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## **High Power Materials Development of Olivine System using Non-Stoichiometry or Surface Coating Method**

Technology #12347

### **Applications**

Nano-sized coatings improve the performance of electrodes in lithium batteries. Lithium batteries have applications ranging from power tools to hybrid electric vehicles.

### **Problem Addressed**

LiMPO<sub>4</sub> materials are of interest for rechargeable Li batteries as they are safe, relatively inexpensive and very stable. However, LiMPO<sub>4</sub> materials are relatively weak conductors; therefore, they are typically coated with carbon. This technology is a coating that is extremely stable, a good ionic and electronic conductor, and can be applied in-situ (during synthesis of the material) or ex-situ (after synthesis) of the electrode material.

### **Technology**

Due to demand for lightweight, high energy density batteries, improvements in the energy storage of battery materials is needed. This coating is an amorphous or microcrystalline glass of Li-P-O-N-Fe. The coating can be applied in-situ or ex-situ and at a 44C rate the material has over 120 mAh/g capacity. At 60C the material retains 100 mAh/g capacity, the best performance observed for a LiFePO<sub>4</sub> electrode. The material increases cyclability, rate capability, and capacity retention through increasing the electronic conductivity.

### **Advantages**

- Can be applied in-situ or ex-situ
- Increases cyclability, rate capability, and capacity retention

### **Categories For This Invention:**

Energy

Energy Storage

Batteries

Lithium Batteries

### **Intellectual Property:**

Oxide coatings on lithium oxide particles

Issued US Patent

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## Publications:

Battery Materials for Ultrafast Charging and Discharging  
Nature  
458, 190-193 (12 March 2009)

## Image Gallery:

