Higher Energy Density *via* Inactive Components and Processing Conditions

U.S. DEPARTMENT OF ENERGY | Energy Efficiency & Renewable Energy

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Technical Approach:

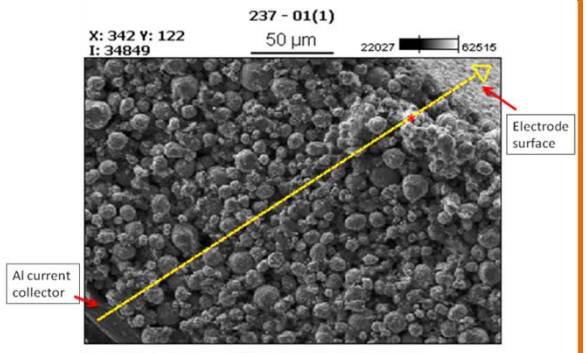
- Vendors capable of providing binders, conductive additives, and active materials of various MW, structures, and size, respectively, identified.
- Baseline electrodes fabricated and tested.
- Electrodes of ever increasing thickness are fabricated and tested. Failure modes identified.
- Modifications made to processing conditions or materials or both depending upon the failure mode.

Status:

- Critical vendors identified.
- Baseline processes and electrodes identified
- Thicker electrodes fabricated and tested.

Technology:

Cross section of a dry, thick electrode (*ca.* 250 µm, 7.4 mAh/cm^2) fabricated under standard materials and processing conditions.



SEM cross-section image of NMC thick (237 µm) electrode

Objectives:

- Determine how thick an electrode can be produced of standard materials and processing conditions that does not delaminate.
- Determine if the thickest, intact electrode can still meet the EV power.
- Determine the failure mode of thick electrodes.
- Determine which modifications lead to thicker electrodes.

Fabricate the highest energy density electrodes for EVs through minor modifications to materials and processes.

Deliverables: Correlations between electrode fabrication, active material properties, and level of inactive components.

Funding:

Duration: 3 yrs (Yr 1)
FY16 Budget: $500K (DOE)

Milestones:

- **Q1:** Fabricate laminates of NCM cast to different thicknesses using standard materials and various processing.
- **Q2:** Develop a technique for measuring the cross sectional composition of the electrode from surface to current collector.
- **Q3:** Produce thick electrodes at different coating speeds and slurry viscosities.
- **Q4:** Go/No-go. Determine if a higher molecular weight binder is worth pursuing to achieve thicker electrodes based on ease of processing and level of performance.