

PROJECT FACTS

UNIVERSITY OF KENTUCKY CENTER FOR APPLIED ENERGY RESEARCH

Electrochemical Power Sources

Carbon Monofluoride (CF_x) for Li/CF_x Batteries

Lithium/Carbon Monofluoride (CF_x) batteries are very attractive because they offer very high-energy density, long-storage life, very good safety record, a wide temperature operating range, and very low self-discharge. These batteries are found in a wide range of applications for military, aerospace, electronics, and medical customers. Carbon nanospheres made by hydrothermal synthesis at CAER have been fluorinated and tested as CF_x cathodes. The fluorinated carbon nanospheres were tested in two electrolytes: 1M LiBF₄ in PC:DME (1:1), and 0.5M LiBF₄ in PC:DME (2:8). The measured capacity of the fluorinated carbon nanospheres is 832 mAh/g @ 1.5 V in 0.5M LiBF₄ PC:DME (2:8) which is close to the theoretical capacity of 850 mAh/g. The fluorinated carbon nanospheres have energy density of 2052 Wh/kg and 4000 Wh/L at an operating voltage of 2.6V, which is considerably higher than MnO₂ (847 Wh/kg, 4235 Wh/L), and SO₂ (1150 Wh/kg, 1650 Wh/L) systems currently available today. We are in the process of developing ordered carbons for CF_x that can graphitize at much lower temperatures than 2500 °C. Also, we are developing subfluorinated disordered carbons that may serve as CF_x cathodes.

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