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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 Fe_3O_4 nanoparticles synthesized by reverse co-precipitation and MWCNTs functionalized by –COOH acid functionalization. The results show that Optimized 25wt% Fe_3O_4@FMWCNT show high specific capacitance 100 mF/cm^2 at one mA/cm^2 whereas 15wt% Fe_3O_4@FMWCNT showed high stability (80% retention capacity) over 5000 cycles. The electrolyte used in the coin cell is LiPF6 and the thickness of the electrode is 30 microns. The optimized Fe_3O_4@FMWCNT bucky papers coin cell electrochemical studies suggest that 25wt% Fe_3O_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, Fe3O4@FMWCNT, supercapacitor, symmetric coin-cell
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