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Electrochemical Double Layer Capacitors Using Aligned Multiwall Carbon Nanotubes Grown Directly on Conductive Substrates
RAKESH SHAH, XIANFENG ZHANG, SAIKAT TALAPATRA, Department of Physics, Southern Illinois University Carbondale, IL, 62901 — We report on the properties of Electrochemical Double Layer Capacitor (EDLCs) electrodes fabricated using aligned multiwall carbon nanotubes (MWNT) grown on Inconel sheets. Air assisted chemical vapor deposition technique was employed to synthesize the aligned MWNT on these substrates. The capacitive behavior of the EDLC's fabricated using different lengths of aligned MWNTs was examined using cyclic voltammetry, constant current charge/discharge, and impedance spectroscopy. These measurements show that the charge storage phenomenon was non-Faradic with equivalent series resistance in the range of 0.13-0.4Ω. The maximum values of specific capacitance of the carbon nanotube materials used in these devices were in the range of 14.6-21.57 F/g. The maximum value of power density and energy density of the whole supercapacitor devices were 1.48 Wh/Kg and 2.7 KW/Kg, respectively. These results show that the multiwall carbon nanotubes grown directly on conductive substrates are promising candidates as electrodes for electrochemical energy store device applications.

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