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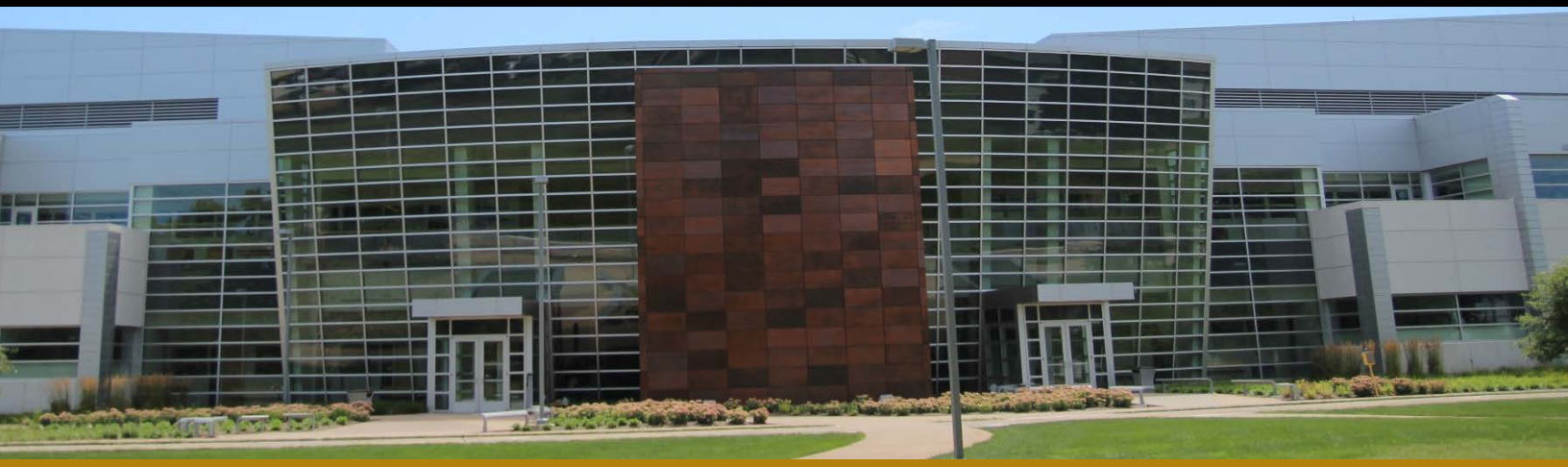

Birck Nanotechnology Center

Spatially Resolved Electrochemical Imaging on Energy Materials

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2:00pm – 3:00pm, BRK 2001

Research Interests: Scanning probe microscopy, 2-D materials, Lithium-ion batteries, Electrochemistry

Abstract: Local electrochemical analyses including imaging techniques play an important role for development of energy materials in electrochemical devices such as lithium-ion battery or electrocatalytic electrodes. Indeed, scanning probe microscopies (SPMs) are key techniques to elucidate their electrochemical activities on the nano-/micro-meter scale. As a well-known scanning probe technique, scanning tunneling microscopy is a powerful technique to analyze the sample with atomic level resolution, but the information is limited to *electronic* conduction. Instead, as an electrochemical SPM, scanning electrochemical microscopy (SECM) uses nano-/micro-electrodes by tracing the electrochemical reaction on the sample which is soaked into electrolyte. Due to the sample inside electrolyte, the electrochemical information obtained would be on the average or be limited in resolution over micrometer scale. For introducing higher resolution and confined electrochemical active area, we have developed scanning electrochemical cell microscopy (SECCM) with a single barrel glass nanopipette filled with electrolyte and a quasi-reference/counter electrode (QRCE) as a probe of SECCM [1,2]. For local electrochemical analysis, SECCM utilizes a nanoscale electrochemical cell which is created between the pipette and sample surface. The cell can limit the electrochemical active area. In this talk, we will show recent progress of nanoscale electrochemical imaging on energy materials from battery electrodes to two-dimensional materials by SECCM.

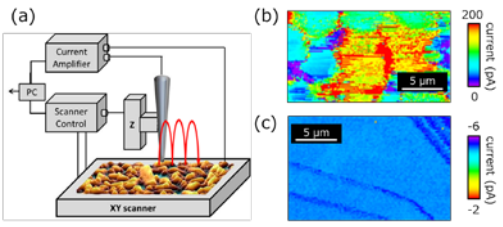

Fig. 1 (a) A schematic diagram of SECCM system, nanoscale electrochemical imaging on (b) $LiFePO_4$ for ion t ransport and (c) graphene edge effects for redox activities.

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