

(7) Dopant Induced Processability of Poly (o-toluidine) For Fabrication of Conducting Blends : A Concept Useful For An Antistatic Application

R. C Patil.

The solubility of polyaniline and its derivatives in organic solvents like m-cresol can be achieved using counter ion induced processability¹. This invention has open a new door for fabrication of conducting blends with different insulating matrixes by co-dissolution method. Such blends are useful in applications like EMI shielding or as an antistatic coatings². In the present work, blends of poly (o-toluidine) (POT) were prepared with acrylonitrile-butadiene-styrene (ABS) copolymer and their suitability as an antistatic coating have been evaluated.

The camphorsulfonic acid (CSA) doped POT show electrical conductivity of 28 S/cm. The change in molecular conformation from coil to expanded coil like is responsible for the high conductivity of CSA-doped POT compared to HCl-doped POT (1 S/cm). The presence of free carrier tail at ~ 1000 nm in optical absorption spectrum (Fig. 1) gives strong evidence to change in the conformation. Inset of Fig. 1 represents a plot of conductivity versus wt % of CSA-doped POT in ABS and percolation threshold has been found to be at $\sim 2.66\%$. The plot of voltage versus time clearly reveals that conducting CSA-doped POT as filler particles (Fig. 2a) is better than that of commercially used antistat (epichloro-hydrin/ethylene oxide, Fig. 2b) in neutralizing surface static charge. The envisioned applications of these antistatic blends includes copy machine, electronic machine such as personal computer and word processor.

Acknowledgement : RCP is thankful to VBL for awarding PDF.

- 1) A, G, MacDiarmid and A. J. Epstein, Synth. Met., 65 (1994) 103.
- 2) B. Wessling, Synth. Met., 93 (1998)

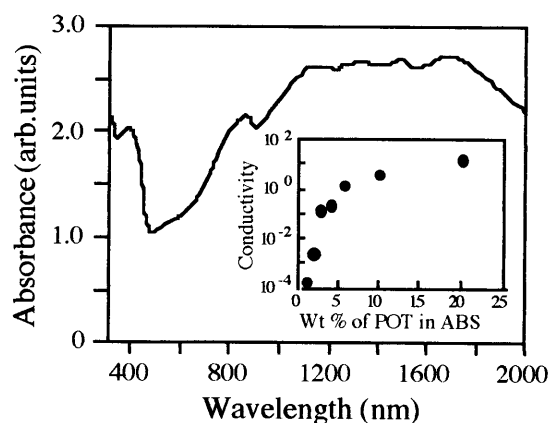


Fig 1 : Optical absorption spectrum of CSA-doped POT in m-cresol, inset : plot of conductivity versus weight fraction of CSA-doped POT in ABS matrix

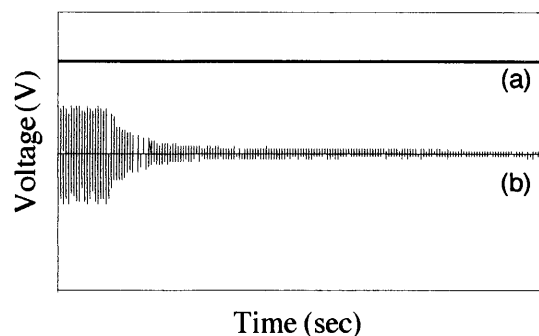


Fig. 2 : Plot of voltage against time for ABS blends containing (a) CSA-doped POT (4%) and (b) epichloro-hydrin/ethylene dioxide copolymer (10%) as an antistatic agent.

Future Work :

- 1) Some other dopant solvent systems such as picric acid/m-cresol and penta fluorophenol/hexa fluoropropanol will be studied in details.
 - 2) Dopant-induced processible substituted polyanilines will be utilized to check their humidity sensing properties. Different types of dopants will be used so as to decide the most suitable one for commercial application.
- 2) Poly (o-anisidine) -ABS blends : Investigations of some physico-chemical properties, R. C. Patil, H. Shiigi, M. Nakayama and K. Ogura, J. Mater. Chem., (Communicated)
 - 3) Preparation and characterization of highly transparent conducting blends of POT-PMMA, R. C. Patil and K. Ogura (Under Preparation)
 - 4) Composites of polyaniline and its derivatives with insulating polymers : promising materials for humidity sensing, H. Shiigi, R. C. Patil, M. Nakayama and K. Ogura, (under preparation)

Publications :

- 1) Studies on CSA-induced processability of conducting poly (o-toluidine) and its polyblend with ABS, R. C. Patil, K. Kuratani, M. Nakayama and K. Ogura, J. Poly. Sci. : Part A : Polymer Chemistry (In Press) .

連絡先

E-mail : rcpatil@po.cc.yamaguchi-u.ac.jp