

A Robust and Inexpensive Iron-Air Rechargeable Battery for Grid-Scale Energy Storage

Lead: University of Southern California, Loker Hydrocarbon Research Institute

Sub-Awardee: Jet Propulsion Laboratory, California Institute of Technology

ARPA-E GRIDS Program

Advantages of the Iron-Air Battery

- Extremely Low Cost Materials
- Environmentally friendly
- Abundant raw materials all over the world
- High Theoretical Specific Energy, 764 Wh/kg
- Iron electrode is robust to cycling

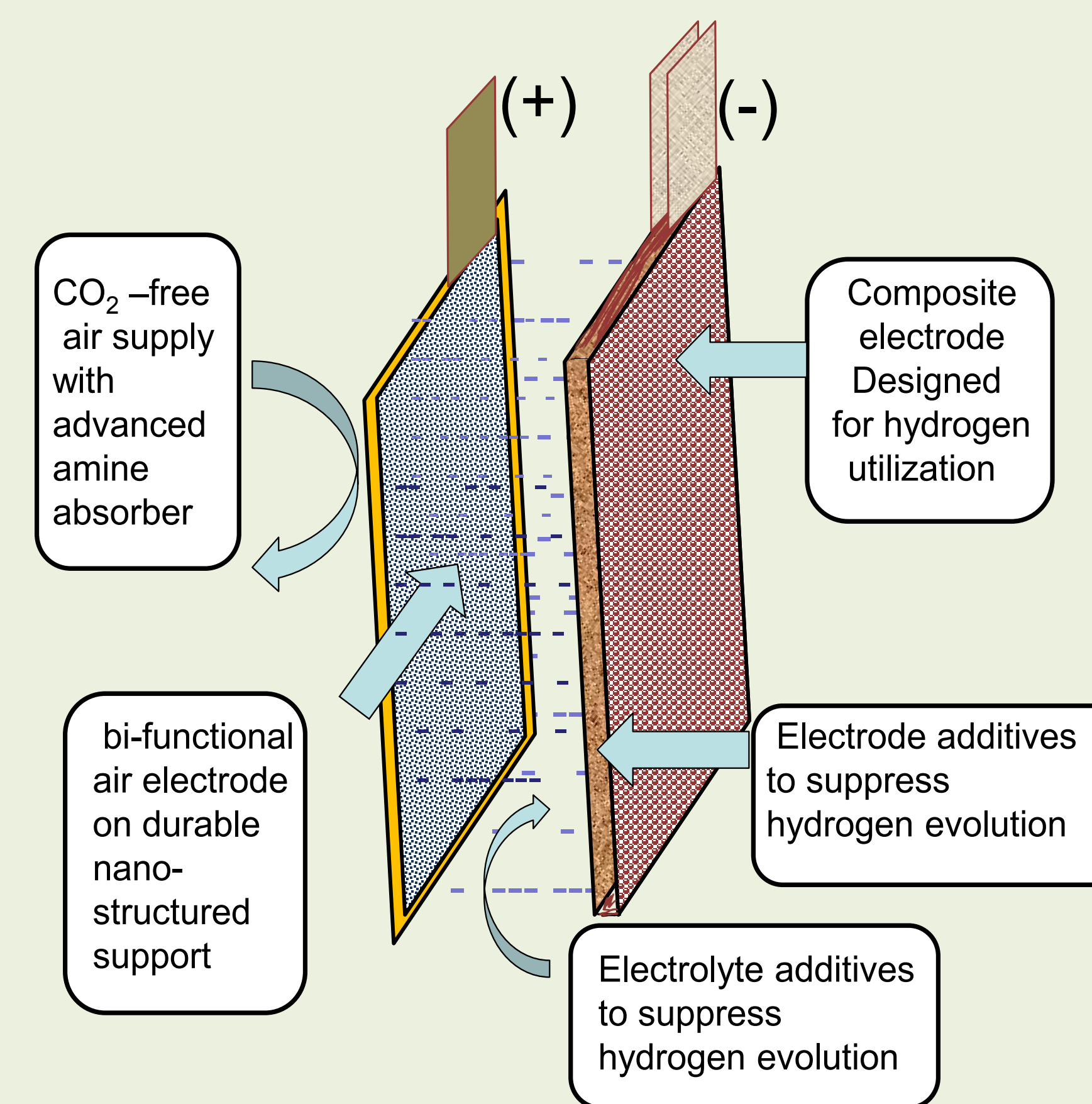
Overall Objective

Demonstrate a high-performance *iron-air rechargeable battery* that meets the targets for Large-Scale Electrical Energy Storage

