

August 11-14th at the Crowne Plaza Hotel in downtown Knoxville, TN



Contribution ID: 123

Type: **Invited Talk**

## Quasi-Elastic Neutron Scattering for Investigating Dynamic Behavior in Energy Materials

Understanding the microscopic dynamics of various constituents in energy materials is crucial for exploring the fundamental mechanisms of energy storage and plays a significant role in their applications within energy storage and conversion technologies. By acquiring molecular-level structural and dynamic information about electrodes and electrolytes, we can create new materials with enhanced properties that lead to better performance in device applications. In this study, we present dynamic investigations of different energy materials, including 2D-layered transition metal carbides, as well as solid-state lithium and polymer electrolytes. We will discuss the stochastic dynamics—originating from both diffusive and relaxational processes—in the picosecond to nanosecond time range, as revealed by quasielastic neutron scattering and simulations.

### Topical Area

Hard matter: energy materials

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