

APS WK9: Accelerated Advances in Energy Storage Systems Enabled by APS and APS-U

Organizers: Uta Ruett and Shirley Meng

Novel and diverse concepts for energy storage systems are required for a decarbonization of transportation and a modern electricity grid adapted to the emerging renewable sources.

The research to advance the energy storage systems addresses not only energy and power density, and production cost, fast charging ability, cycle life, safety, but also economic and ecologic sustainability, lifetime, energy justice. The challenges range from materials discovery, synthesis and manufacturing optimization to detailed understanding best architectures for ion transportation in functional batteries. Essential in situ and operando characterization tools need to be identified and transformed into core techniques that balance the needs for fast turnover yet highly quantitative characterization, which will also enable applications of machine learning, or other artificial intelligence guided data interpretations. Unprecedented tools for higher spatial, energy and/or temporal resolution will revolutionize the detailed understanding of the effects of ion transport during operation of energy storage systems after the facility upgrade.

In this workshop, expert users and beamline scientists will discuss state-of-the-art techniques today and identify the required developments for best support of research on cutting edge electrochemical energy storage systems. The scope spans from instrumental design, sample environments for various stimuli to high-throughput data analysis and simulation for adaptive decisions using AI techniques.