

## **Mechanical Exfoliation of Large Area Graphene from Sri Lankan Graphite for Device Application**

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Graphene is known as a unique material with wide range of applications in renewable energy generation and storage, biosensors, and device applications. Single atomic thickness with extremely high electron mobility and a zero-band gap provide many advantages to the graphene as an electronic material. Sri Lankan graphite is known for its very high carbon content and high purity. However, Sri Lanka is still exporting the graphite as a raw material. Recently, the government of Sri Lanka launched a project for value addition of local minerals and the Sri Lankan vein graphite has been identified as a potential candidate in energy storage devices. In this work, we attempted to exfoliate single layer graphene from Sri Lankan graphite and to fabricate field effect transistors and to study their electronic properties. We used a simple scotch tape technique and transferred graphene onto a 100 nm SiO<sub>2</sub> coated Si substrate. The thickness and the uniformity of the graphene layer were tested using Atomic Force Microscopy (AFM). The thickness was confirmed to be 0.4 nm and the surface roughness was found to be 0.04 nm. The AFM images also confirmed the growth of double layer graphene also with the thickness of 0.9 nm. The Field Effect Transistor was fabricated by making electrical contact using thermal evaporation of gold and we found that the graphene layer showed an ambipolar current response with a positive Dirac voltage. Our studies suggested that the Sri Lankan graphite is one of best raw material for graphene exfoliation and the graphene exfoliated can be used for device applications.

**Keywords:** Graphene, Graphite, Sri Lankan vein graphite, Field-effect transistor