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A Design of Electrochemical Cell for Operando Optical Microscope

Microscope-integrated electrochemical cell maps electrode dynamics in real time.

Researchers at Purdue University have created an electrochemical cell to be used in optical microscopes to observe the effects of electrical and chemical fields on electrodes in real-time. For example, because battery capacity and charging rate are dependent on the internal dynamics of Li transport, imaging and understanding of the operating phenomena can lead to improvements in battery chemistry and design. Imaging of internal ion exchange within the electrode can also be used to create more accurate computational models. This technology has applications in optical microscopy, battery modelling and design, and electrochemistry in general.

Technology Validation: This technology has been validated through the imaging of a lithium-ion cathode during multiple charging and discharging cycles. Results were used to create a multi-physics computational model of cathode dynamics.

Advantages

-Cell is easily integrated into existing and low-cost optical microscopes

-Operando mapping of electrode composition dynamics

-Real-time full field data

Applications

-Imaging of battery dynamics via optical microscopy

-Creation of more accurate computational models of battery cathodes

-Electrode microstructure analysis

Related Publications:

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Category
Energy & Power Systems/Energy Storage
Digital Health & Medtech/Medical Image Processing
Materials Science & Nanotechnology/Materials Testing & Characterization Tools

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