New 'layered-layered' materials for rechargeable lithium batteries

May 7 2007

Researchers at the Department of Energy's Argonne National Laboratory have developed a new approach to increasing the capacity and stability of rechargeable lithium-ion batteries.

The technology is based on a new material for the positive electrode that is comprised of a unique nano-crystalline, layered-composite structure.

Argonne's strategy uses a two-component "composite" structure -- an active component that provides for charge storage is embedded in an inactive component that stabilizes the structure.

Details of the new developments will be presented on Tuesday, May 8 at the 211th Meeting of The Electrochemical Society, being held in Chicago, May 6-10.

In recent tests, the new materials yielded exceptionally high charge-storage capacities, greater than 250 mAh/g, or more than twice the capacity of materials in conventional rechargeable lithium batteries. Theories explaining the high capacity of these manganese-rich electrodes and their stability upon charge/discharge cycling will be discussed at the Electrochemical Society meeting.

In addition, by focusing on manganese-rich systems, instead of the more expensive cobalt and nickel versions of lithium batteries, overall battery cost is reduced.

Rechargeable lithium-ion batteries which would incorporate the new materials with increased capacity and enhanced stability could be expected to be used in a diverse range of applications, from consumer electronics such as cell phones and laptop computers, to cordless tools and medical devices such as cardiac pacemakers and defibrillators. In larger batteries, the technology could be used in the next generation of hybrid electric vehicles and plug-in hybrid electric vehicles.

Source: Argonne National Laboratory