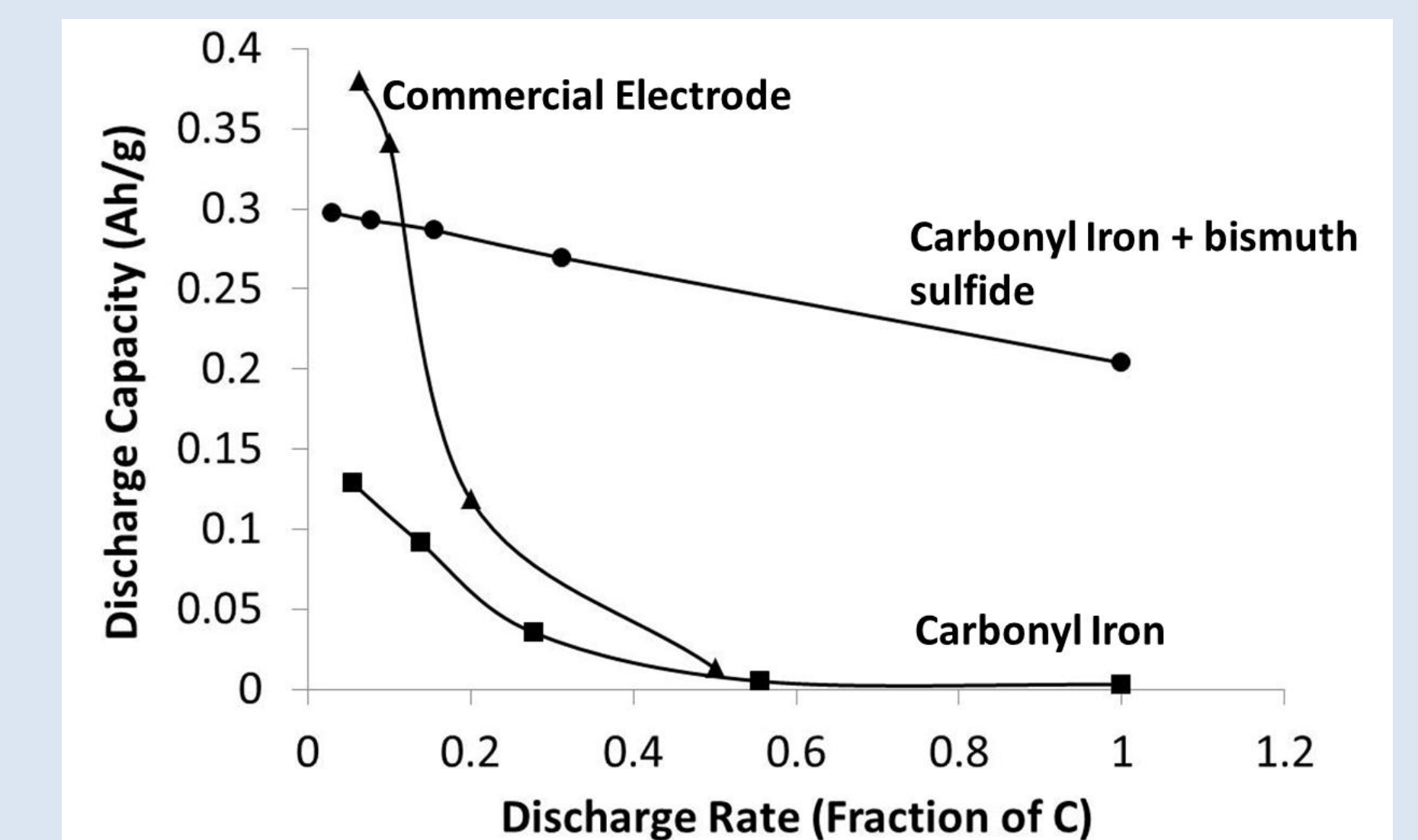
| Desired Characteristic | State-of-Art | Performance Target |
|-------------------------------------|--------------|--------------------|
| Round trip energy efficiency | 50% | 80% |
| Cycle life, cycles | 1000-2000 | 5000 |

| Year | Key Milestones & Deliverables |
|--------|--|
| Year 1 | <ul style="list-style-type: none"> • Complete design of iron electrode • Demonstrate feasibility bi-functional air electrode materials |
| Year 2 | <ul style="list-style-type: none"> • Complete selection of additives and catalysts • Complete characterization of CO₂ system. |
| Year 3 | <ul style="list-style-type: none"> • Fabricate cell incorporating advancements • Demonstration of Proof-of-concept iron-air cell |

Technical Approach



Demonstrated Iron Electrodes with capacity of 0.3 Ah/g



Results

Identified Electrode and Electrolyte Additives that increase charging efficiency to 96%

