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Fabrication of Chemically Reduced Graphene Oxide Thin Films by Atomized Spray Pyrolysis Deposition

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Synthesis of reduced graphene oxide (RGO) by Modified Hummers method is an excellent method for bulk production of RGO powder. RGO has received a considerable attraction due to its properties such as extremely high carrier mobility, carrier density etc. RGO is used in many industrial applications, mostly by fabricating it on a substrate as a thin film (TF). In the reporting work, a novel method has been used to deposit RGO-TF on borosilicate glass substrates by Atomized Spray Pyrolysis Deposition (ASPD). In order to prepare the RGO ink used for ASPD, first 1 g of RGO flakes was dispersed in 100 ml of N-Methyl-2-pyrrolidone. Then ultrasonic treatment was carried out for the initial dispersion for six hours. Later, supernatant (ink) was extracted by a pipet after allowing the dispersion to settle overnight. During the ASPD, the distance between the substrate and the nozzle, and the speed of the substrate relative to the nozzle was set to 4 mm and 1.2 cm s^{-1}, respectively. The deposition was carried out for 70 minutes. Compressed air was used as the carrier gas by maintaining the atomization pressure at 100 psi.

Deposited RGO-TF were optimized to obtain the lowest sheet resistance, highest carrier concentration and highest mobility by altering deposition temperature, thickness of the RGO-TF and annealing temperature. GIXRD, SEM, *XPS and Hall measurements were carried-out to study structure, surface topography/film thickness, work function and carrier mobility of RGO-TF, respectivel.*

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Publications:

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