

Hierarchical Assembly of Inorganic/Organic Hybrid Si Negative Electrodes

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Technical Approach:

- Develop hierarchical electrode structure to maintain electrode mechanical stability and electrical conductivity.
- Form *in situ* compliant coating on Si and electrode surface to minimize Si surface reaction.
- Use prelithiation to compensate first cycle loss of the Si electrode.

Status:

- Developed high loading Si based electrode above 3mAh/cm².
- Full cell testing verified the improved performance.

Technology:

Combine material synthesis and composite particle formation with electrode design and engineering to develop high capacity, long life and low cost hierarchical Si based electrode.



Objectives:

- Aim to enable Si as a high capacity and long cycle-life material for negative electrode to address two of the barriers of lithium-ion chemistry for EV/PHEV application, insufficient energy density and poor cycle life performance. The proposed work will combine material synthesis and composite particle formation with electrode design and engineering to develop high capacity, long life and low cost hierarchical Si based electrode.

Deliverables: Develop high-capacity long-life negative electrode for lithium-ion battery applications.

Funding:

- Duration - 4 yrs
- Total - \$2.0M
- DOE - \$500.00 (100%)

Milestones:

- **Q1:** Investigate the impact of polymer side chain.
- **Q2:** Quantify the adhesion groups.
- **Q3:** fabricate high loading electrode.
- **Q4:** Full cell testing.