PREPARATION OF CERIA-CARBON COAXIAL NANOTUBE COMPOSITES FOR SUPERCAPACITOR APPLICATIONS

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Carbon based materials, conducting polymers and metal oxides are typically used as electrodes for electrochemical double layer (EDLCs) supercapacitors or psuedocapacitors. For achieving better performance, the composites of carbonaceous materials and metal oxide or conducting polymers are being recently investigated. In this study, we report the synthesis of ceria-carbon coaxial nanotube composites \([(\text{CeO}_2\cdot\text{C})\text{NT}]\) by chemical bath deposition method and the evaluation of their capacitive performance. The \([(\text{CeO}_2\cdot\text{C})\text{NT}]\) composites were prepared by using carbon nanotubes (NTC) as substrates for the deposition of CeO\textsubscript{2} phase and cerium nitrate as precursor with a subsequent heat-treatment in air at 300 °C. The NTC were functionalized with carboxyl groups to achieve the uniform growth of CeO\textsubscript{2}. The heat-treatment was used for the crystallization of CeO\textsubscript{2} phase, which resulted multiwalled in nature. The \([(\text{CeO}_2\cdot\text{C})\text{NT}]\) coaxial nanotube composites are continuous with length from 6 to 12 µm and diameters between 60-100 nm. The specific capacitance of \([(\text{CeO}_2\cdot\text{C})\text{NT}]\) coaxial nanotube composites was found to be about 198 Fg\textsuperscript{-1} determined by cyclic voltammetry.

**Keywords:** Carbon nanotubes, Coaxial nanotube nanocomposites, Supercapacitors

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