# Supporting information-Probing and Quantifying Cathode Charge Heterogeneity in Li Ion Batteries

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Table S1. Summary of key charge heterogeneity characterization techniques covered in this review.

| **Technique** | **Properties investigated** | **Sample environment** | **Pros and Cons** |
|---|---|---|---|
| Confocal X-ray diffraction | Bulk crystal structures, phase stability | Electrode samples | Can be used to map phases at different depths of an electrode. Good for thick electrodes. Spatial resolution is less appealing. |
| Transmission X-ray Microscopy (TXM) | 2-D, 3-D imaging, morphological, elemental distribution and chemical state information | Electrode particles, or small regions in electrodes. | Real-space full-field imaging technique. Spatial resolution is ~30 nm. Element-specific. Data collection is slow and challenging for in situ experiments. |
| Scanning transmission X-ray Microscopy (STXM), | 2-D, 3-D imaging and mapping of element distributions and chemical states. | Electrode particles | Scanning imaging technique. Uses X-ray absorption spectroscopy to map elemental distributions and oxidations states. Data collection is slow and difficult for in situ experiments. |
| X-ray tomography | 3-D imaging, elemental distribution, morphological information, oxidation states | Electrode particles, electrodes, cells | Full-field imaging technique. Need to have reconstruction technique to build 3D images. Can be coupled with XAS to give composition and oxidation state information in 3D. |
| Scanning transmission electron microscope (STEM)-electron energy-loss spectroscopy (EELS) | 2-D, 3-D imaging, elemental mapping, oxidation states, | Nanoparticles | Scanning imaging mode, with good spatial resolution, elemental and oxidation state mapping, potentially 3D with reconstruction |
| Raman imaging | 2-D imaging | Electrode samples | Spatial resolution is limited. easily accessible in most institutions. |