

## **Ternary functionalised carbon nanofiber/polypyrrole/manganese oxide as high specific energy electrode for supercapacitor**

### **ABSTRACT**

A successful fabrication of ternary functionalised carbon nanofibers/polypyrrole/manganese oxide (f-CNFs/PPy/MnO<sub>2</sub>) composite was reported. The field emission scanning electron microscopy (FESEM) image had revealed a random distribution of granular PPy and spherical nanoparticles of MnO<sub>2</sub> on the surface of f-CNFs. The measured contact angle of f-CNFs indicated superhydrophilic nature which can enhance the surface wettability and ionic diffusion. The ternary f-CNFs/PPy/MnO<sub>2</sub> composite displayed a remarkable specific capacitance of 409.88 F/g compared with f-CNFs/MnO<sub>2</sub> (322.96 F/g) and f-CNFs/PPy (290.83 F/g). The electrochemical properties of f-CNFs/PPy/MnO<sub>2</sub> had contributed to the appreciable specific energy of 42.53 Wh/kg at a specific power of 297.32 W/kg. The assembled f-CNFs/PPy/MnO<sub>2</sub> composite also showed low resistance of charge transfer (R<sub>ct</sub>) value (3.40 Ω) with a better cycle life (86.30% capacitance retention over 3000 cycles). Hence, ternary f-CNFs/PPy/MnO<sub>2</sub> can be suggested as a high-performance electrode for supercapacitor.

**Keyword:** Superhydrophilic; Carbon nanofibers; Polypyrrole; Manganese oxide; Supercapacitors