

# Dielectric Relaxation and Optical Properties of Polyvinyl Chloride/Lead Monoxide Nanocomposites

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**Abstract:** Sol–gel synthesized lead monoxide (PbO) nanoparticles were mixed with polyvinyl chloride (PVC). The dielectric characteristics of PVC/PbO nanocomposite films were studied in the temperature range 303–408 K and frequency range 30 kHz–3 MHz. There is a sharp increase in the dielectric constant ( $\epsilon'$ ), after the glass transition temperature. According to the temperature and frequency dependence of the dielectric loss modulus ( $M''$ ), the observed  $\alpha_a$ -relaxation peak is due to the micro Brownian motion of the polymer main chains. The behavior of  $\sigma_{ac}(f)$  for the composite films indicate that the homogenous distribution of PbO nanoparticles allows the formation of conductive three-dimensional networks throughout the nanocomposite films which assisting the charge carriers to hop from conducting clusters to neighbors. The influences of PbO content on the direct optical band gap and the refractive index of the films are also discussed and compared with those of previous studies of PVC composites.