OAK RIDGE NATIONAL LABORATORY
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High Energy Density Secondary Lithium Batteries

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Technology Summary

During the last three decades, a large variety of materials have been synthesized and evaluated as cathode materials for Li-batteries. Notable among them is the layered LiMO2 (M = Co, Ni, Mn) compositions which have already found application in rechargeable lithium ion battery technology. However, only about 50–60% of the theoretical capacity can be utilized in practical cells because of structural and chemical instabilities associated with deep charge of Li1-xMO2(x > 0.5) along with safety issues. The present invention overcomes that limitation and successfully demonstrates high energy density Lithium secondary cells with total energy density exceeding 600 Wh/L at a cell level combining high voltage lithium rich composition with high capacity metal alloy anodes such as silicon.

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