample

**Maturity level** : - mature for resolutions > 5 µm

- per sample optimisation needed for ≈ 1 µm

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