CARBON NANOTUBE NET AS A CONDUCTIVE AND TRANSPARENT FILM FOR SOLAR ENERGY CONVERSION

Sergio Pinilla, José Lorenzo Balenzategui, C. Morant, E. Elizalde

Universidad Autónoma de Madrid, Cantoblanco, 28049 Madrid, Spain
sergio.pinilla@uam.es

Abstract

Vertically aligned silicon nanowires arrays have been grown through a metal assisted chemical etching method [1] obtaining a heavily absorbing surface. Over this surface, a transparent and conductive net of carbon nanotubes (CNTs) has been formed by chemical vapor deposition method [2]. The optical and electrical properties of this net have been studied. The influence of the catalyst deposition method in the mentioned properties and structure has also been evaluated. The optical characterization of the net has been performed by the study of its hemispherical reflectance and the electrical properties have been obtained by 4-point probe method and I-V curves of the surface.

A high transmittance of the net (over 99%) in the 300-900 nm range is reported. Also, a good sheet resistance value has been obtained (around 3 kΩ/□) for such a thin carbon nanotube net.

In addition, Raman spectroscopy show that the carbon nanotube net is formed by single walled CNTs, according to the literature [3]. The structural data of the CNTs obtained by Raman has been correlated with the observed optical and electronic properties.

References

[1] Z.P. Huang, N. Geyer, P. Werner, J. de Boor, U. Gosele, Advanced Materials. 23 (2011) 285-308.

[2] C. Morant, T. Campo, F. Marquez, C. Domingo, J.M. Sanz, E. Elizalde, Thin Solid Films. 520 (2012) 5232-5238.

[3] M.S. Dresselhaus, G. Dresselhaus, R. Saito, A. Jorio, Physics Reports-Review Section of Physics Letters. 409 (2005) 47-99.

Figures

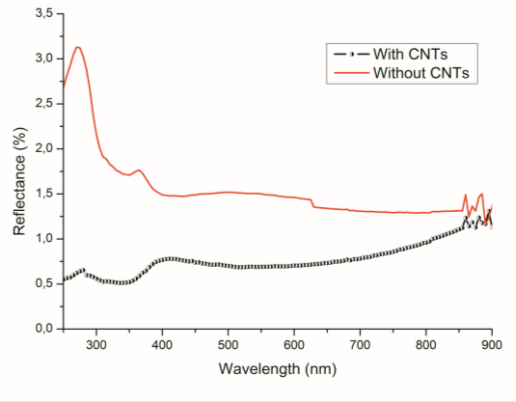

Figure 1Reflectance measurements on samples with and without CNTs

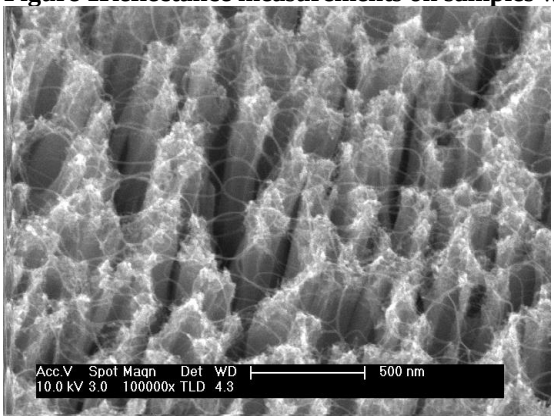

Figure 2 CNT net over the SiNWs