# Advanced Lithium Sulfur Battery, Phase I Project

SBIR/STTR Programs | Space Technology Mission Directorate (STMD)

## ABSTRACT

CRG proposes to develop an Advanced Lithium Sulfur Battery (LSB) based on combining a novel super ion conducting ceramic electrolyte, entrapped sulfur cathode, and a lithium metal anode necessary to meet NASA's needs for high energy density, rechargeable, and safe energy storage. These new materials for LSBs will build upon a proven ceramic electrolyte for rechargeable lithium metal batteries. A composition of a metallic lithium anode, ceramic electrolyte, and a novel sulfur cathode will be optimized to achieve program goals for energy density, operational temperatures, storage, and cycle life. Supporting the Human Exploration and Operations Directorate, this project's technologies directly address requirements for high energy density space batteries for space exploration systems including rovers, landers, ascent vehicle space craft. This project's technologies offer high energy density (>450 Whr/kg), long storage life, and long operational life batteries. These advancements will enable space power supplies to keep pace with increasing electricity demands, and reduce battery weight by 50% while advancing the state of the art battery technology.

## ANTICIPATED BENEFITS

### To NASA funded missions:

Potential NASA Commercial Applications: Supporting the Human Exploration and Operations Directorate, this project's technologies directly address requirements for high energy density space batteries for space exploration systems including rovers, landers, ascent vehicle space craft. This project's technologies offer high energy density (>450 Whr/kg), long storage life, and long operational life batteries. These advancements will enable space power supplies to keep pace with increasing electricity demands, and reduce battery weight by 50% while advancing the state of the art battery technology.

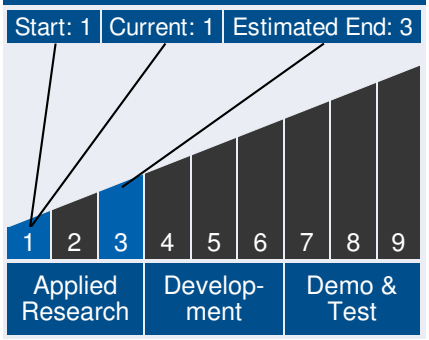
### To the commercial space industry:

Potential Non-NASA Commercial Applications: This project's


### Table of Contents



### Technology Maturity




### Management Team

**Program Executives:**

- Joseph Grant
- Laguduva Kubendran

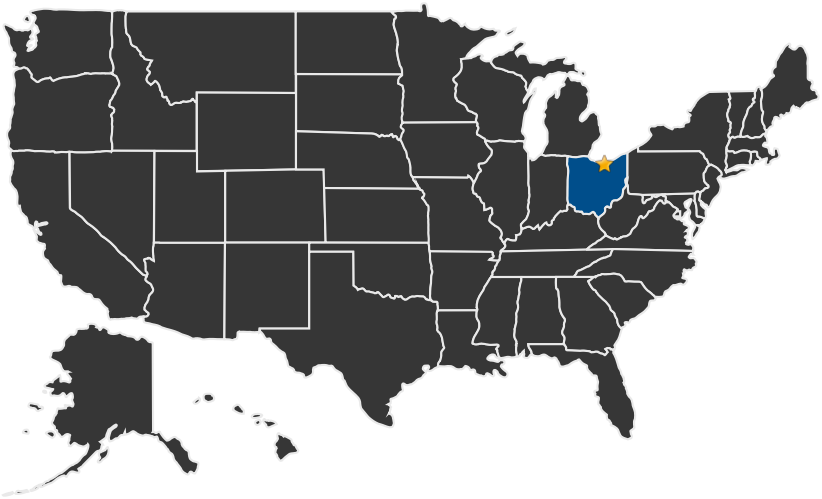
**Program Manager:**

- Carlos Torrez

*Continued on following page.*

technologies, developed for NASA systems, would directly apply to systems operated by other government and commercial enterprises. Advanced solid state battery chemistries have been gaining interest for electric vehicles, UAVs, portable devices, and multifunctional structural materials. The technology is also generally applicable for a variety of other energy storage applications of interest to the DoE. Lithium metal battery systems enable significantly higher energy density at safe operating conditions that would be considered revolutionary for a variety of applications.

## U.S. WORK LOCATIONS AND KEY PARTNERS



U.S. States With Work

**Lead Center:**
Glenn Research Center

**Other Organizations Performing Work:**

- Cornerstone Research Group, Inc. (Dayton, OH)

### Management Team *(cont.)*

**Principal Investigator:**

- Brian Henslee

### Technology Areas

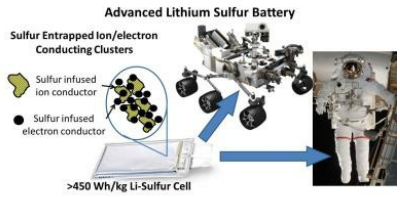
**Primary Technology Area:**
Space Power and Energy Storage (TA 3)
└ Energy Storage (TA 3.2)
└ Batteries (TA 3.2.1)

## PROJECT LIBRARY

### Presentations

- Briefing Chart
  - (http://techport.nasa.gov:80/file/23310)

## IMAGE GALLERY




*Advanced Lithium Sulfur Battery, Phase I*

## DETAILS FOR TECHNOLOGY 1

### Technology Title

Advanced Lithium Sulfur Battery, Phase I

### Potential Applications

Supporting the Human Exploration and Operations Directorate, this project's technologies directly address requirements for high energy density space batteries for space exploration systems including rovers, landers, ascent vehicle space craft. This project's technologies offer high energy density (>450 Whr/kg), long storage life, and long operational life batteries. These advancements will enable space power supplies to keep pace with increasing electricity demands, and reduce battery weight by 50% while advancing the state of the art battery technology.