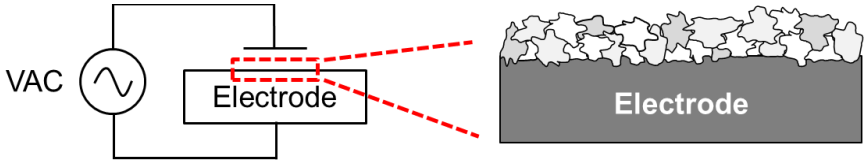
Investigating the Formation of Salt Films on Metal Electrodes in Secondary Batteries

Objective: Understand the formation of salt films on metal electrodes in order to identify methods for controlling film structure and growth.

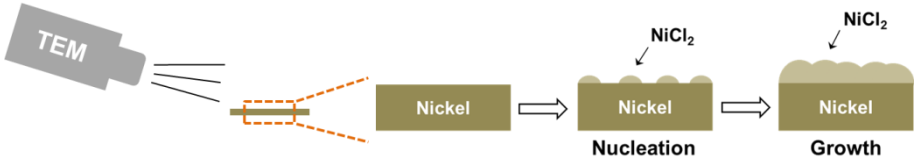
Description of Research: Use advanced in-situ imaging techniques and electro-analytical methods to characterize the mechanisms of salt film formation and resulting film structure in two secondary batteries: lead-acid and sodium nickel-chloride.



Electrochemical impedance spectroscopy for studying film structure

Main Questions: How do chemical additives in the electrolyte impact the development of salt films on electrodes? What are the mechanisms causing electrode passivation?

Major Challenge: Obtaining transmission electron microscope (TEM) images of the sodium nickel-chloride reaction at temperatures greater than 250 ºC.



Real-time TEM imaging using electrochemical sample holders

Benefits of Research Efforts: Controlling the growth rate and structure of salt films is crucial for minimizing degradation and capacity loss in secondary batteries.

Reducing degradation will lead to the development of long-lasting batteries for renewable energy storage, telecommunications back-up and electric/hybrid vehicles.

Rendering of a battery bank energy storage system (Credit: A123 systems)

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