INTRODUCING OPTICAL ACTIVITY INTO POLYANILINE-CARBON NANOTUBE COMPOSITES

Raquel Sainz[a], Marc in het Panhuis[b] William Small[b], Peter Innis[c], Leon A.P Kane-Maguire[c], Ana M. Benito[a], M.Teresa Martínez[a], Simon E. Moulton[c], Gordon G. Wallace[c], Wolfgang K. Maser[a]

[a] *Instituto de Carboquimica (CSIC), C/Miguel Luesma Castán 4, E-50018, Zaragoza, Spain*

[b] *Department of Chemistry, University of Hull, Hull HU6 7RX, United Kingdom*

[c] *ARC Centre for ElectroactiVe Materials, Intelligent Polymer Research Institute, University of Wollongong, Wollongong NSW 2522, Australia*

rakel@carbon.icb.csic.es

The synthesis of optically active polymers has attracted considerable interest because of potential application as chiroptical sensors, chiral electrodes for asymmetric synthesis and enantioselective membranes. Optical activity can be introduced by the interaction of the polymer chain with a chiral acid [1]. Recently, we have reported the synthesis of a completely soluble polyaniline/multi-wall carbon nanotube (PANI-CNT) composite with drastically enhanced conductivity, improved thermal stability and luminescent behaviour (Fig.1) [2,3]. In a next step we showed for the first time that optical activity also can be introduced into this highly functional PANI-MWNT composite system (Fig.2) [4]. Here, we present a detailed study on the transformation of PANI-MWNT into an optically active composite by doping with the chiral acid (S)-(+)-10-camphorsulfonic acid (HCSA). We show that both morphology (Fig3) and optical activity is controlled by the way in which HCSA is introduced (in-situ during composite synthesis or ex-situ after composite synthesis), as well as by the doping concentration and by the MWNT content.

References:

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[2] R. Sainz, A.M. Benito, M.T. Martínez, J.F. Galindo, J. Sotres, A.M. Baró, B. Corraze, O. Chauvet and W.K. Maser, Adv. Mater. 17 (2005) 278

[3] R. Sainz, A.M. Benito, M.T. Martínez, J.F. Galindo, J. Sotres, A.M. Baró, B. Corraze, O. Chauvet, A.B. Dalton, R.H. Baughman, W.K. Maser, Nanotechnology, 16 (2005) 150

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Figures:

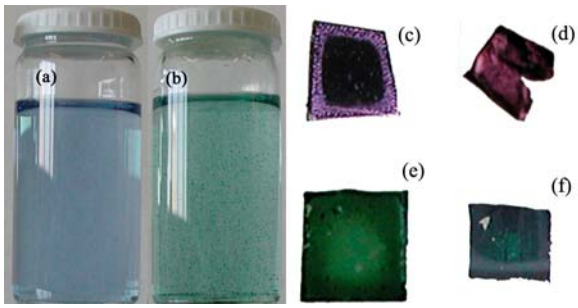

Fig. 1: Photographs of polyaniline-MWNT composite solutions and films

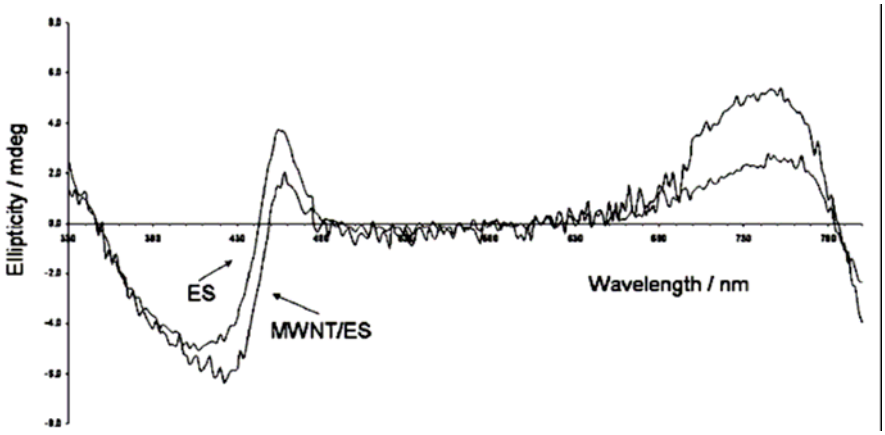

Fig. 2: Circular dichroism spectra (normalized) of polyaniline in emeraldine salt (ES) form, and polyaniline-MWNT composite (MWNT/ES) in emeraldine salt form in NMP

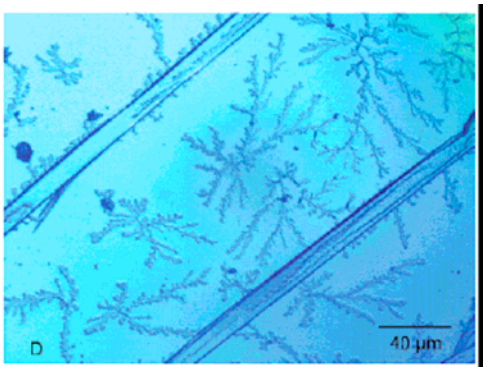

Fig. 3: Optical micrograph image of thin films of polyaniline-MWNT composite