

High Performance of Lithium-ion Capacitors

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Lithium-ion capacitor (LIC) is a new energy storage device which consists of an electric double layer capacitance (EDLC) cathode and a lithium-ion battery (LIB) anode, between which the ions shuttle during charge and discharge processes. The LIC not only retained all the advantages of EDLC such as specific power >5 kW/kg and cycle life $>100,000$ cycles; but also had higher specific energy of 15-30 Wh/kg and higher maximum cell voltage of 4.0 V than that of EDLC. The LIC has a wide operating temperature range from -40 to 70o C.

Because the potentials of anode and cathode as well as the maximum cell voltage of LIC is comparable to that of LIB, it allows the LIC and LIB to be assembled in one package as a monolithic LIB and LIC hybrid cell. The energy density and power density of the hybrid cell will be designed to meet the requirements by a reasonable distribution of the ratio between LIB and LIC electrodes in a hybrid cell.

Biography:



Dr. Jim P. Zheng is a Professor and Sprint Eminent Scholar Chair at the Department of Electrical and Computer Engineering of Florida A&M University (FAMU) and Florida State University (FSU). He is the recipient of National Academy of Inventors Fellow, National Research Council Fellow, Army Research & Development Achievement Award, NASA Faculty Research Award, and Progress Energy Professional Development Award. He has published more than 120 articles in scholarly journals, and 110 papers in conference proceedings in the fields of energy storage, fuel cells, nano-sensors, photonics, and thin film growth, and been awarded 18 patents, and 5 patents have been licensed by a private companies. He is the founder of General Capacitor LLC and a co-founder of Bing Energy International Inc. He serves as editorial board of the Journal of Materials. Zheng is a senior member of the Institute of Electrical and Electronic Engineers and member of the Electrochemical Society.