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Fabrication and Electrochemical Properties of Carbon Nanotube/Carbon Fiber Nanocomposite Web as an Electrode for Supercapacitors Prepared by Co-Electrospinning

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The aim of this work was the fabrication and application of carbon nanotube/carbon fiber nanocomposite web as an electrode for supercapacitors prepared by co-electrospinning technique. An electrospinning method was introduced to prepare nanostructured composites of PAN (polyacrylonitrile)/MWCNT (multi-walled carbon nanotube) in the form of a paper with almost mono-disperse diameters of 500 nm (or less). The electrical conductivity and the activation yield increased with increasing MWCNT embedded ratio. The 3 wt.% MWCNT embedded nanocomposite samples exhibited the largest specific surface area (2180 m²/g) and the highest capacitance (180 F/g). The specific capacitances from the samples wereranged from 140 to 180 F/g, depending on the MWCNT embedded ratio. The introduced MWCNT was necessary to increase the capacitance and reduce the nanostructured electrodes resistance. The results show a simple and economical means that can substantially enhance the capacitance of nanostructured composites.