UCLA College | Physical Sciences Chemistry & Biochemistry

Chem 218: Student Exit Seminar

"Structural Stability and Phase Transformation Behavior in Nanostructured Energy Storage Materials"

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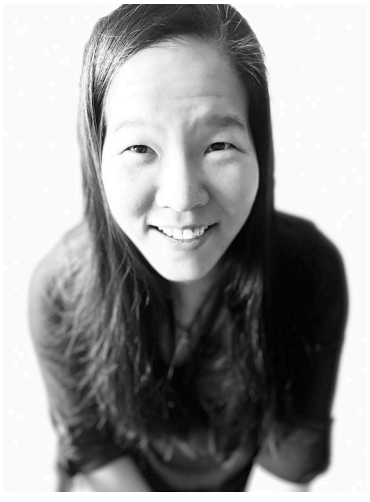
Abstract: Novel battery technology must be capable of providing increased energy density and power density to keep up with global energy demand. Several energy storage materials ($LiMn_2O_4$, MoS_2, and SbSn) have been synthesized as nanoporous architectures to reduce ion diffusion length, mitigate volume changes, and enhance structural stability. We employ *operando* synchrotron x-ray diffraction (XRD) and total scattering / pair distribution function (PDF) analysis techniques to give insight into dynamic changes in average structure (crystalline phases observed in XRD) and local structure (atom-atom correlations in PDF) during battery operation. Structural evolution is correlated with improved electrochemical properties in terms of fast-charging performance of nanoporous MoS_2 (intercalation electrode) and cycling stability of nanoporous SbSn (alloying anode). We demonstrate that both size and disorder can be used to suppress Li-intercalation induced phase transitions in layered MoS_2 to enhance pseudocapacitive charge transfer.

Thursday, March 17th, 2022
12:00 p.m. I Young Hall 2033
& via Zoom



For questions, please contact: jzabala@chem.ucla.edu