CARRIER TYPE REVERSAL OF GRAPHENE MULTILAYERED THIN FILMS

H.A. Elmeleegi[1], *Z.S. Elmandouh*[1], *F. Taher*[2]

[1]Physical Research Division,
National Research Center (NRC)
(*12622, Dokki, Cairo, Egypt*),
[2]Faculty of Science, AlAzhar University (Girls)
(*2, Cairo, Egypt*)

S u m m a r y

Graphene has unique two-dimensional structure, high surface area, and remarkable chemical stability. Graphene oxide (GO) produced by the Hummers method was reduced to graphene by pulsed laser deposition (PLD). The graphene specimen in the form of a powder and a multilayered structure is studied. X-ray diffraction of graphene is interpreted to elucidate its short-range order and to calculate the number of layers of graphene. Electron diffraction and transmission electron microscope studies elucidate the short-range order nature of deposited graphene. The temperature dependence of the Seebeck coefficient (S) indicates the carrier type reversal (CTR) from the n- to p-type, by starting from 60 °C. CTR is affected by the applied voltage, frequency, and temperature. Distinct oscillations in the Seebeck coefficient thickness dependence are observed and attributed to the size quantization effect in graphene layers. The velocity, mobility, and electrical conductivity are measured and calculated to complete the transport properties of graphene.