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Synthesis and Electrical Characterization of Graphene Oxide Films

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Abstract

In this work, we have synthesized Graphene Oxide (GO) using modified Hummers method and investigated its electrical properties using parallel plate impedance spectroscopic technique. Graphene Oxide films were prepared using drop casting method on Indium Tin Oxide (ITO) coated glass substrate. Atomic force microscopy was used to characterize the films' microstructure and surface topography. Electrical characterization was carried out using LCR meter in frequency regime (100 Hz to 10 MHz) at different temperatures. AC conductivity σ_{ac} of the films was observed to be varied with angular frequency, ω as ω^S , with $S < 1$. The electrical properties of GO were found to be both frequency and temperature dependent. Analysis showed that GO film contains direct current (DC) and Correlated Barrier Hopping (CBH) conductivity mechanisms at low and high frequency ranges, respectively. Photon absorption and transmittance capability in the visible range and excellent electrical parameters of solution processed graphene oxide suggest its suitability for the realization of low cost flexible organic solar cells and organic thin film transistors, respectively.

Keywords: Graphene Oxide, Dielectric Constant, AC conductivity, LCR-meter.

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