Advanced Research Projects Agency • ENERGY

GRIDS PROJECT

UNIVERSITY OF SOUTHERN CALIFORNIA

IRON-AIR RECHARGEABLE BATTERY

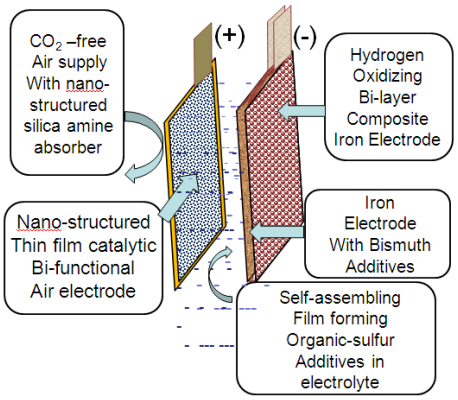
PROJECT TITLE:	A Robust and Inexpensive Iron-Air Rechargeable Battery for Grid-Scale Energy Storage		
ORGANIZATION:	The University of Southern California (USC)	LOCATION:	Los Angeles, CA
PROGRAM:	GRIDS	ARPA-E AWARD:	$1,459,324
TECH TOPIC:	Energy Storage: Stationary	PROJECT TERM:	10/1/10 – 9/30/13
WEBSITE:	www.arpa-e.energy.gov/ProgramsProjects/GRIDS.aspx		

CRITICAL NEED

Our national electric grid has limited ability to store excess energy, so electricity must constantly be generated to perfectly match demand. Though wind and solar power are promising clean alternatives to fossil fuels, their natural unpredictability and intermittency make them incapable of delivering the power on-demand necessary to operate today's grid. The U.S. needs technologies that can cost-effectively store renewable energy for future grid-use at any location. Flexible, large-scale storage would create a stronger and more robust electric grid by enabling renewables to contribute to reliable power generation.

PROJECT INNOVATION + ADVANTAGES

USC is developing an iron-air rechargeable battery for large-scale energy storage that could help integrate renewable energy sources into the electric grid. Iron-air batteries have the potential to store large amounts of energy at low cost—iron is inexpensive and abundant, while oxygen is freely obtained from the air we breathe. However, current iron-air battery technologies have suffered from low efficiency and short life spans. USC is working to dramatically increase the efficiency of the battery by placing chemical additives on the battery's iron-based electrode and restructuring the catalysts at the molecular level on the battery's air-based electrode. This can help the battery resist degradation and increase life span. The goal of the project is to develop a prototype iron-air battery at significantly cost lower than today's best commercial batteries.



IMPACT

If successful, USC's iron-air battery would represent a low-cost alternative to the best commercial batteries in use today. This technology could be scaled up to provide substantial storage capacity for the use of renewable power within the electric grid.

- SECURITY: A more efficient and reliable grid would be more resilient to potential disruptions.
- ENVIRONMENT: Electricity generation accounts for over 40% of U.S. carbon dioxide (CO_2) emissions. Enabling large-scale contributions of wind and solar power for our electricity generation would result in a substantial decrease in CO_2 emissions.
- ECONOMY: Increases in the availability of wind and solar power would reduce fossil fuel demand, resulting in reduced fuel prices and more stable electricity rates.
- JOBS: Advances in energy storage would result in new high-paying jobs in supporting sectors such as manufacturing, engineering, construction, transportation, and finance.

CONTACTS

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