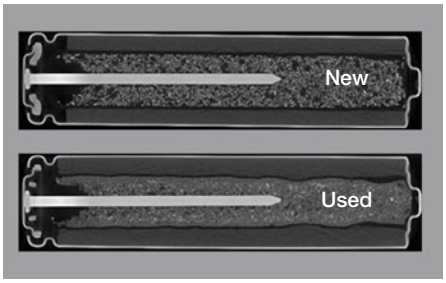
Multiscale Imaging of Batteries

Imaging techniques such as microCT, SEM, FIB-SEM and TEM are used to study the 2D and 3D morphology of battery components at different stages in the lifecycle.

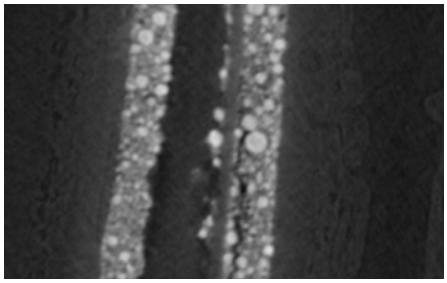
These techniques cover the full length scale from the cell level with microCT down to the atomic scale with TEM. 3D imaging is necessary to provide a complete geometric evolution of the electrode microstructure upon cycling. Geometric parameters such as volume fraction, surface area, particle size distribution and tortuosity are typically assessed using a combination of microCT and FIBSEM techniques.

3D imaging at the battery level with microCT



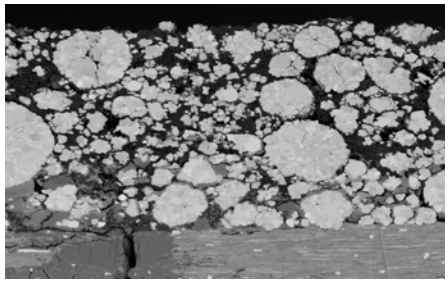
New and used AAA battery

3D imaging at the electrode level with microCT



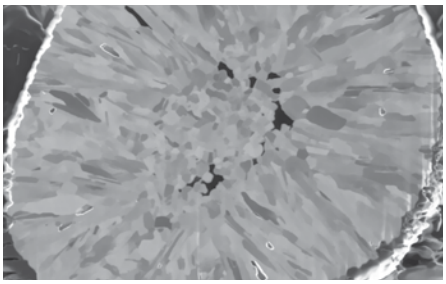
Quality control of cathode sheets

3D imaging at the electrode level with Plasma FIB-SEM



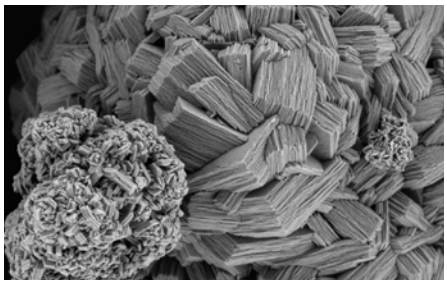
A 100 micrometer wide section of a battery cathode as part of a 3D reconstruction

3D imaging at the active material level with FIB-SEM



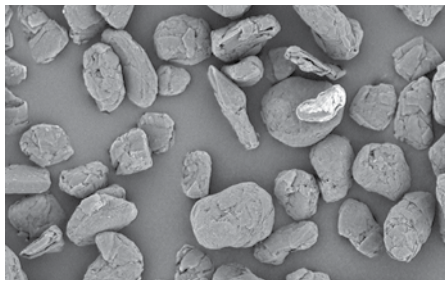
Section through an NMC cathode particle

High resolution 2D imaging in the SEM



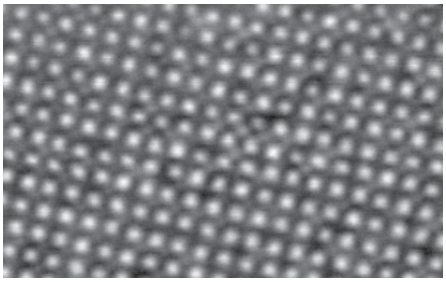
Cathode active particle morphology

Quick and easy imaging in the desktop SEM



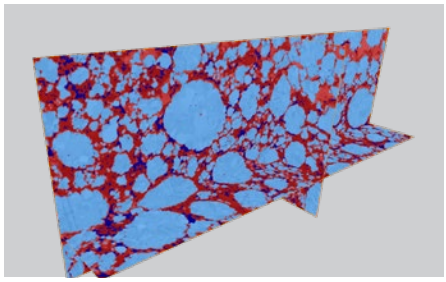
Quality control on graphite anode particles

Atomic scale characterization with TEM



Direct imaging of Li-atoms in the lithium oxide crystal structure

2D and 3D image analysis with Avizo Software



Three phase segmentation of a battery cathode

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microCT

TEM

FTIR

desktop SEM

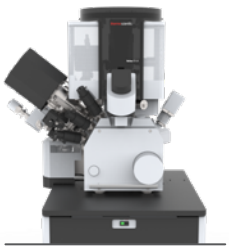
XPS

GC

FESEM

XRD

NMR



FIB-SEM

Raman

HPLC

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