Fabrication of Flexible Pressure Sensors Using MWCNTs Nanocomposites Material

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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 (β-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 β-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 β-HNA. Optical properties showed the absorbance increases as the weight ratios of MWCNTs increase. The treatment of MWCNTs with β-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.