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$\alpha-MnO_2$ Nanorod-composites as Electrode Material for Supercapacitors PRASADA RAO TALAKONDA, AJAY KUMAR, Wayne State University, VAMAN M. NAIK, University of Michigan, Dearborn, RATNA NAIK, Wayne State University — MnO_2-based supercapacitors as electrochemical storage systems have attracted immense interest due to their low cost, natural abundance, high theoretical specific capacitance and environmental friendliness. We have synthesized α-MnO_2 and α-MnO_2/CNF (carbon nanofibers, 5 wt%) nanocomposites using co-precipitation method. The XRD results confirm the formation of a single phase α-MnO_2 and SEM, TEM studies reveal the formation of nanorods of α-MnO_2, but with a larger size in the case of α-MnO_2-CNF nanocomposites. Pure α-MnO_2 shows a larger surface area (266 m/g), and lower electrical conductivity (0.02 S/cm) compared to that of α-MnO_2-CNF (131 m/g, 0.67 S/cm). Cyclic voltammetry (CV) studies and galvanostatic charge/discharge studies have been performed on α-MnO_2 nanocomposites, coated on Ni foam, using a potential ranging from -0.02 to 0.8 V, in a 1 M Na_2SO_4 aqueous solution. The measured specific capacitance of α-MnO_2 is 245 F/g whereas that of α-MnO_2-CNF is 192 F/g. Although, the electrical conductivity of α-MnO_2-CNF is higher than that of α-MnO_2, its observed lower specific capacitance is attributed to its reduced surface area compared to α-MnO_2. Currently, we are optimizing the amount of CNF in α-MnO_2-CNF nanocomposites to enhance supercapacitor performance.

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