

(Research Article 1)

Effect of nanosilica on optical, electric modulus and AC conductivity of polyvinylalcohol/polyaniline films

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Nanosilica (NS) was synthesized by a sol–gel method and mixed with 0.98 poly vinyl alcohol (PVA) / 0.02 polyaniline (PANI) in different amounts to produce nanocomposite films. High-resolution transmission electron microscopy (HR TEM) revealed the average particle size of the NS to be ca.15nm. Scanning electron microscopy (SEM) showed that the NS was well-dispersed on the surface of the PVA/PANI films. The Fourier transform infrared (FTIR) spectra of the samples showed significant change in the intensity of the characteristic peak of the functional groups in the composite films with the amount of NS added. The absorbance and refractive index (n) of the composites were studied in the UV–vis range, and the optical energy band gap, E_g , and different optical parameters were calculated. The dielectric loss modulus, M'' and ac conductivity, σ_{ac} , of the samples were studied within 300–425 K and 0.1 kHz –5 MHz, respectively. Two relaxation peaks were observed in the frequency dependence of the dielectric loss modulus, M'' . The behavior of $\sigma_{ac}(f)$ for the composite films indicated that the conduction mechanism was correlated barrier hopping (CBH). The results of this work are discussed and compared with those of previous studies of similar composites.