

## A Novel All-Solid-State Microsupercapacitor Based on Carbon Nanotube Sheets

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**Abstract :** Supercapacitors which are also known as ultra supercapacitors play a significant role in development of energy storage devices owing to their high power density and rate capability. Nobel research has been conducted on micro scale energy storage systems currently to address the demand for smaller wearable technology and portable devices. Improving the performance of these microsupercapacitors have been always a challenge. Here, we demonstrate a facile fabrication of a microsupercapacitor (MSC) with interdigitated electrodes using novel structure of carbon nanotube sheets which are spun directly from as-grown carbon nanotube forests. Stability and performance of the device was tested using an aqueous PVA-H<sub>3</sub>PO<sub>4</sub> gel electrolyte that also offers desirable electrochemical capacitive properties. High Coulombic efficiency around 100%, great rate capability and excellent capacitance retention over 15,000 cycles were obtained. Capacitive performance greatly improved with surface modification with acid and nitrogen doping of the CNT sheets. The high power density and stable cycling performance make this microsupercapacitor a suitable candidate for verity of energy storage application.

**Keywords :** carbon nanotube sheet, energy storage, solid state electrolyte, supercapacitor

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