
Protocol for the Electrical Characterization of Powder-type Graphene Materials

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Due to its unique properties such as extremely high mobility and ballistic transport of electrons, graphene has attracted attention as an efficient candidate for use in electronic products such as transparent conducting films, electronic inks, supercapacitor, etc. Characterization of the electrical properties of graphene itself is essential to both manufacturers and users in order to develop innovative electronic devices or to improve existing electronic ones using it. Commercialized graphene products can be categorized by their manufacturing methods as follows: (i) graphene films grown by CVD, (ii) graphene sheets suspended in liquids, and (iii) graphene flakes in powder form. Many electrical properties of a powder-type graphene product are sensitively affected by its geometric and electronic parameters. Therefore, it is necessary to select the best representative parameter among its electrical properties which may exhibit the quality of graphene. Among the many measurands to determine an electronic property of graphene flakes, e.g. sheet resistance, conductivity, resistivity, volume resistivity, and so on, the volume resistivity (or volume conductivity) was selected for the representative measurand which reveals the electrical property of powder-type graphene through a series of experiments. This work provides a standardized method for evaluating electrical property of commercialized powder-type graphene products to enable users to select a product suitable for their applications.

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