

In-situ Solvothermal Synthesis of Novel High Capacity Cathodes

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Technical Approach:

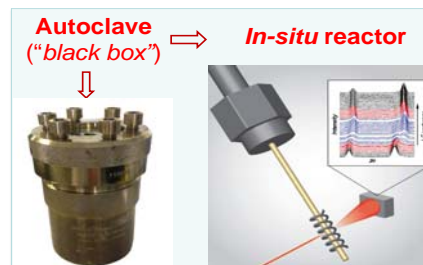
- Synthesis by Design, *via in-situ* probing synthesis reactions under real conditions.

Status:

- Developed reactors for *in-situ* studies of solvothermal, ion exchange & solid-state synthesis of cathodes;
- Synthesis procedures were developed for preparing Ni-Mn-Co layered oxides.

Technology: time-resolved XRD – identify synthesis reaction pathway and quantify thermodynamic/kinetic parameters governing synthesis process, enabling us to

- ‘dial in’ desired phases and material properties
- build phase diagram under real synthesis conditions
- obtain insights into design and synthesis of new cathode materials



Objectives:

- Our goal is to develop low cost, high-capacity cathodes with precise control of the phase, stoichiometry and morphology.

Deliverables: Lithium cathode materials of high capacity (≥ 200 mAh/g) and low cost.

Funding:

- Duration - 3 yrs
- Total - \$1050 k
- DOE - \$1050 k

Milestones:

- **Q1:** Develop synthesis procedures for preparing Ni-Mn-Co layered oxides
- **Q2:** Identify the impact of synthesis conditions on the reaction kinetics and pathways towards forming layered Ni-Mn-Co oxides via *in-situ* studies
- **Q3:** Develop new capabilities for monitoring synthesis parameters (P, T, PH values) in real time during solvothermal synthesis of cathode materials
- **Q4:** Identify synthetic approaches for stabilizing the layered structure of Ni-Mn-Co cathodes