

**Battelle Number(s):**

16246

Available for licensing in all fields

Available Technologies

## Lithium Air Electrodes

### SUMMARY

With the surge in demand for electric vehicles, automotive suppliers and manufacturers are in a race to find cutting edge technologies that deliver more powerful batteries in smaller packages and lower cost – a challenge that researchers at Pacific Northwest National Laboratory have undertaken and remain committed to solving.

Conventional lithium ion battery cells are comprised of two electrodes (an anode and cathode) soaked in a non-aqueous electrolyte and isolated from one another by a separator. In an effort to further improve the energy-to-weight ratio, researchers at PNNL are making advances in a battery technology that uses oxygen as the working cathode material. The oxygen can be absorbed from the surrounding environment (air) during battery operation, thus eliminating the need of carrying active cathode materials inside the battery, as is the case with conventional rechargeable Li-ion batteries.

As a result, these Li-air batteries have the highest theoretical specific energy (~11,000 Wh/kg when only lithium electrode considered) among all of the existing battery chemistries. This enormous increase in the battery's specific energy could mean much greater storage capacity for electric vehicle batteries, thus greatly increasing their range or decreasing their cost.

### ADVANTAGES

- \* lower manufacturing costs (due to fewer components)
- \* delivers highest voltages available from metal air batteries
- \* offers higher specific energy (per weight)

### RELATED LINKS

» **Transformational Materials Science Initiative**

Information about PNNL's investment and focus on materials science

<http://materials.pnl.gov/>

» **Ambient operation of Li/Air batteries**

Published by Journal of Power Sources. Elsevier. 2010.

[http://www.sciencedirect.com/science?\\_ob=MIimg&\\_imagekey=B6TH1-4Y65SCW-4-H&\\_cdi=5269&\\_user=2741876&\\_pii=S0378775310000777&\\_origin=search&\\_zone=rslt\\_list\\_](http://www.sciencedirect.com/science?_ob=MIimg&_imagekey=B6TH1-4Y65SCW-4-H&_cdi=5269&_user=2741876&_pii=S0378775310000777&_origin=search&_zone=rslt_list_)

item&\_coverDate=07%2F01%2F2010&\_sk=998049986&wchp=dGLbVzz-zSkWA&md  
5=83c991a102bf49ca2ac683a4e6aa9043&ie=/sarticle.pdf

### Technology Portfolio(s)

» Energy Storage - Electrochemical

### Potential Industry Applications

» Aerospace & Defense

» Automotive & Transportation

» Communications & Media

» Consumer Products

» Energy & Utilities

---

**Peter C. Christensen**  
Pacific Northwest National Laboratory  
(509) 371-6159  
peter.christensen@pnnl.gov  
<http://availabletechnologies.pnnl.gov>



Proudly Operated by **Battelle** Since 1965