

# Accepted Manuscript

Self-discharge of a hybrid supercapacitor with incorporated galvanic cell components

Y. Wang, X. Qiao, C. Zhang, Xiangyang Zhou

PII: S0360-5442(18)31235-0

DOI: [10.1016/j.energy.2018.06.170](https://doi.org/10.1016/j.energy.2018.06.170)

Reference: EGY 13212

To appear in: *Energy*

Received Date: 19 March 2018

Revised Date: 19 June 2018

Accepted Date: 24 June 2018

Please cite this article as: Wang Y, Qiao X, Zhang C, Zhou X, Self-discharge of a hybrid supercapacitor with incorporated galvanic cell components, *Energy* (2018), doi: 10.1016/j.energy.2018.06.170.

This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting proof before it is published in its final form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.



# Self-Discharge of a Hybrid Supercapacitor with Incorporated Galvanic Cell Components

Y. Wang, X. Qiao, C. Zhang and Xiangyang Zhou<sup>1</sup>

*Department of Mechanical and Aerospace Engineering, University of Miami, Coral Gables, Florida, 33146, United States*

## Abstract:

Supercapacitors can provide a high specific power and long cycle life but suffer a significant self-discharge limiting their application as a stand-alone energy storage device. A new hybrid supercapacitor with incorporated galvanic cell components was proposed to mitigate the self-discharge problem. The hybrid supercapacitor was similar to a conventional supercapacitor with two active carbon electrodes separated by a polymer electrolyte membrane containing 1.5 M zinc sulfate. However, a zinc foil and a copper foil were used as the current collectors for the negative and the positive electrodes respectively, which can provide a micro-current to compensate the self-discharge current. The hybrid supercapacitor exhibited a maximum specific capacitance of 55 F g<sup>-1</sup> and specific energy of 4.51 Wh kg<sup>-1</sup> with a charge efficiency of 90%. The capacitance retention of the hybrid supercapacitor was 80% after 2000 cycles. The open circuit voltage of the charged hybrid supercapacitor was stable and declined slightly from initial 0.90 V to 0.85 V in a month. The results demonstrate that via replacement of a pair of conventional metal current collectors with a galvanic couple the ubiquitous self-discharge problem can be significantly mitigated and the storage time can be prolonged to meet the

Download English Version:

<https://daneshyari.com/en/article/8071113>

Download Persian Version:

<https://daneshyari.com/article/8071113>

[Daneshyari.com](https://daneshyari.com)