

Lithium Dendrite Suppression for Lithium-Ion Batteries

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Technical Approach:

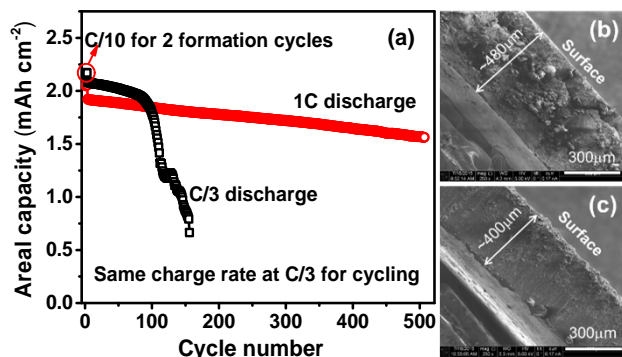
- Develop mixed salts electrolytes to protect lithium (Li) metal anode with high Coulombic efficiency
- Investigate effects of Li salts, additives and carbonate-based electrolyte formulations on Li anode morphology, Coulombic efficiency and performances

Status:

- Demonstrated well protection of Li metal anode and improvement in battery cycle life by optimizing charge/discharge protocols.
- Demonstrated enhancement in fast charging capability by using dual-salt electrolytes.

Technology:

Fast discharging rates lead to the formation of a transient high-concentration electrolyte on Li metal surface, protecting Li anode and enhancing battery cycle life.



Objectives:

- Enable Li metal to be used as an effective anode in rechargeable Li-metal batteries for long cycle life at a reasonably high current density
- Investigate the surface layers on Li anode and cathode
- Suppress Li dendrite formation on graphite anode in Li-ion batteries

Deliverables: Over 500 cycles for 4-V lithium metal batteries with high cathode loading and at high current density cycling

Funding:

- Duration - 4 yrs (Yr 4)
- FY15 budget - \$400K (DOE)

Milestones:

- **Q1:** Develop mixed salts electrolytes to protect Al substrate and Li metal anode, and to maintain Li Coulombic efficiency over 98%.
- **Q2:** Demonstrate over 500 cycles for Li || LiFePO₄ cells with high LiFePO₄ loading and at high current density cycling.
- **Q3:** Demonstrate over 200 cycles for 4-V Li-metal batteries with high cathode loading and at high current density cycling.
- **Q4:** Achieve over 500 cycles for 4-V Li-metal batteries with high cathode loading and at high current density cycling.