

## **Incorporation of iron oxide into CNT/GNF as a high performance supercapacitor electrode**

### **ABSTRACT**

CNT/GNF/Fe<sub>2</sub>O<sub>3</sub> ternary composites were synthesized via a simple hydrothermal route. The electrochemical findings reveal that the incorporation of iron oxide (Fe<sub>2</sub>O<sub>3</sub>) into CNT/GNF (174 F g<sup>-1</sup>) boosts the specific capacitance (Cs) to 307 F g<sup>-1</sup> at 10 mV s<sup>-1</sup>. The system also shows good capacity retention, as it maintained 92% of its original capacitance after 200 cyclic voltammetry cycles. Physicochemical characterization shows that Fe<sub>2</sub>O<sub>3</sub> was anchored randomly on the CNT/GNF sidewalls, forming a network for facile ion diffusion. The improved supercapacitance of CNT/GNF/Fe<sub>2</sub>O<sub>3</sub> can be ascribed to the synergistic effect of the double-layer capacitance of CNT/GNF and the pseudocapacitance of Fe<sub>2</sub>O<sub>3</sub>.

**Keyword:** CNT; GNF; Iron oxide; Supercapacitors; Physicochemical; Electrochemical.