



Enhanced electrochemical properties in nanostructured β - MnO_2 , synthesized through a single step auto-igniting modified combustion technique.

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Abstract: Nanoparticles of manganese dioxide are prepared by an auto igniting combustion technique and its structural, morphological, optical, and electrochemical properties are investigated. The X-ray diffraction studies reveal that MnO_2 possesses phase pure tetragonal structure with space group of P_{cab} . The average particle size of the as-prepared nanoparticles obtained from both the Scherrer formula and scanning electron microscopy is ~ 30 nm. EDAX confirms the composition of MnO_2 . The UV-vis absorption spectra of the sample was obtained and the optical band gap calculated from Tauc's Plot is 3.25 eV. Electrochemical tests reveal that the sample has a high specific capacitance (320 F/g at 0.25 A/g) and good rate capability, which can be attributed to its unique structure. The capacitance retention reaches 89% after 1000 cycles at a current density of 3 A/g. These results show that manganese dioxide have great potential applications in supercapacitor electrode material.

Keywords: Combustion synthesis, supercapacitor, pseudo-capacitance, charge-discharge process.