PENNSTATE

Technology Available for Licensing
Office of Technology Management - The Pennsylvania State University
113 Technology Center, University Park, PA 16802
814.865.6277 phone - 814.865.3591 fax

Non-Confidential Description - PSU No. 4388
"Polymer-Cellulose Composite Electrolyte for Li-Ion Battery"

Keywords:

lithium ion battery, polymer electrolyte, cellulose

Inventors:

Janna Maranas, Pengfei Zhan, Lalitha Ganapatibhotla

Links:

http://sites.psu.edu/jannamaranas/

Background

Polymer electrolytes for Li-ion-ion batteries are safer, cleaner, and more flexible than currently used liquid electrolytes. However, polyethylene oxide (PEO) based electrolytes are not stiff enough to prevent dendrite formation, which limits the use of a Li metal anode. They also do not have sufficient conductivity to be practical. For amorphous polymer electrolytes, stiffness and conductivity are inversely related because Li motion is coupled to polymer motion. In current technology, liquid plasticizers are added to the solid polymer electrolyte to increase conductivity. However, such attempts result in decreased stiffness and increased risks from the use of flammable and toxic liquid plasticizers.

Invention Description

This new technology employs an electrolyte comprising of a crystalline PEO_6LiX complex as the conduction media. Crystalline PEO_6LiX complex has high room temperature conductivity with minimal temperature dependence compared with solid polymer electrolytes currently available. The use of PEO_6LiX as a conduction mechanism used to promote conductivity in long molecular weight PEO-based electrolytes is novel. Acidic cellulose nanowhiskers are used to promote the formation of PEO_6LiX complex through the surface interaction. Addition of cellulose not only improves the conductive properties, but also increases the mechanical strength of the electrolyte.

Advantages

- First high performance solid polymer electrolyte with crystalline conduction mechanism
- Improved room temperature conductivity compared to conventional polyethylene oxide solid electrolyte
- Conductivity not highly dependent on temperature from 20 to 50 degrees C
- Anticipated decreased dendrite growth will increase battery life time

Contact: **William H Gowen**
Sr. Technology Licensing Officer
The Pennsylvania State University
Phone: (814) 865-7070
Fax: (814) 865-3591
E-mail: whg10@psu.edu