Comparison and characterization of acid functionalization of multi walled carbon nanotubes using various methods

ABSTRACT

Functionalization of multiwalled carbon nanotubes (MWCNT) is one of several methods used to improve the compatibility of CNT. Even though acid functionalised method is effective, the strong acids such as H_2SO_4/HNO_3 were normally employed and long hours of sonication is used to disperse the CNTs in the solution frequently can damage the nanotube, thus limiting their great performance as mechanical and electrical reinforcements. Here we are reporting comparison between three methods used in acid functionalized treatments of MWCNT. The first method, MWCNT was functionalized using ultra sonication water bath and followed by reflux (Method A). The second method, MWCNT was functionalized using ultrasonication water bath only for 2 hours (Method B). Finally, the third method MWCNT was functionalized using ultrasonication water bath only for 6 hours (Method C). Raman spectroscopy measurements were used to examine the general relationship between the chemical treatment and the amount of non-graphitic carbon. Electron microscopy analysis revealed that MWCNT functionalized using Method C suffered the highest degree degradation such as, nanotube shortening and additional defect generation in the graphitic network. Method B proved to be the most effective for this aim.

Keyword: Acid functionalization; Carbon nanotubes; FESEM-EDX analysis; Raman analysis