World Academy of Science, Engineering and Technology
International Journal of Energy and Power Engineering
Vol:12, No:06, 2018

Nitrogen Doping Effect on Enhancement of Electrochemical Performance of a Carbon Nanotube Based Microsupercapacitor

Authors : Behnoush Dousti, Ye Choi, Gil S. Lee

Abstract : Microsupercapacitors (MScs) are known as the future of miniaturized energy sources that can be coupled to a battery to deliver stable and constant energy to microelectronics. Among all their counterparts, electrochemical microsupercapacitor have drawn the most research attention due to their higher power density and long cycle life. Designing the microstructure and choosing the electroactive materials are two significant factors that greatly affect the performance of the device. Here, we report successful fabrication and characterization of a microsupercapacitor with interdigitated structure based on Carbon nanotube sheets (CNT sheet). Novel structure of highly aligned CNT sheet as the electrode materials which also offers excellent conductivity and large surface area along with doping with nitrogen, enabled us to develop a device with serval order of magnitude higher electrochemical performance than the pristine CNT in aqueous electrolyte including high specific capacitance and rate capabilities and excellent cycle life over 10000 cycles. Geometric parameters such as finger width and gap size were also studied and it was shown the device performance is much depended on them. Results of this study confirms the potential of CNT sheet for future energy storage devices.

Keywords : carbon nanotube, energy storage systems, microsupercapacitor, nitrogen doping
Conference Title : ICESTFC 2018 : International Conference on Energy Storage Technologies and Fuel Cells
Conference Location : San Francisco, United States
Conference Dates : June 06-07, 2018