

All-Solid-State Lithium Carbon Monofluoride Batteries

Disclosure Number

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Technology Summary

This invention describes the first construction of an all-solid-state Li-CFx battery which uses lithium phosphorous sulfide (LPS) as the solid electrolyte. The battery uses carbon monofluoride (CFx) as the cathode, metallic lithium as the anode. This battery overcomes two major problems associated with conventional Li-CFx batteries: (1) the swelling of the battery during discharge, and (2) large heat generation. Using LPS as the solid electrolyte eliminates the volume change and tolerates the heat generation. In addition, we found that the LPS contributes to the total capacity of the Li-CFx battery. The theoretic capacity of CFx is 864.5 mAh/g (when x=1). In the design of all-solid-state cell, the CFx cathode achieved an apparent capacity of 1094.5 mAh/g, which is about 26.7% higher than its theoretic capacity. The extra capacity is attributed to the LiF catalyzed electrochemical discharge of LPS.

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