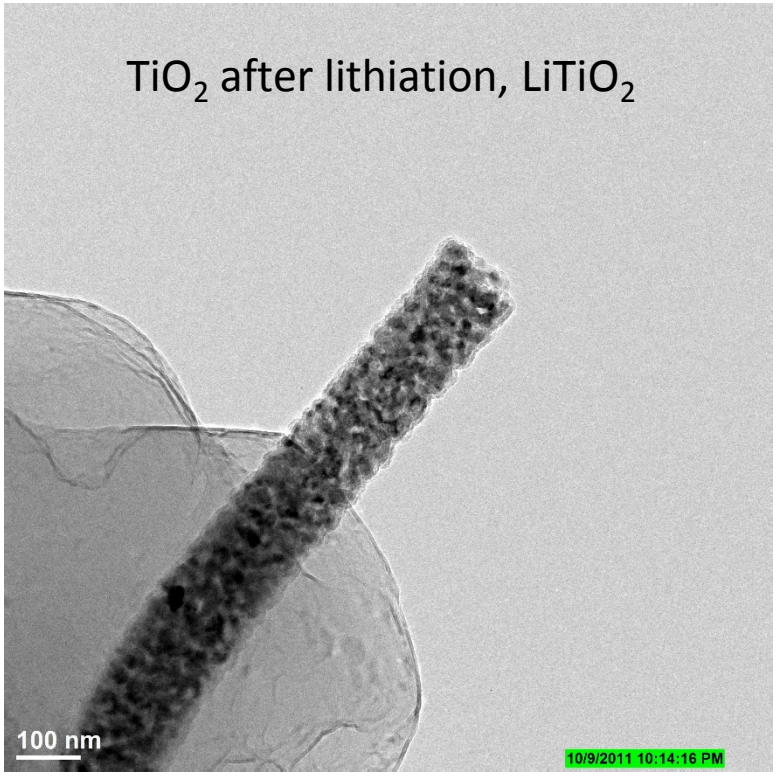
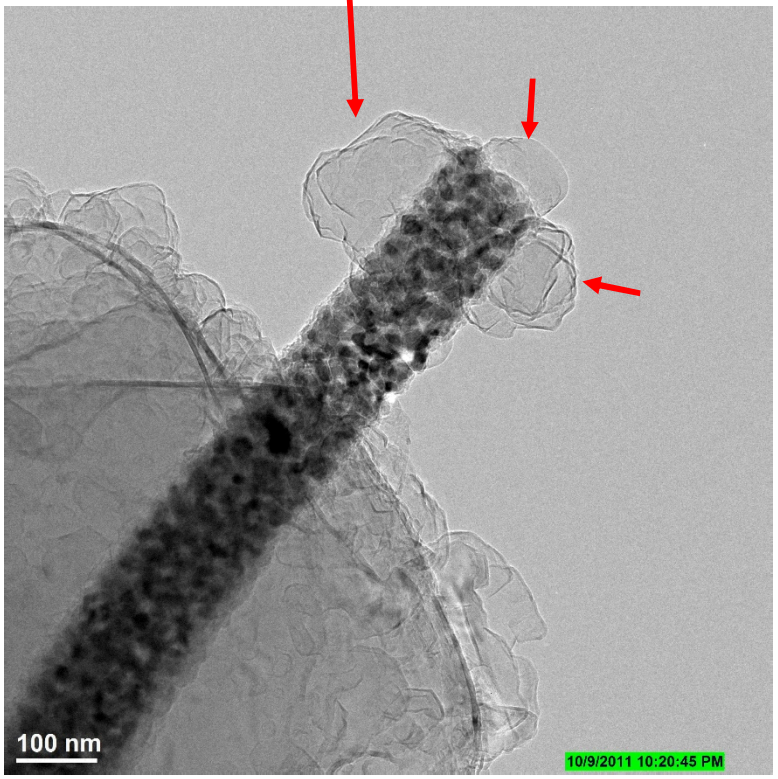
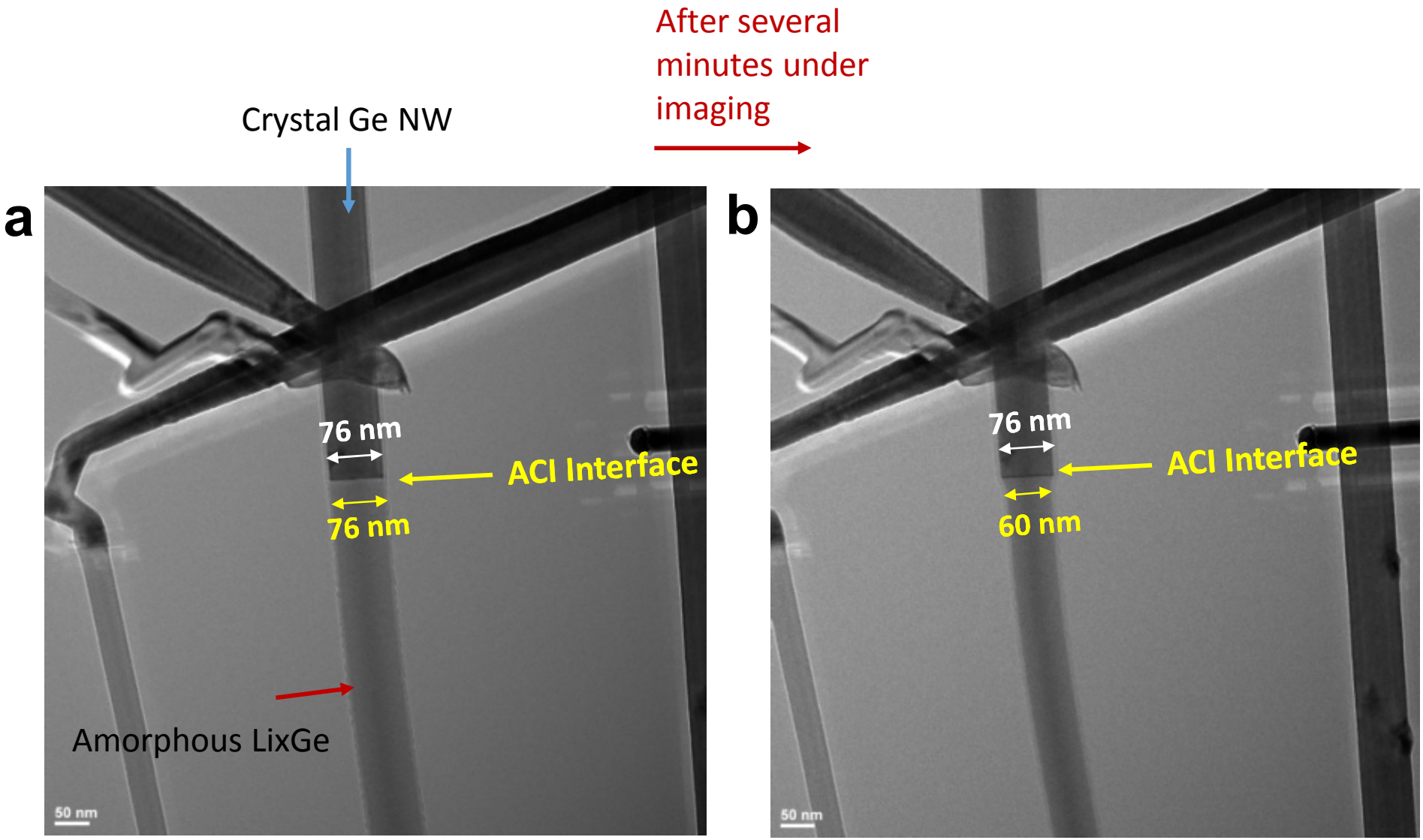
Li fiber growth under electron beam





