Nano-confined Amorphous Solid-oxidant Cathodes for Next-generation Lithium Ion Battery

Technology #17959

Applications

Nano-confined amorphous solid-oxidant cathodes improve lithium battery performance primarily by increasing the number of lithium ion sites on the cathode. Lithium batteries have applications ranging from portable electronics to electric vehicles.

Problem Addressed

Traditional crystalline oxide cathodes, such as LiCoO2+, LiMn2O4, and LiFePO4, etc., have low practical capacity (<200 mAhg-1) and cannot satisfy the demands of the increasing capacity of lithium ion batteries. Li2S nanoparticles synthesized and dispersed on reduced graphene oxide cathode paper for a high-performance lithium sulfur battery achieve a high reversible capacity of 597mAhg-1 at a high rate of 7C, which proves that Nanosized Amorphous Solid-Oxidant Cathodes (NASOCs) can improve rate capability and lower over-potential.

Technology

These anodes can be composed of several different materials including unencapsulated amorphous Ca(ClO)2 or nanolithia (Li2O/LiO2) encapsulated by Co3O4. The advantage of these amorphous structures is that they have more sites to accommodate Li ions than traditional crystalline electrodes. The number of Li ion sites is directly related to the electrode's capacity; therefore, the increased number of Li ion sites increases the battery's overall capacity. NASOCs are also self-contained without need to exchange oxygen with the outside (only lithium goes in and out), which makes them more stable and reliable. These cathodes also have a lower overpotential (0.25V compared to 1V) - potential difference between charging and discharging - which reduces heat emitted by the battery.

Advantages

- Improves reliability and charging time
- Increases battery voltage and capacity

Categories For This Invention:

Energy
Energy Storage
Batteries
Lithium Batteries
Materials
Micro & Nanotech

255 Main Street, room NE 18-501
Cambridge, MA 02142-1601
Phone: 617-253-6966 Fax: 617-258-6790
http://tlo.mit.edu
Contact the Technology Manager: tlo-inquiries@mit.edu

Nanomaterials

Intellectual Property:

Nano-confined amorphous solid-oxidant cathodes for next generation lithium ion battery
PCT
2017-106168
Nano-confined amorphous solid-oxidant cathodes for next generation lithium ion battery
US Patent Pending
2020-0028206

Inventors:

Ju Li
Zhi Zhu

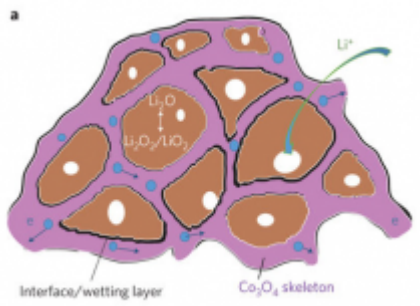
Publications:

Anion-redox Nanolithia Cathodes for Li-ion Batteries
Nature Energy
July 25, 2016

External Links:

Li Group
http://li.mit.edu/

Image Gallery:



255 Main Street, room NE 18-501
Cambridge, MA 02142-1601
Phone: 617-253-6966 Fax: 617-258-6790
http://tlo.mit.edu
Contact the Technology Manager: tlo-inquiries@mit.edu