Multifunctional Cathode Additives for Li-S Battery Technology

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

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Technical Approach:

- Select electronic conductive and electrochemical active transition metal sulfides as multifunctional cathode additives (MFCA).
- Investigate interactions between sulfur and MFCA and select leading candidates for system optimization.

Status:

- Established benchmark Li-S and MFCA cell performances.
- Demonstrated sulfur-MFCA interactions and completed proof of concept studies – Go decision requirement was successfully met.
- Leading MFCA candidates identified for Li-S battery electrochemical performance optimization studies.

Technology:

Interaction between sulfur and conductive MFCA in hybrid electrode results in improved Li-S cell power capability and better cycle life at high discharge rate.

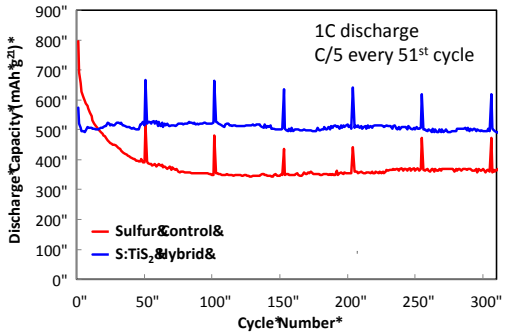

Figure. Cycle life Improvement with conductive TiS_2 additive

Objectives:

- Develop a low cost, high energy Li-S battery technology for PEV applications. The project is aimed to improve the sulfur electrode power capability and cycle life by introducing multifunctional cathode additive (MFCA).
- Identify and evaluate electronic conductive and electrochemical active transition metal sulfides as MFCA for Li-S battery performance optimization.

Deliverables: Identify the leading MFCA candidates for improved Li-S cell electrochemical performance and complete the hybrid cathode formulation and process optimization studies.

Funding:

— Duration - 3 yrs (Yr 2)

— FY16 - $500K (DOE)

Milestones:

Q1: Synthesized MFCA evaluation and selection.

Q2: Go/No-Go: MFCA particle size effect study and best candidate selection. Criteria: Improvement over control Li-S cell in power capability and cycle life

Q3: Cathode material and process optimization.

Q4: Cathode formulation optimization.