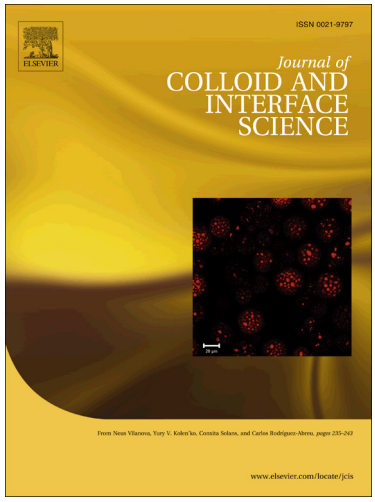

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Chlorine-doped reduced graphene oxide as an efficient and stable electrode for supercapacitor in acidic medium

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Abstract

We demonstrate the efficient doping of reduced graphene oxide (RGO) by Chlorine and its capacitive performance was alculated by cyclic voltammetry and charge–discharge cycling in 1M H_2SO_4 solution. In this regard, we are prepared RGO nanosheets through a simple, eco-friendly and efficient electrochemical method, with selectively functionalized edges by chlorine which involves added the RGO to the halogen-containing acid solution and dispersed by ultrasonic**.** After synthesis**,** Cl-RGO is characterized using X-ray diffraction, Raman spectroscopy, Fourier-transform infrared (FTIR) spectroscopy, Energy-dispersive X-ray (EDX) spectroscopy and tunneling electron microscopy. FTIR spectra show the chlorine-containing functional groups. Energy-dispersive X-ray spectroscopy analysis confirmed the presence of doped chlorine in RGO. Raman spectroscopy shows a high density of defects in the RGO layer. Electrochemical charactristics of Cl-RGO are characterized by cyclic voltammetery, galvanostatic charge/discharge and electrochemical impedance spectroscopy. According to the galvanostatic charge/discharge analysis, Cl-RGO represents specific capacitance (Cs) of 178.4 Fg^{-1} at current density of 1 A g^{-1}, which is higher than that of RGO (100.5 Fg^{-1}) in H_2SO_4 solution.

Keywords: electro-synthesis, reduced graphene oxide, chlorine-doped, , supercapacitor, electrochemical performance

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