

Argonne Opens New Chapter in Battery Research: Lithium-air

Lithium-air batteries have a capacity for energy storage that is five to 10 times greater than that of lithium-ion batteries.

The Challenge

Lithium-air batteries have great potential, but it could take one to two decades of research and development before the technology is ready to be commercially adopted. These next-generation batteries have both scientific and engineering challenges.

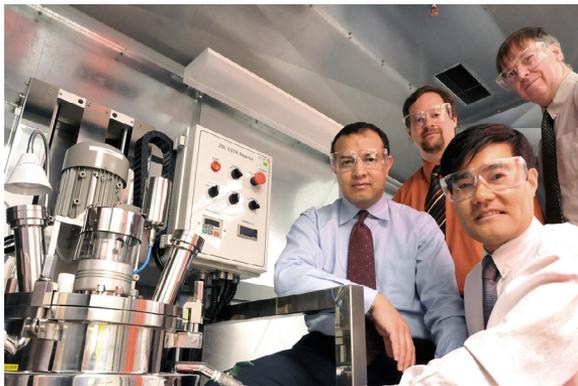
- ▶ **Science:** Developing new materials, including the creation of an advanced catalyst, a highly stable electrolyte, and the effective stabilization of a metallic lithium anode.
- ▶ **Engineering:** Developing high-porosity gas diffusion electrodes, ways to deposit the catalyst onto the cathode, and a membrane to prevent oxygen crossover to the lithium anode.

The Solution

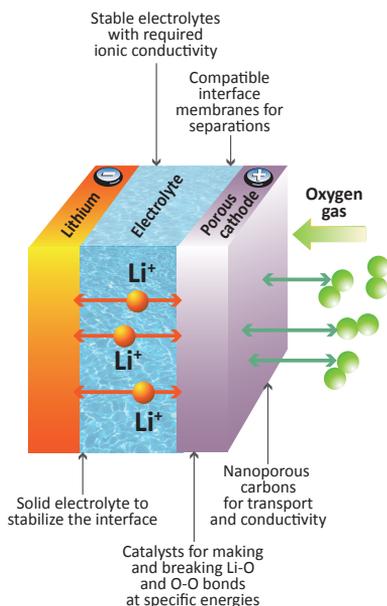
Argonne has researched a variety of battery technologies during the last four decades, and has become a leader in the development of new materials for advanced batteries. To help lithium-air batteries become a reality, Argonne has formed an interdisciplinary team to span basic, applied and theoretical sciences and leverage the lab's world-class research facilities—the Advanced Photon Source, the Center for Nanoscale Materials and Argonne's Leadership Computing Facility.

The Future

Argonne's renowned lithium-ion battery research program has yielded technology transfer agreements, 149 inventions, more than 40 patents and four R&D 100 Awards. In a natural progression, Argonne is now making it a priority to achieve the same type of success with its pursuit of commercially viable lithium-air batteries.



Argonne's staff of world-class interdisciplinary researchers has developed a broad and deep understanding of the scientific challenges involved in the development of advanced batteries.



Lithium-air batteries use a catalytic air cathode that supplies oxygen, an electrolyte and a lithium anode.

"This is an opportunity to put together an interdisciplinary team of scientists and engineers from across the lab to attack all problems and barriers of lithium-air in a concerted and collaborative way," said Khalil Amine, senior materials scientist, Argonne National Laboratory.