Modeling of Laser Assisted Thermal Reduction of Graphene Oxide for the Development of a Strain Gauge

W.M.D.S. Wamakulasooriya; V.S Rajapakshe; D. Attygalle*

Department of Material Science and Engineering, University of Moratuwa, Sri Lanka

*Email: dattyga@uom.lk

A computational model to predict the degree of reduction of graphene oxide by using laser irradiation was developed. 3-Dimensional thermal distribution was modeled using heat conduction equation and computational modeling was done using COMSOL Multiphysics software package. Mathematical model for reaction kinetics was carried out considering Lerf and Klinowski model of graphene oxide and thermal profile of graphene oxide, which predicts the oxygen percentage distribution along the surface and depth after laser irradiation. Combinations of laser wavelength and laser powers were identified that are feasible for reducing graphene oxide. Conductivity range according to final weight percentage was identified. The work is carried out to model manufacturing process of graphene-based strain gauge using graphite and other resources in Sri Lanka.

Keywords: Klinowski model, COMSOL