

POLYPLUS BATTERY COMPANY

RECHARGEABLE LITHIUM-AIR BATTERIES

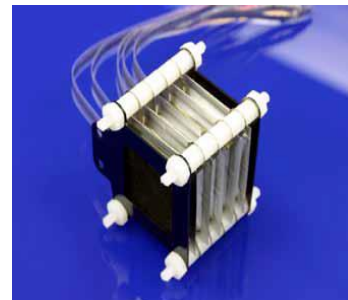
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| PROJECT TITLE: | Development of Ultra High Specific Energy Rechargeable Lithium-Air Batteries Based on Protected Lithium Metal Electrodes | | |
| ORGANIZATION: | PolyPlus Battery Company (PolyPlus) | LOCATION: | Berkeley, CA |
| PROGRAM: | BEEST | ARPA-E AWARD: | \$4,996,311 |
| TECH TOPIC: | Energy Storage: Portable | PROJECT TERM: | 7/1/10 – 6/30/12 |
| WEBSITE: | www.polyplus.com | | |

CRITICAL NEED

Most of today's electric vehicles (EVs) are powered by lithium-ion (Li-Ion) batteries—the same kind of batteries used in cell phones and laptop computers. Most Li-Ion battery packs for EVs have a driving range limited to 100 miles on a single charge and account for nearly 65% of the total cost of EVs. To compete in the market with gasoline-based vehicles, EVs must cost less and drive farther. An EV that is cost competitive with gasoline would require a battery with twice the energy storage of today's state-of-the-art Li-Ion battery at 30% of the cost.

PROJECT INNOVATION + ADVANTAGES

PolyPlus is developing the world's first commercially available rechargeable lithium-air (Li-Air) battery. Li-Air batteries are better than the Li-Ion batteries used in most EVs today because they breathe in air from the atmosphere for use as an active material in the battery, which greatly decreases its weight. Li-Air batteries also store nearly 700% as much energy as traditional Li-Ion batteries. A lighter battery would improve the range of EVs dramatically. Polyplus is on track to making a critical breakthrough: the first manufacturable protective membrane between its lithium-based negative electrode and the reaction chamber where it reacts with oxygen from the air. This gives the battery the unique ability to recharge by moving lithium in and out of the battery's reaction chamber for storage until the battery needs to discharge once again. Until now, engineers had been unable to create the complex packaging and air-breathing components required to turn Li-Air batteries into rechargeable systems.



IMPACT

If successful, PolyPlus' project would enable EVs to travel 500 miles on a single charge, much further than today's EVs or gasoline-powered cars can go.

- **SECURITY:** Increased use of EVs would decrease U.S. dependence on foreign oil—the transportation sector is the dominant source of this dependence.
- **ENVIRONMENT:** Greater use of EVs would reduce greenhouse gas emissions, 28% of which come from the transportation sector.
- **ECONOMY:** This battery would enable an EV to travel from New York City to Raleigh, NC (500 miles) on a single charge, for less than \$10 on average..
- **JOBS:** This project would help position the U.S. as a leader in rechargeable battery manufacturing. Currently, the U.S. manufactures only a small percentage of all rechargeable batteries, despite inventing the majority of battery technologies.

CONTACTS

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