

## Hybrid Aluminum-Lithium Ion Battery having Enhanced Power Density

### **Disclosure Number**

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### **Technology Summary**

Current battery technologies including state-of-the-art lithium ion batteries are not sufficient to meet the needs of using electrical energy efficiently in transportation and residential applications, and new electrochemical cell chemistries and designs are needed for batteries with high energy, high power density, safety, reliability, and low cost. Aluminum is a very attractive electrode material for batteries, due to its advantages in abundance, cost, and theoretical energy density. Prior to the present invention, rechargeable Al batteries had been a challenge as a viable battery system. In this work, a rechargeable battery that includes reversible aluminum dissolution-deposition at anode (Al) and lithium insertion-extraction at cathode in a room temperature ionic liquid electrolyte has been demonstrated. This new battery shows an average discharge voltage of 2.0 V, very low self-discharge at charged state, and rechargeable capacity with tens of cycles. The feasibility of a hybrid aluminum-lithium ion battery increases the likelihood of using aluminum as active electrode material for safer and less expensive rechargeable batteries. The present invention includes any metal oxide used as a cathode in a lithium ion battery.

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