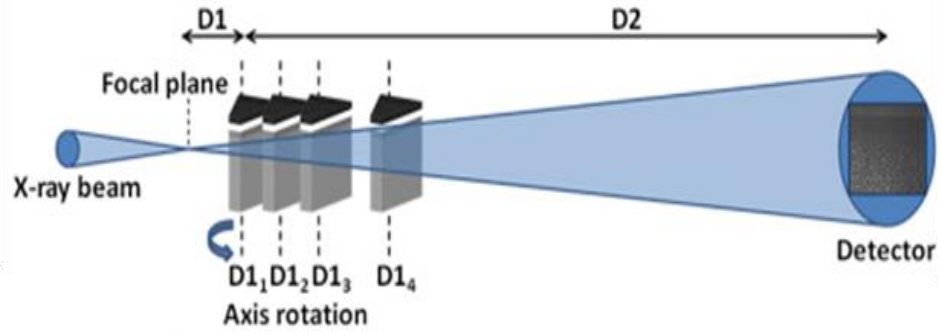
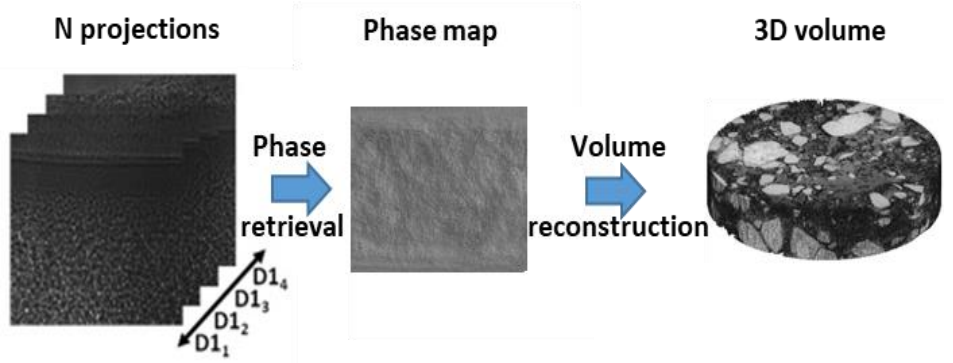
T8 NANOTOMOGRAPHY - ESRF

TEESMAT
Open Innovation Test Bed for Electrochemical Energy Storage Materials

Principle:

X-ray nano-tomography is a **phase** contrast imaging technique that provides **3D** high spatial resolution microstructural information within a sample. The high flux and high coherency of the synchrotron X-ray source helps resolve complex microstructure of material, even in the case of **low attenuating** material, with **fast acquisition rate** at the **nano-scale** level.



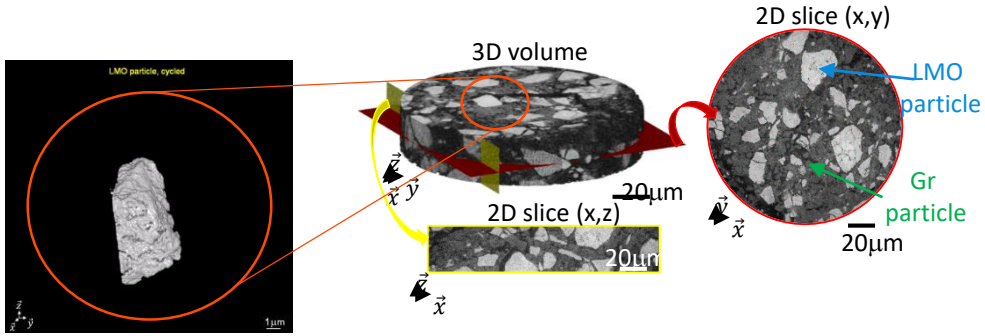


Notable features:

- Energy: 17.5/29.6 keV
- Acquisition under normal atmosphere condition
- Voxel size: from 25 to 150 nm
- Corresponding field of view: 64x64x54µm³ to 384x384x324µm³

Investigation time-scale : single acquisition ca. 1h

Maturity level : advanced



Movie of a 3D LMO particle (25 nm resolution)

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The European Synchrotron | ESRF

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Sample requirements:

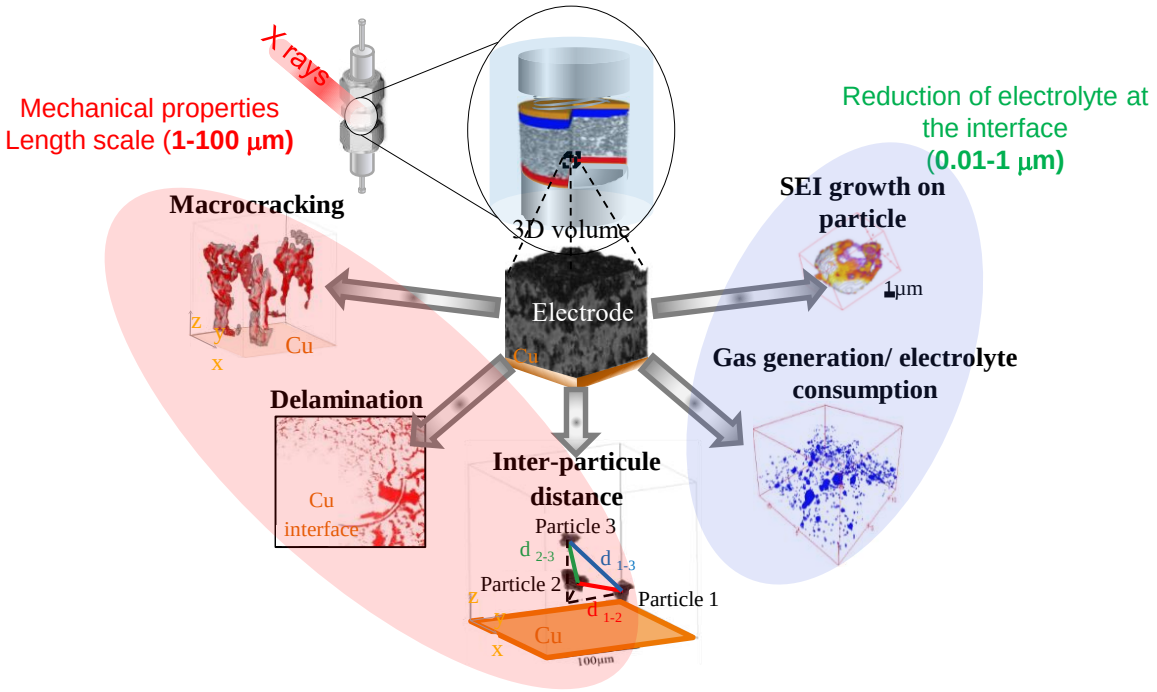
- **Ex situ/post-mortem** analysis: Extraction of a small part taken out of the original electrode/ battery components (typically ca. **250 μm – 1mm diameter**).

Nota: Encapsulation under Ar can be considered depending on the case study.

- **In situ/operando** analysis: In house developed cell with **1mm** diam. electrodes. Can be considered following the case study.

Technique application:

This technique can be useful in various field of application for complex material, that requires access to 3D information with high spatial resolution. Different 3D parameters (porosity, volume fraction of different phases, particle size distribution, tortuosity, areal surface, etc.) can be extracted thanks to an extrenal service provider Xploraytion.



- Production control/ process optimization (particle size, phases % ….)
- Performance/durability: degradation over cyclelife (electrode cracking, delamination, gas formation, electrolyte consumption, etc.)