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Comparison of Few-layer Graphene Prepared from Natural Graphite through Fast Synthesis Approach

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We report the synthesis of high quality few-layer graphene on a large scale using high purity natural graphite from Sri Lanka. A novel thermal method was adapted to prepare graphene from intermediate graphite oxide, which was obtained by heating the intermediate at low temperature (above 150 °C) in air for 5 min and subsequent heating at 500 °C in Argon for 15 min. The samples were characterized by X-ray diffraction, Fourier transform infrared spectroscopy, scanning electron microscopy, Raman spectroscopy etc. The properties and the performance of graphene were observed to depend on the graphite source. The reduced graphite oxide from Kahataga graphite source exhibits higher Brunauer-Emmett-Teller specific surface area $\sim 500 \text{ m}^2 \text{ g}^{-1}$ and stable specific capacity as an anode in Li-ion batteries, whereas Bogala graphite showed higher initial irreversibility and higher capacity as anode, exceeding the theoretical specific capacity of graphite. Both graphene showed high electrical conductivity. The graphene, which exists in stacks of only a few layers, supposed to be 2–6 layers, would be promising for vast variety of applications.

Key words: Graphite; Graphite oxide; Graphene; Li-ion batteries

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