

## Evaluation of Iron Oxide-Functionalized Multiwall Carbon Nanotube Self- Standing Electrode for Symmetric Supercapacitor Application

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**Abstract :** The rapid development of renewable energy sources has drawn great attention to energy storage devices, especially supercapacitors, because of their high power density and rate performance. This work focus on  $\text{Fe}_3\text{O}_4$  nanoparticles synthesized by reverse co-precipitation and MWCNTs functionalized by  $-\text{COOH}$  acid functionalization. The results show that Optimized 25wt%  $\text{Fe}_3\text{O}_4@FMWCNT$  show high specific capacitance  $100 \text{ mF/cm}^2$  at one  $\text{mA/cm}^2$  whereas 15wt%  $\text{Fe}_3\text{O}_4@FMWCNT$  showed high stability (80% retention capacity) over 5000 cycles. The electrolyte used in the coin cell is  $\text{LiPF}_6$  and the thickness of the electrode is 30 microns. The optimized  $\text{Fe}_3\text{O}_4@FMWCNT$  bucky papers coin cell electrochemical studies suggest that 25wt%  $\text{Fe}_3\text{O}_4@FMWCNT$  could be a good candidate for high-capacity supercapacitor devices. This could be further tested for flexible and planar supercapacitor device application with gel electrolytes.

**Keywords :** self-standing electrode,  $\text{Fe}_3\text{O}_4@FMWCNT$ , supercapacitor, symmetric coin-cell

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