Wednesday, August 6, 5:45 - 6:45 PM

A Journey in Time and Space: Exploring the evolution of correlative X-ray microscopy and its application to Electrochemical Devices

Speaker: Dr. Paul Shearing, University College London

Electrochemical device is a term used to describe a group of technologies including fuel cells, batteries, electrolysers and super-capacitors. Whilst many of these technologies are already in common daily usage, for example Li-ion batteries that power our mobile phones, in the future electrochemical devices will play an increasing role in our lives – from fuel cells that can power our homes to high performance batteries for our cars.

At a microscopic length scale, these devices can be considered as one of a general class of porous materials, whereby the physical microstructure will influence a range of phenomena, including diffusion, catalysis and conductivity – our ability to engineer these microscopic features to maximize performance can be translated to substantial improvements in device design. Furthermore, these materials are likely to evolve over time, in response to range of processing and environmental conditions (sintering, corrosion, failure etc.)

Over the past 10 years the increasingly widespread use of tomography has revolutionized our understanding of these materials. Here we consider examples of our work to explore these materials in three and “four” dimensions, presenting case studies from Solid Oxide Fuel Cells and Li-ion batteries that utilize both laboratory and synchrotron X-ray microscopy techniques. Furthermore we explore how their application with complementary spectroscopy and correlative microscopy tools (e.g. electron and ion microscopy) can be used to inform a comprehensive understanding of these materials, from the atom to the device.