Abstract

In this research work, we used the co-precipitation technique to synthesize a composite material that consisted of Strontium Cobaltite ($SrCo_2O_4$) and Strontium Cobaltite anchored reduced Graphene Oxide ($SrCo_2O_4$/rGO). SEM micrographs of $SrCo_2O_4$ show flake like structures while $SrCo_2O_4$/rGO exhibited cotton like structure, which provide large surface area containing numerous active sites responsible for enhancement in electrochemical properties. The identification of two prominent peaks at 660 cm^{-1} and 581 cm^{-1} in the FTIR study can be attributed to the vibrational modes related to the metal-oxygen bonds, notably the Sr-O and Co-O bonds. Based on the results obtained from UV-Visible Spectroscopy, it can be observed that the inclusion of reduced Graphene Oxide (rGO) induces a decrease in the band gap, causing a shift from 2.13 eV to 1.80 eV. Cyclic Voltammetry and Galvanostatic Charging/Discharging procedures were utilized in order to evaluate the electrochemical performance of the material. The maximum specific capacitance achieved for the $SrCo_2O_4$/rGO composite material was found to be 455 Fg^{-1} when tested at 1 Ag^{-1}. $SrCo_2O_4$/rGO composite material exhibited a maximum energy density of 15.80 $Whkg^{-1}$ at a power density of 250 Wkg^{-1}.