Qi Tianjiao et al., Int J Mater Sci Res. 2017
http://dx.doi.org/10.18689/2638-1559.a1.004

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 (λ=380～780nm) 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 KΩ/□ 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.

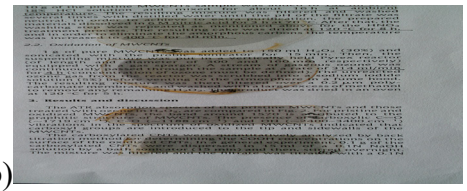
(a)  (b) 

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