

# Assembly of Battery Materials and Electrodes

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## Technical Approach:

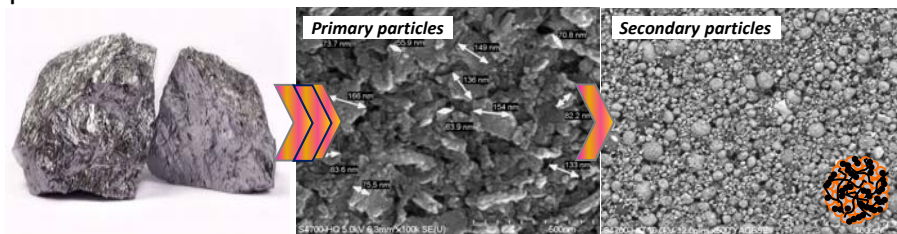
- Design and optimize electrode architecture by controlling tortuosity and porosity while still maintaining high ionic conductivity.
- Identify a method to produce low-cost nano-Si.

## Status:

- Optimizing the manufacturing process for cheaper Nano-Si powder and developing the process for making electrode. Verification of electrochemical performance and characterization of Nano-Si/C composite electrode.

## Technology:

To increase the electrochemical performance and to reduce the material cost of Nano-Si anode, HQ is optimizing the material manufacturing process by a metallurgical method. Secondary particles of Nano-Si/C composite with proper pore distribution and electronic conductivity will be developed using a spray dry process.



## Objectives:

- Develop high-capacity, low-cost electrodes with improved cycle stability and rate capability.
- Identify a method to produce new sources Si.
- Understand the electrode degradation mechanism by using *in situ* tools to guide the development of optimized electrode composition and architecture.

**Deliverables:** Nano-Si/C composite powder in 2016/Q2 and Nano-Si/C composite electrode with capacity >1000 mAh/g and 80% retention @ 300 cycle in 2016/Q3. Supply a 2 Ah Li-ion full cells based on Si and NCM electrodes in 2016/Q4.

## Funding:

Duration: 4 yrs (Yr 4)  
FY16 Budget: \$365K (DOE)

## Milestones:

- **Q1:** Failure mode analysis of large-format cells manufactured in 2015/3Q as a deliverables.
- **Q2:** Finalize the structure of Nano-Si/C composite and supply Nano-Si/C composite powders
- **Q3: Go/No-Go** Finalize the architecture of Nano-Si/C composite electrode. Criteria : > 300 cycles (80% retention), Loading > 3mAh/cm<sup>2</sup>. Supply Nano-Si/C composite electrode.
- **Q4:** Verification of performance in pouch-type full cell (<2Ah) and supply 10 ea. full cells.