944/E1

Synthesis of reduced graphene oxide from local graphite using alternative microwave method

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Reduced graphene oxide (RGO) has attracted wide attention due to various applications, such as super capacitors, sensors, solar cells, batteries, transistors, and nano electronics, due to its unique properties such as high surface area, stability, conductivity, and flexibility. RGO can combine with metal oxide, which results in formation of nanocomposites, which may improve the properties of RGO. In this study, Graphite Oxide (GO) was synthesized from Kahatagaha vein graphite mined in Sri Lanka, using a modified version of the common Hummer method first, from which RGO was synthesized using the microwave assisted hydrothermal method. Attention has been paid in this study to use an alternative and cheap domestic microwave oven of power 800W for the first time, instead of the higher power reported elsewhere. In addition, a pure form of graphite (above 99%) was used. The prepared products (GO, RGO) were characterized using X-Ray Diffraction Spectroscopy (XRD) and Fourier transform infrared spectroscopy (FTIR). In the XRD pattern of GO, the peak at about $2\vartheta = 11°$ disappeared, confirming successful reduction of GO to RGO, and a low intensity broader peak appeared at $2\vartheta = 26°$, revealing successful formation of RGO in 15 minutes. The bands at around 1544 cm^{-1} of the FTIR also very clearly shows the formation of RGO. Therefore, the domestic microwave oven is suitable to successfully convert GO into RGO in 15 minutes using lower power. The obtained RGO is pure since highly pure graphite was used.

Acknowledgement: Financial assistance by NRC Grant (No. 16-138).

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