

**SYNTHESIS AND CHARACTERIZATION OF REDUCED
GRAPHENE OXIDE FOR SUPERCAPACITORS**

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Degree of Master of Science

Department of Materials Science and Engineering

University of Moratuwa.

Sri Lanka.

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**This Dissertation submitted in partial fulfillment of the requirements for the Degree of
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DECLARATION

“I declare that this is my own work and this dissertation does not incorporate without acknowledgement any material previously submitted for a degree or Diploma in any other University or Institute of higher learning and to the best of my knowledge and belief it does not contain any material previously published or written by another person except where the acknowledgement is made in text”

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The above candidate has carried out research for the partial fulfilment of the requirements for the Degree of Master of Science in Material Science under my supervision.

Project Supervisor: Prof.S. U. Adikary

Date: 23/06/2020

Abstract

The main focus of this investigation was to add value to high purity Sri Lankan graphite. Reduced graphene oxide (rGO) was synthesized using locally available graphite from Kahatagaha mines and purity was recorded as 99%. Modified Hummers method was used to synthesize rGO. Synthesized rGO was characterized using Fourier-Transform Infrared Spectroscopy (FTIR), Scanning Electron Microscope (SEM) and X-ray Diffraction Spectroscopy (XRD). The specific capacitance was recorded as 0.45 Fg^{-1} in rGO. The specific capacitance of the capacitor was calculated using cyclic voltammetry testing at 10 mVs^{-1} . SEM analysis shows the rGO surface character, larger surface area and warped morphology of rGO.

In this research, we were able to develop rGO material from locally available graphite for capacitor applications without surface activation. Numerous research projects are ongoing in this field with ultra-pure (99.99%) graphite materials but the purity of locally sourced graphite recorded as 90% to 99% without value addition. Therefore, the usability of local graphite to develop rGO seen prospective for its super capacitance performance, however, future improvement is needed.

Key words: Graphene, Supercapacitors, reduced graphene oxide.

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LIST OF ABBREVIATIONS

EDLC	Electrically Double Layer Capacitor
rGO	reduced Graphene Oxide
GO	Graphene oxide
CMG	Chemically modified graphene
FTIR	Fourier transform infrared
SEM	Scanning Electron Microscope
XRD	X-Ray diffraction
CV	Cycle voltammetry