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Comparative Supercapacitive Properties of Asymmetry Two Electrode Coin Type Supercapacitor Cells made from MWCNTS/Cobalt Oxide and MWCNTs/Iron Oxide Nanocomposite

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Supercapacitive properties of synthesized metal oxide nanoparticles (MO) vis a vis iron oxides (Fe(sub2)O(sub3)) and cobalt oxide (Co(sub3)O(sub4)) nanoparticles integrated with multi-walled carbon nanotubes (MWCNT) in a two-electrode coin cell type asymmetry supercapacitor assembly was investigated. The synthesised MO and nanocomposite films were characterised using techniques such as transmission electron microscopy (TEM), scan electron microscopy (SEM), electron dispersive X-ray spectroscopy (EDX) and X-ray diffraction spectroscopy (XRD). The supercapacitance of the asymmetry MWCNT-MO based supercapacitor in 1 M H(sub2)SO(sub4) and 1 M Na(sub2)SO(sub4) electrolytes was measured using cyclic voltammetry (CV), electrochemical impedance spectroscopy (EIS) and galvanostatic constant current charge-discharge (CD) techniques. The asymmetry supercapacitors MWCNT-Fe(sub2)O(sub3)|MWCNT and MWCNT-Co(sub3)O(sub4)|MWCNT gave the highest specific capacitance (SC) values of 439.94 mFcm(sup-2) (or 64.74 Fg(sup-1)) and 425.83 mFcm(sup-2) (or 45.79 Fg(sup-1)) respectively in 1 M H2SO4 using charge-discharge technique. Results obtained from charge-discharge experiment are much higher compared with those obtained using the CV technique since it is the most reliable and accurate method. The values compared favorably and higher compared to those reported in literature using similar technique. MWCNT-Fe(sub2)O(sub3)|MWCNT cell gave specific power (SP) and specific energy (SE) of 19.31 Wkg(sup-1) and 2.68 WhKg(sup-1) respectively in 1 M H(sub2)SO(sub4), while the energy deliverable efficiency (h/%) of the cell is 99.6 and 91.3% in 1 M H2SO4 and 1 M Na(sub2)SO(sub4) respectively.