

Research of Carbon Nanotubes/Nafion® Transparent Conductive Films

Qi Tianjiao, Wang Hui, Wang Lin and Yang Fang

Institute of Chemical Materials, China Academy of Engineering Physics, China

Transparent conductive films (TCFs) is high transparency in visible light ($\lambda=380\sim780\text{nm}$) with nearly metallic conductivity. They are important materials in functional films because of good conductivity and optical transmittance. In this study, we incorporated Nafion® into the coating layer of carbon nanotubes (CNTs) to improve the transparent conductive films. The transparency and electrical conductivity properties of the CNTs/Nafion® thin films were significantly improved by the 3,4-ethylenedioxythiophene (EDOT) incorporation. Carbon nanotubes/Nafion® (CNTs/Nafion®) composites are prepared based on filtration technology. CNTs are dispersed in mixed with different amounts of Nafion® and then driven by ultrasonic. From these mixtures CNTs/Nafion® composites were dipped in EDOT. The dispersion of CNTs/Nafion® is characterized by infrared spectroscopy, scanning electron microscopy and UV-vis spectra. Using the developed process, CNTs/Nafion® thin films that are uniform and the dispersion of CNTs with Nafion® connected with one another to form an interweaving films and highly transparent have been fabricated. The resistivity and optical transmittance of CNTs/Nafion® with EDOT thin film were $82\text{ K}\Omega/\square$ and over 69% with optimum condition when the volume of CNTs/Nafion® was 0.3mL and the ratio of Nafion® was 2.5%. With the optimization of the composition of Nafion® composite, CNTs/ Nafion® thin films might potentially offer better or comparable performances as the conductive oxides.

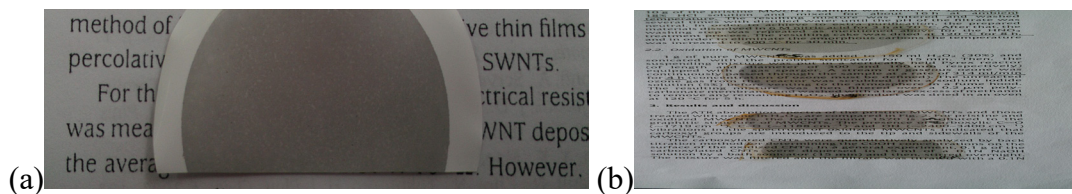


Fig.1.The TCFs of CNTs/Nafion® (a) no deal (b) deal with EDOT