About the EMIH

The Canadian Light Source strategic plan has identified four priority areas of activities: Advanced Materials, Agriculture, Environment and Health. Within the area of Advanced Materials, research in energy storage and conversion materials is arguably the single most active field at CLS, with hundreds of users from across Canada and around the world using the facility. As such, the CLS has developed specialized infrastructure to support these users and has invested financial and human resources to acquire and develop several tools that are available to the research community using multiple beamlines. To increase the visibility of this specific infrastructure, the CLS is thus developing an *Energy Materials and In-situ Hub* to provide users access to the enhanced capabilities beyond what photons impinging on materials can probe. This hub is a collection of multiple instruments that can be used for dynamic experiments, electrochemical cycling and preparation of samples on site so that users can carry out relevant experiments at CLS, rather than rely on their own labs in the home institution.

In addition to the beamlines where most of energy-materials research is carried out (HXMA, SXRMB, SM, SGM, VLS-PGM, BXDS, BMIT), the collection of instruments in the hub includes:

- In-situ electrochemical cells for the Scanning Transmission X-ray Microscope at the SM beamline
- Electrochemical cycling station portable to multiple beamlines for dynamic experiments of charging and discharging batteries in realistic conditions
- Electrochemical and gas in-situ cells for hard and tender X-ray beamlines (HXMA, SXRMB)
- Liquid cells for SGM, HXMA, SXRMB beamlines
- Two glove boxes for battery materials (each one dedicated to different chemistries so as to avoid contamination)
- Temperature controllers

Given these capabilities it is possible for researchers to investigate how battery and catalysts materials evolve during realistic operating conditions without resorting to model cells that do not represent actual commercial batteries or fuel cells. Experiments have already been carried out by CLS staff and users to study how the crystalline structure of cathode and anode materials changes during cycling, and how batteries swell during realistic operation conditions.