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Electrode Structures and Surfaces for Li Batteries (ANL-IN-10-095)

Improved stability of composite electrode structures and a low cost manufacturing method.

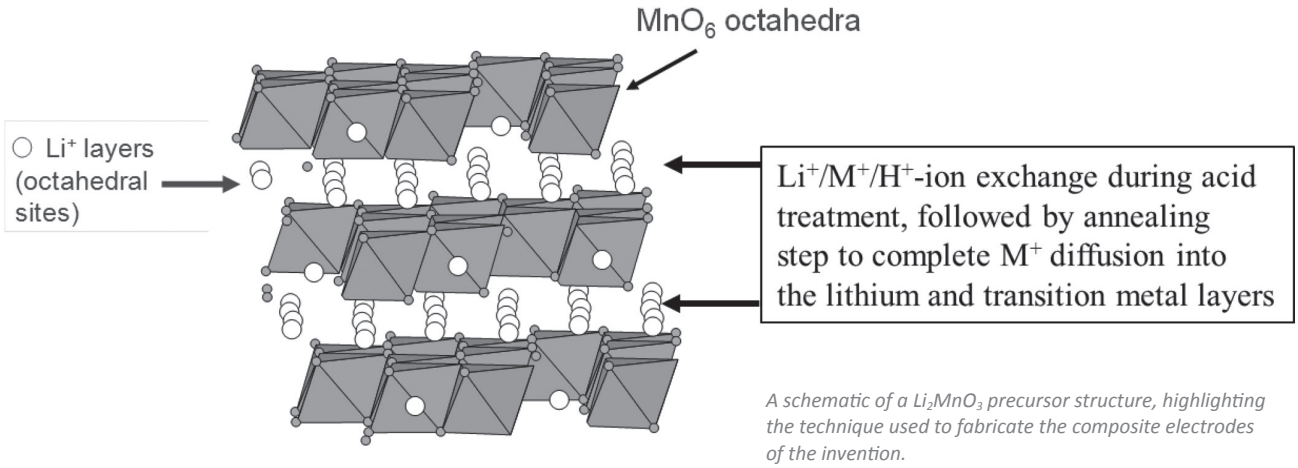
The Invention

This invention relates to positive electrode materials (cathodes) for electrochemical cells and batteries. It relates, in particular, to electrode precursor materials comprising manganese ions, such as Li_2MnO_3, and to methods for fabricating lithium-metal-oxide electrode materials and structures using the precursor materials, notably for lithium cells and batteries. More specifically, the invention relates to improved or novel lithium-metal-oxide electrode materials with layered-type structures, spinel-type structures, rocksalt-type structures, combinations thereof and modifications thereof, notably those with imperfections, such as stacking faults and dislocations. The invention extends to include lithium-metal-oxide electrode materials with modified surfaces to protect the electrode materials from highly oxidizing potentials in the cells and from other undesirable effects, such as electrolyte oxidation, oxygen loss and/or dissolution.

Applications

Electrodes used in lithium batteries for

- Electric and plug-in hybrid electric vehicles;
- Portable electronic devices;
- Medical devices; and
- Space, aeronautical, and defense-related devices.



A schematic of a Li_2MnO_3 precursor structure, highlighting the technique used to fabricate the composite electrodes of the invention.

Developmental Stage

Reduced to practice

Availability

Available for licensing

Patent Information

Pending PCT Patent #040652

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U.S. DEPARTMENT OF ENERGY

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