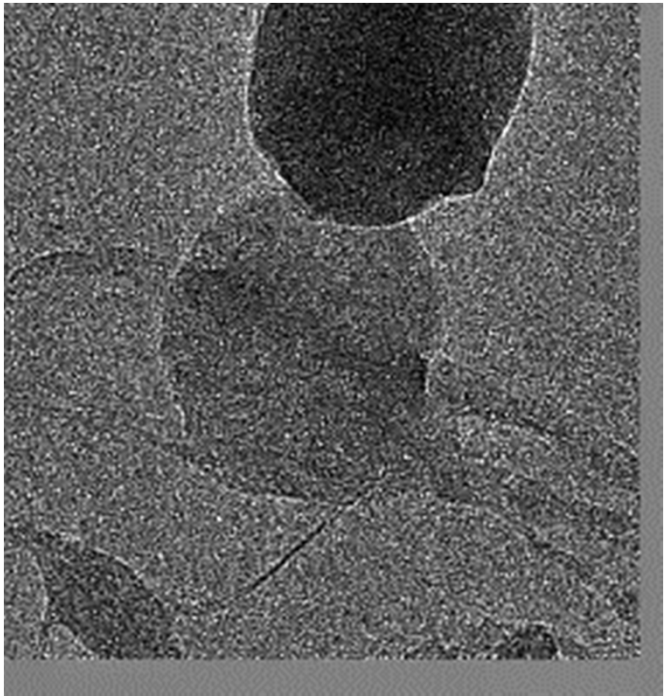
Electron beam induced delithiation in $LiTiO_2$



