

# Mechanical Properties at the Protected Lithium Interface

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## Technical Approach:

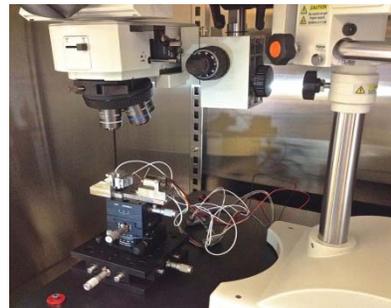
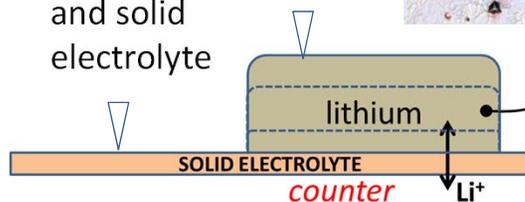
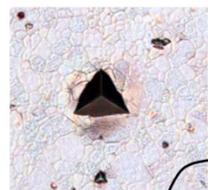
- Use nano-indentation to map the mechanical properties of several solid electrolytes and also Li metal as thin film and rolled sheets.
- Evaluated the changes in lithium and the interface with the solid electrolyte induced by cycling.

## Status:

- Nano-indentation of Li gives mechanical properties
- Uniformity of the solid electrolyte's mechanical properties depends on density, phases, surface finish
- Li penetration alters acoustic wavespeed, creates dark flaws and increases hardness near shorts in electrolyte

## Technology:

Nanoindentation tests of active Li and solid electrolyte



## Objectives:

- Understand the mechanical and physical properties of the Li metal – solid electrolyte interface and how it changes with cycling or formation of Li shorts
  - Effects of variation in the electrolyte properties
- Determine the defects formed and microstructure of lithium under rapid deposition and plating reactions.

**Deliverables:** Utilize nanoindentation to determine mechanical properties and causes of premature failures at the protected lithium interface

## Funding:

- Duration - 3 yrs
- Total - \$1,000,000
- DOE - \$667,000
- Army joint funding - \$333,000

## Milestones:

- Q1 Milestone: Determine elastic properties of battery grade lithium from different sources and preparation, comparing to values from the reference literature
- Q3 Milestone: Compare lithium properties, uncycled versus cycled, using thin film battery architecture. Q3 Milestone:
- Q4 Milestone: View annealing of defects following a single half cycle, using thin film battery architecture.