

Chemical surface modification of CNTs via three oxidative acid treatments

Abstract

Carbon nanotubes are commonly used to create polymer-nanotube composite for various applications. To suffice the needs of the emerging interest in utilizing nanotube, a great concern in creating a stable dispersion of the nanotube in solvent emerged. There is a paramount need to enhance the adhesion between the polymer and carbon nanotube to give a homogenous and stable dispersion throughout the polymer matrix. Thus, oxidative acid treatments are often chosen to chemically functionalize carbon nanotube in order to give such dispersing ability to the nanomaterials. In this study, purified multi-walled carbon nanotubes (MWCNTs) is oxidized under the influence of three types of oxidants i) hydrogen peroxide, ii) citric acid monohydrate and iii) mixture of 3:1 sulphuric and nitric acid. All the MWCNTs suspensions ultrasonicated for 8 hours to create opening defects on the MWCNTs to allow the surface modification to occur. In this comparative study of chemically surface modification using oxidative acid treatments, FTIR was used to examine the formation of -OH, -COOH and -C=O groups on the surface of the MWCNTs, TGA and XRD used to determine the thermal behaviour and the crystal structure studies of the modified MWCNTs respectively.