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### **FTIR analysis of graphene synthesized using microwave irradiation in different solvents**

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Graphene is an atomic thick layer of carbon atoms arranged in a honeycomb two dimensional (2D) lattice in space. Graphene is used for superior quality applications due to its excellent electrical, thermal and mechanical properties and is studied in the context of many applications such as polymer composites, energy related materials, sensors, transistors and other applications. Graphene is a high value added form of graphite which can be synthesized from natural graphite. In Sri Lanka, natural graphite is being exported mainly as a raw material at very low price. Attempts were made to develop an economically efficient method to synthesize high quality graphene from local graphite.

Among the methods employed to synthesize graphene the reduction of graphite oxide (GO) is promising for mass scale production of graphene based materials. GO can be synthesized in large quantities by oxidizing inexpensive graphite powder using strong oxidants. The resulting GO can then be reduced to graphene via a number of chemical or thermal methods. In the present study, Bogala graphite flakes of 97% purity were oxidized using Hummers method. The dispersions of graphite oxide in different solvents such as water, methanol, ethylene glycol (EG) and benzyl alcohol (Bn) were irradiated with microwave (700 W) to reduce graphite oxide to graphene. Use of a solvent system such as Bn in microwave irradiation is novel. Functional groups attached to the graphite oxide and graphene were characterized using Fourier Transformed Infra Red (FT-IR) spectrometer.

According to the FT-IR spectra, a significant peak was not observed for graphite to indicate the presence of any functional group. However, the presence of different types of oxygen functionalities in graphite oxide was confirmed at various oxygen configurations; epoxide (C–O–C), carboxyl (COOH), hydroxyl (C–OH), ketonic species (C=O) and C–O. After the microwave irradiation, intensity changes were observed for the whole spectrum of each graphite oxide mixture compared to the unreduced GO. This can be interpreted as a rough indication of the change in the concentrations of the various remaining oxygen functionalities on the graphene basal plane. Since it is apparent that a certain extent of oxygen functionalities are still remaining on the reduced graphite oxide, the end product can be referred to as a “partially reduced” graphene.