

(Research Article ٧)

**Effect of Gamma Irradiation on the Structure, Optical and Thermal
Properties of PC–PBT/NiO Polymer Nanocomposites Films;**

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Bayfol (PC–PBT blend-film) is a class of polymeric solid state nuclear track detector which has a lot of applications in several radiation detection fields. It is a bisphenol-A polycarbonate PC blended with polybutylene terephthalate PBT. Bayfol/nickel oxide (PC–PBT/NiO) nanocomposite films have been deposited using molding technique. It is worth mentioning that this report is almost the first one dealing with the topic of the changes of physical properties of Bayfol/NiO nanocomposite due to gamma irradiation. Samples from PC–PBT/NiO (5 w%) nanocomposite were irradiated with gamma doses in the range 20–250 kGy. The structural modifications in the gamma irradiated nanocomposite samples have been studied as a function of dose using different characterization techniques such as X-ray diffraction, UV spectroscopy, color difference studies, differential scanning calorimetry and scanning electron microscope. The results indicate the proper dispersion of NiO nanoparticles in the PC–PBT matrix that causes a strong intermolecular interaction between NiO and PC–PBT, resulted in an increase in refractive index and the amorphous phase. Also, it is found that the gamma irradiation reduces the optical energy gap that could be attributed to the increase in structural disorder of the irradiated PC–PBT/NiO nanocomposites due to

crosslinking. Further, the color intensity ΔE , which is the color difference between the non irradiated sample and the irradiated ones, was greatly increased with increasing the gamma dose, convoyed by a significant increase in the red and yellow color components.