Electron beam induced delithiation in amorphous LixGe

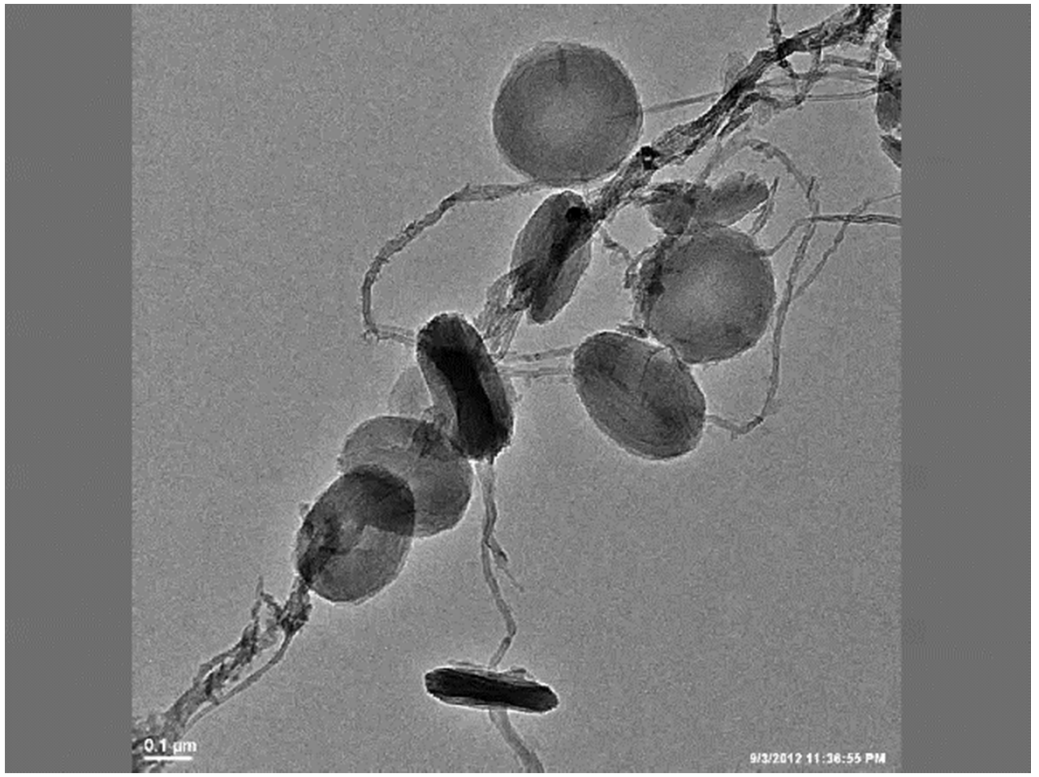
Ref: Nano Letters, **2013**, *13*, 4876–4883

Movies showing the difference of electrochemical oxidation of Li_2O_2 and e-beam decomposition of Li_2O_2



Electrochemical oxidation

Electron beam intensity: < 3A/m^2.
Beam blank experiments, only except for short exposure to beam about 5 seconds every 2min for imaging, and for movie capture.

