



Lithium metal as negative electrode : electrochemical and metallurgical aspects

Context

Lithium metal :

- Extremely high theoretical capacity (3860 Ah/kg)
 - Very low electrochemical potential (-3.04V vs SHE)
- The most promising material for batteries

Lithium characterization :

- Lithium metal manipulated under inert atmosphere (sensible to humidity)
- Only few studies on lithium metallurgical aspect

Aim :

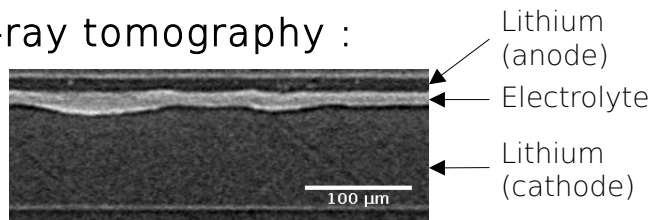
→ Improve our knowledge on lithium metallurgy to explain the failure of actual batteries and enhance their performances

Method and tools

Characterization of different types of cells and their comparison :

- Lithium/Electrolyte/Lithium (LEL)
- Lithium/Electrolyte/Cathode (LEC)
- Complete stacks

X-ray tomography :



Example of an X-ray tomography scan : slice of a LEL cell after oxidizing 80% of the anode

Other techniques :

- Electrochemical impedance spectroscopy
- MEB, Optical microscope

Results

- Identification of different phenomena that can lead to batteries failure
- Characterization of lithium grain size depending on different parameters (foil thickness, annealing temperature...)
- Analysis of lithium oxidation and reduction mechanism with the impact of the microstructure