Characterization of picric-acid-doped polyo-toluidine/ and the picric-acid-doped polyo-toluidine/-induced conductive composite of acrylonitrile–butadiene–styrene

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Abstract:

Polyo-toluidine. POT. in emeraldine base form. EB. has been doped with picric acid PA-doped POT. and dinitrophenol DNP-doped POT.. The conductivities of these doped polymers were found to be 10.52 and 4.82×10⁻³ S cm⁻¹, respectively. The large difference in conductivity of these polymers is attributed to the more acidic nature of picric acid PA. than dinitrophenol DNP.. The disappearance of the peak at 650 nm due to EB and the presence of the peak at 850 nm due to localized polaron in the absorption spectra clearly reveal the dopant-induced protonation of POT. This is also supported from the XPS spectrum showing the disappearance of the peak at 398.2±0.1 eV due to the imine nitrogen component in EB and the appearance of the peak at 402.16±0.1 eV owing to the iminium ion NH₅⁺ of PA-doped POT. The PA-doped POT is thermally stable up to 140°C and completely dedoped at 300°C. The mass spectra recorded simultaneously with the thermal weight loss showed several fragments due to the decomposition of PA in the temperature region from 140°C to 300°C. The observed high conductivity of PA-doped POT film is attributed to the expanded coil-like conformation, which was proven with the help of the reduced viscosity measurement. The composite of PA-doped POT with insulating acrylonitrile–butadiene–styrene copolymer ABS. was prepared, and the percolation threshold for this composite was 3 wt.%, which was considerably low compared to that for a typical composite, e.g., 16 vol.% for poly[3-alkylthiophenes. P3ATs].poly-styrene PSt. composite. q2000 Elsevier Science S.A. All rights reserved.

Keywords:

Picric acid; Polyo-toluidine.; Acrylonitrile–butadiene–styrene

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