

(Research Article 7)

**Characterization, Optical and Dielectric Properties of Polyvinyl
Chloride/Silica Nanocomposites Films**

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Silica nanoparticles were synthesized by a sol – gel method and mixed with different amounts of polyvinyl chloride (PVC) to get nanocomposite films. The samples were characterized by XRD, HR- TEM, SEM and FTIR. High resolution transmission electron microscopy (HR- TEM) proved that the average particle size of the nano silica is 15 nm. The scanning electron microscopy (SEM) showed that the nano silica was well dispersed on the surface of the PVC films. Fourier Transform Infrared (FTIR) spectra for nanocomposite films intimates a significant change in the intensity of the characteristic peaks of the functional group with addition of nanosilica. The optical band gap was found to decrease with the addition of nanosilica while the refractive index increased. The dielectric constant ϵ' , the dielectric loss modulus M'' and AC conductivity (σ_{ac}) were also studied. It was found that increases with temperature for all sample, a clear dielectric α relaxation observed from dielectric loss M'' around the glass temperature (T_g), this could be related to micro- Brownian motion of the main PVC chain. The activation energy was calculated, and the AC conductivity could be a hopping one. The results of this work are discussed and compared with previously obtained data.