Advanced Research Projects Agency • ENERGY

FIRST OPEN SOLICITATION

ARIZONA STATE UNIVERSITY

METAL-AIR ELECTRIC VEHICLE BATTERY

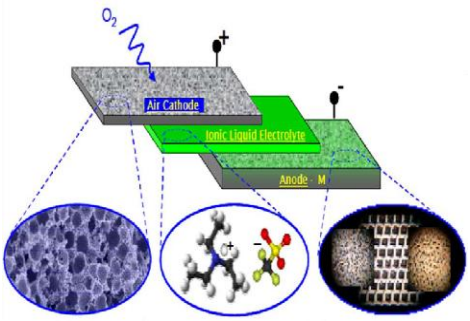
PROJECT TITLE:	Sustainable, High-Energy Density, Low-Cost Electrochemical Energy Storage – Metal-Air Ionic Liquid (MAIL) Batteries		
ORGANIZATION:	Arizona State University (ASU)	LOCATION:	Tempe, AZ
PROGRAM:	FOA1	ARPA-E AWARD:	$5,133,150
TECH TOPIC:	Energy Storage: Portable	PROJECT TERM:	12/21/09 – 12/20/11
WEBSITE:	www.engineering.asu.edu/macme		

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 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 distances than they can today. 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

ASU is developing a new class of metal-air batteries. Metal-air batteries are promising for future generations of EVs because they use oxygen from the air as one of the battery's main reactants, reducing the weight of the battery and freeing up more space to devote to energy storage than Li-Ion batteries. ASU technology uses Zinc as the active metal in the battery because it is more abundant and affordable than imported lithium. Metal-air batteries have long been considered impractical for EV applications because the water-based electrolytes inside would decompose the battery interior after just a few uses. Overcoming this traditional limitation, ASU's new battery system could be both cheaper and safer than today's Li-Ion batteries, store from 4-5 times more energy, and be recharged over 2,500 times.



IMPACT

If successful, ASU's project would improve the safety and driving range of EVs while reducing their sticker price.

- SECURITY: Widespread use of EVs would help reduce U.S. dependence on foreign oil. The U.S. transportation sector is the dominant source of this dependence.
- ENVIRONMENT: Use of EVs would reduce greenhouse gas emissions, 28% of which come from the U.S. transportation sector.
- ECONOMY: This project would enable EVs that could travel from Chicago to St. Louis (300 miles) on a single battery charge, costing drivers less than $10.
- 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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