

RESEARCH PROPOSAL

SURFACE MODIFICATION OF GRAPHENE SHEETS BY SIMPLE CONDENSATION REACTION

INTRODUCTION

In late 2004, graphene was discovered by Andre Geim and Kostya Novoselov - 2010 Nobel Prize in Physics. Million times thinner than paper and stronger than diamond. Better than copper. But, weak bonding between layers separated by mechanical exfoliation of 3D graphite crystals. 2-dimensional hexagonal lattice of carbon sp^2 hybridized carbon atoms, basis for nanotubes, and graphite. Among strongest bonds in nature.

OBJECTIVES

Preparation of graphene nano sheets by modified Hummer's method. Functionalization of graphene nanosheets by simple condensation reaction. Characterization of functionalized graphene by various spectroscopy techniques. Assessment of dispersibility of functionalized graphene in various solvents.

PREPARATION OF GRAPHENE

It is prepared by modified Hummer's method. Dispersion of graphite powder is in cold H_2SO_4 . Add $KMnO_4$ slowly to the cold solution with vigorous stirring. Addition of de-ionized water slowly to the above solution to get graphite oxide. Add 30% of hydrogen peroxide to graphite oxide. After 30 min, ultra-sonication transforms graphite oxide into graphene oxide. Graphene oxide is then reduced to graphene using hydrazine.

FUNCTIONALIZATION OF GRAPHENE

Functionalization of graphene nano sheets have been carried out by simple condensation reaction. Graphene oxide (GO) is dispersed in de-ionised water. To the GO Dispersion, add benzoic acid and cinnamic acid dissolved in THF, DMF and Chlorobenzene. The mixture is then refluxed at $100^\circ C$ for 20h, during reflection undergo condensation reaction with epoxide group of the GO. Finally the functionalized graphene nanosheets are dried at Petridis.

CONCLUSION:

An attempt has been made to synthesis functionalized graphene nanosheets by simple condensation reaction. Characterization using various spectroscopy techniques confirm the functionalization of graphene. The functionalized graphene are found to be dispersible in various organic solvents. Functionalized graphene can be used for the fabrication of polymer nanocomposites, super-capacitor devices, drug delivery system, solar cells, memory device, transistor devices, biosensor.