

Synthesis and characterization of polyvinyl alcohol /polyaniline/functionalized multiwalled carbon nanotube composite by gamma radiation method

ABSTRACT

The composite of functionalized multiwalled carbon nanotube (f-MWCNT), polyvinylalcohol (PVA) and polyaniline (PANI) were in-situ synthesized by gamma irradiation method. In order to make the free standing composite films, the mixture was cast onto a glass plate and dried before being exposed to irradiation. The formation and incorporation of PANI onto the surface of f-MWCNT were confirmed by field emission scanning electron microscopy (FESEM), X-Ray Diffraction (XRD), Fourier Transform Infrared Spectroscopy (FTIR) and UV-Visible (UV-Vis) Spectrophotometer. It was found that in-situ polymerized PANI was coated onto the surface of f-MWCNT due to the increase of f-MWCNT diameter after irradiation and it is supported by the XRD spectra in which it shows that the intensity of main peak in PANI decreases upon irradiation. The increasing of absorption spectra intensity in the FTIR spectra indicates the polymerization of PANI is occurred. In addition, it was found that quinoid unit in composite film is richer as compared to unirradiated sample. This is supported by UV-Vis analysis that shows the benzenoid ring is excited in which the pi-pi* transition peak is shifted to the high wavenumber after irradiation. The calculated value for optical energy band gap decreases after irradiated at 50kGy by gammarays suggested that the resultant composite is more conductive as compared to unirradiated samples.

Keyword: Conducting polymer; Carbon nanotubes; Gamma-radiation