**Carbon Nanotube embedded carbon nanofiber composite electrode for high- performance supercapacitor**

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**Abstract**

High performance portable energy storage devices have gain attention now a days due to the increasing demand of energy. Supercapacitors is one of the promising candidates for this portable energy storage devices. Carbon nanofibers is one of the commonly used electrode materials for the development of supercapacitors. The performance of carbon nanofiber derived supercapacitors are hindered due to low conductivity of carbon nanofibers. Herein carbon nanotube (CNT) embedded carbon nanofiber composite membrane is developed through one step electrospinning process followed by thermal treatment. Structure and surface morphology of the membranes are studied by X-ray diffraction, Raman spectroscopy and Field emission scanning electron microscopy (FESEM). The electrochemical behavior of composite membrane are studied by cyclic voltammetry, galvanostatic charge discharge and electrochemical impedance spectroscopy in three electrode set up in 6M aqueous KOH electrolyte solution. The specific capacitance of fabricated CNF/CNT composite membranes displayed 156 Fg-1 at 2 Ag-1 current density. The fabricated electrode exhibit excellent cycle life with capacitance retention of about 99 % of its initial value after 5000 cycles at 5 Ag-1 current density. This excellent cycling stability and high performance will have potential for promising application towards supercapacitor electrode materials.

**Key words**: Electrospinning, CNT, CNF, Supercapacitor, specific capacitance

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