Fabrication of Flexible Pressure Sensors Using MWCNTs Nanocomposites Material

Ali, Osaid

Aljaali, Muhammad

Pressure sensors can be used in daily applications such as electronic pressure gauges, organization of traffic lights, and medical devices. There is a need to make these sensors more effective and efficient. The objective of this project is to manufacture and test pressure sensors using a polymer nanocomposite based on pre-treated multiwalled carbon nanotubes with 3-Hydroxy-2-naphthoic acid (ß-HNA) to get a highly dispersed matrix. Different nanocomposite samples consisting of multiwalled carbon nanotubes (MWCNTs) and polystyrene (PS) were prepared through pretreatment of MWCNTs with ß-HNA and the use of casting technique. The physical properties such as morphology, thermal stability and optical properties were studied. The SEM images showed a good dispersion. Thermal stability of the samples was increased more effectively with increasing the weight ratios of MWCNTs than by increasing of the ß-HNA. Optical properties showed the absorbance increases as the weight ratios of MWCNTs increase. The treatment of MWCNTs with ß-HNA significantly improved the dispersion of pressure sensors and can be used effectively in a broad range of applications. The current-voltage characteristic curves and DC electrical conductivity were investigated as a function of applied pressure from a range of 0-5KN. Results showed that the current level and DC electrical conductivity were increased with the applied pressure from 6.96E-04 A to 0.00152 A during the cycle and the loading-unloading cycle, which indicated that such a composite acts as pressure sensor. The benefits are its cheap material and environmental friendliness.

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