

## Abstract

In this work a modest and environmental-friendly green synthesis approach is used to synthesize MnO/NiO, MnO/NiO/rGO and MnO/NiO/rGO/PEG nano-composites designated as G1, G2 and G3, respectively, utilizing the extract of centilla asiatica leaves. The impact of PEG and rGO on metal oxides is analyzed by adding them sequentially in metal oxide. Among these greenly synthesized nano-composite materials i.e., G1, G2 and G3, respectively are being reported that G3 nano-composite unveils improved electrochemical characteristics because of reinforced intercalation and deintercalation of electrolyte ions across the electrode material. Further, G3 showing low impedances of various kinds, it displays better conductivity by yielding the largest area under the CV curves at different scan rates. The corresponding specific capacitance of G3 evaluated from cyclic voltammogram at 5mV/s is 750.7 F/g more than that demonstrated by G1 and G2 with values of 550 F/g and 350 F/g, respectively. The highly improvised electrochemical properties of G3 are dominated by the good conductive nature of PEG and rGO that further aid the interaction of ions and redox sites. Following the enhanced energy storage capabilities of G3, it highlights the significance of PEG and rGO as potential aides for escalation of reversible oxidation-reduction activities.