Nanostructured lithium cobalt vanadate as electrode material for supercapacitors

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Introduction

• Capacitive energy storage has the advantage of delivering high power in comparison to batteries which store relatively more energy.
• Also supercapacitors have shorter charge/discharge time and longer cycling life.
• Because of multiple processes acting to store charge, the capacitance values are higher in pseudocapacitors.
• Here we propose a facile synthesis of nanocrystalline lithium cobalt vanadate for the first time for energy storage application.

Experimental

Here we report a facile and hydrothermal method to synthesize Lithium cobalt vanadate nanocrystals for the first time for energy storage application.

LiCoVO₄ nanocrystal electrode demonstrated an excellent specific capacitance of 967.98 F g⁻¹ at current density of 0.5 A g⁻¹.
Also excellent capacitance retention of ~99% obtained at 1 A g⁻¹ even after 2000 continuous charge-discharge cycles.
This study essentially offers a new kind of metal vanadium oxides as electrochemical active material for the development of supercapacitor devices.

Results and Discussion

Electrochemical Evaluation

• Measured • Calculated

Hybrid Capacitors charge storage: electrostatically and electrochemically
Pseudocapacitors charge storage: electrochemically (faradaically)
Double Layer Capacitors charge storage: electrostatically (Helmholtz layer)

Reference


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