**Objective:**
- Develop low-cost, high-energy and high-power, Mn-oxide-based cathodes
- Improve the design, composition and performance of advanced electrodes with stable architectures and surfaces
- Understand atomic-scale electrochemical and degradation processes to enable the rational design of new materials

**Impact:**
Advancement of DOE goals for safe, cost-effective, high-energy batteries by selective engineering of nano-domain structures in Li- and Mn-rich cathode materials

**Accomplishments:**
- Developed high energy Mn-rich, layered-layered-spinel (LLS) cathode that gives stable cycling and high specific-oxide energy densities of >750 Wh/kg<sub>oxide</sub>
- Identified a series of phosphate-based materials that show promise for improving cathode surface stability, impedance rise with cycling, and rate performance
- Developed novel surface treatments that, when applied to LLS cathode materials, enabled discharge energies, at high rates, comparable to a nickel-rich, benchmark, NMC-532 electrode

**FY 18 Milestones:**
- Optimization of particle size distribution and density (e.g., Wh/L), using co-precipitation reactors, of Mn-rich, LLS, y[xLi<sub>2</sub>MoO<sub>3</sub>•(1-x)LiMO<sub>2</sub>•(1-y)LiM<sub>2</sub>O<sub>4</sub> (M = Mn, Ni, Co) cathode compositions that can deliver ~800Wh/kg<sub>oxide</sub>
- Electrochemical validation of surface-modified, LLS cathodes in graphite, full-cell configurations

**FY18 Deliverables:**
Quarterly reports; Synthesis, characterization, and scale-up of advanced Mn-based cathodes and their electrochemical evaluation

**Funding:** FY18: $450K, FY17: $500K, FY16: $500K