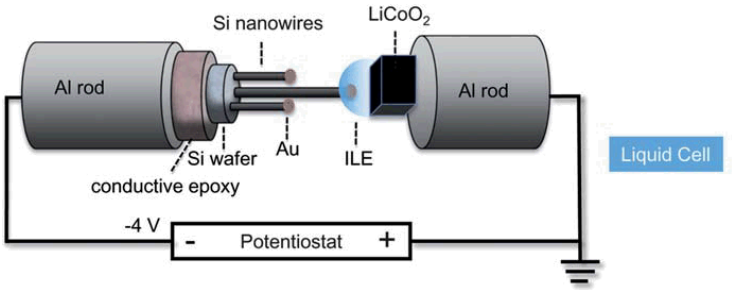


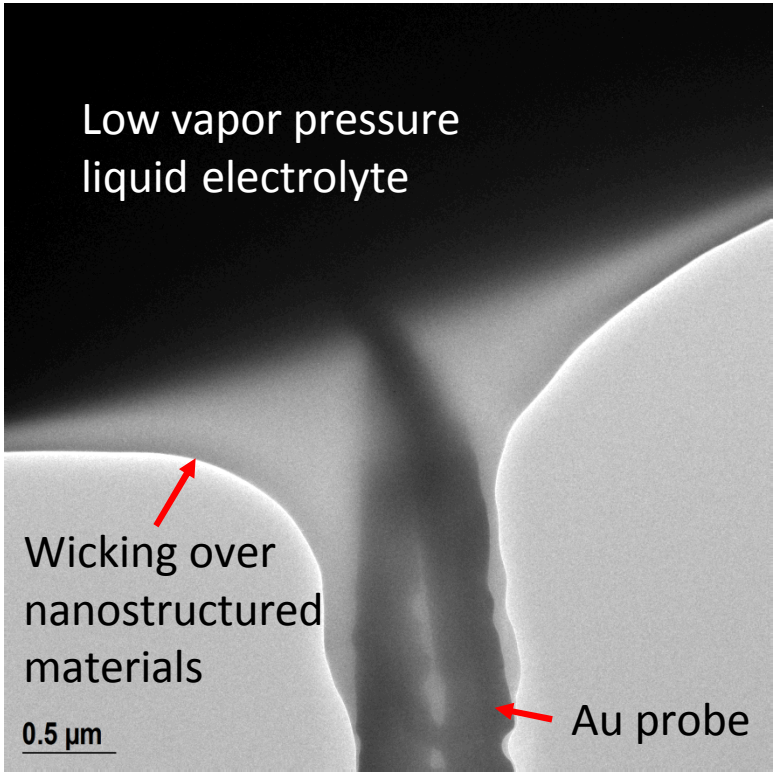
Electron beam decomposition

Electron beam intensity: > 30A/m^2.

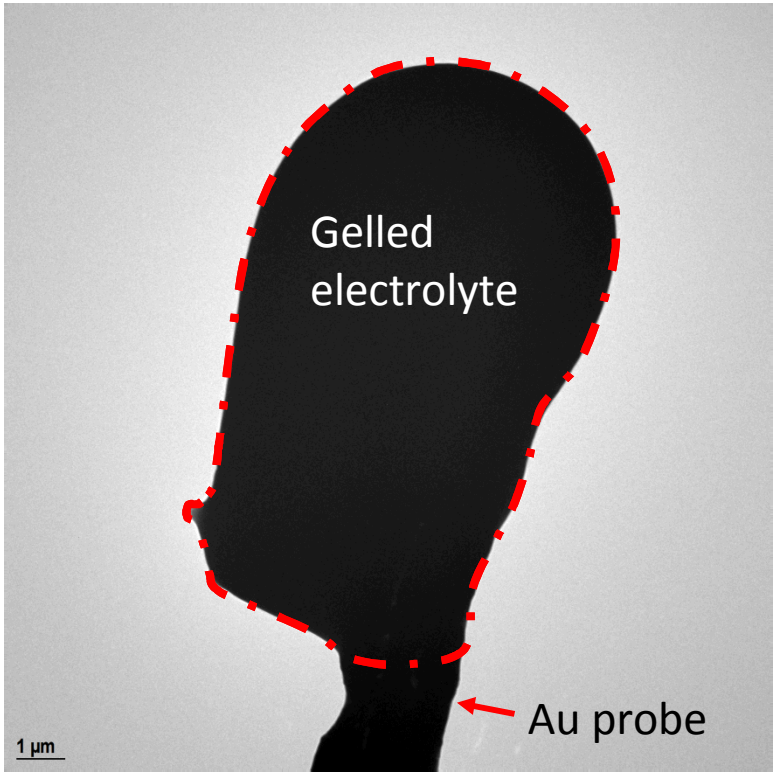
Ref: Nano Letters, **2013**, *13*, 2209–2214

Examples of sample and electron beam issues with ionic liquid electrolyte open cell studies





Wicking of the low vapor pressure liquid electrolyte onto the probe



Electron beam exposure caused gelling of the low vapor pressure liquid electrolyte

How to eliminate electron beam effects in in-situ TEM electrochemistry experiments:

- Try to use as low electron beam intensity as possible (such as spread the beam, lower the spot size).
- Minimize the total electron dose. If the beam intensity is fixed, try to minimize the beam exposure time.
- Always do blank beam experiment for comparison.
- If the observed phenomena can be changed upon changing the beam dose, it is probably an artifact. Thus, varying the beam dose as control experiments are always recommended.
- For some system (such as graphene and carbon nanotubes), can consider lower the acceleration voltage.

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