不同摻雜酸結構對聚苯胺介電行為及電磁波遮蔽效應之研究

英文摘要

In the present study, two different kinds of polyaniline were prepared with three different kinds of protonic acids as the dopants, dodecylbenzene sulfonic acid (DBSA), hydrochloride acid (HCl) and phosphoric acid (H3PO4), in different doping levels. The emeraldine salts (ES1) of polyaniline were synthesized by emulsion polymerization with different dopants at 0℃. And the emeraldine salts (ES2) of polyaniline were prepared by emeraldine base (EB) form of polyaniline doped with different acid dopants at room temperature. The structure and morphology of ES1 and ES2 were characterized by Fourier transform infrared spectrometer (FTIR), Ultraviolet-Visible spectrophotometer (UV-Vis) and wide angle X-ray diffactometer (WXRD), respectively. The ratio of sulfur/nitrogen(S/N values) of samples were measured by element analyzer (EA). The dielectric spectroscopy of samples was analyzed by an impedance analyzer. The electromagnetic interference shielding effectiveness (SE) was measured by a coaxial spectrum analyzer system.

FTIR results showed that doped ratio of HCl/DBSA or H3PO4/DBSA can not be clearly found from IR spectra of ES1 . However, the IR spectra of ES2 with peaks at 1497 cm-1and 1590 cm-1 were significantly observed to shift toward lower wavenumber when polyaniline were doped with HCl/DBSA or H3PO4/DBSA. For ES1 and ES2, their conductivity were approximately proportional to weight averaged molecular weight(Mw). Conductivity and Mw of ES1or ES2 increased with the increasing doping HCl/DBSA or H3PO4/DBSA mole ratio. EA results indicated that the S/N value decreased with the increasing HCl/DBSA or H3PO4/DBSA mole ratio. WXRD results illustrated that, the morphology of polyaniline was significantly changed with

the increasing doping HCl/DBSA or H3PO4/DBSA mole ratio. The distance between backbones of polyaniline were decreased with the increasing HCl/DBSA or H3PO4/DBSA mole ratio. But conductivity increased. Impendence data showed that, at low frequency (10Hz~1MHz), the dielectric behavior of ES1 or ES2 was found to be dominated by the orientation polarization, and the dielectric properties(such as, permittivity, polarization, average dipole moments, loss factor and tanθ) increased with the increasing HCl/DBSA or H3PO4/DBSA mole ratio. At high frequency (1MHz~1GHz), dielectric behavior of ES1 or ES2 was found to be dominated by ionic polarization and the dielectric properties independence of frequency were also found. As for the coaxial spectrum analyzer measurement, the electromagnetic shielding effectiveness was found to be related to loss factor, and ES1 exhibited larger SE value as compared to those of ES2. The SE value increased with HCl/DBSA or H3PO4/DBSA mole ratio.