

In situ X-ray diffraction studies of reaction heterogeneity in rechargeable batteries

Hao Liu¹

¹*Binghamton University*

liuh@binghamton.edu

Reaction heterogeneity in battery electrodes arises when charge and discharge are limited by charge transport. Understanding where and how such heterogeneity occurs is important to inform the design and development of next-generation batteries. In situ X-ray diffraction is a powerful technique to study the charge and discharge processes in rechargeable batteries. Recent developments in sample environment and measurement modality have enabled the study of reaction heterogeneity spanning different length and time scales. Here, we demonstrate the spatial heterogeneity revealed in a tubular cell by in situ synchrotron X-ray diffraction and the adaptation of the long-term measurement in a lab-based X-ray diffractometer to interrogate the long-term degradation in electrodes. Implications of the reaction heterogeneity will be discussed in relation to the function and degradation of battery electrodes.