

**(Research Articles ۲)**

**Effect of nickel-oxide nanoparticle additive concentration and gamma irradiation on the structure and optical properties of polycarbonate.**

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Nanotechnology is one of the world's most promising new technologies. Pure polycarbonate (PC) and PC–nickel oxide (NiO) nanocomposite films have been deposited using the casting technique. The effects of NiO nanoparticle (NP) concentration (2, 5 and 10 wt%) on the structure and optical properties of PC have been studied. The resultant effect of NiO concentration has been investigated using X-ray diffraction and UV spectroscopy techniques. The results of nanocomposite samples compared to the pristine indicate the proper dispersion of NiO NPs in the PC matrix. Also, the addition of NiO NP to PC with 5% concentration causes a strong intermolecular interaction between NiO and PC, resulted in an increase in refractive index and increase in the amorphous phase. Thus, this sample was chosen to be a subject for further study to investigate the effect of gamma irradiation on its structure and optical properties. Samples from the 5% PC–NiO nanocomposite were irradiated with gamma doses in the range of 20–350 kGy. It is found that the gamma irradiation reduces the optical energy gap that could be attributed to the increase in the structural disorder of the irradiated PC–NiO nanocomposites due to cross-linking. In addition the isotropic character of the nanocomposites has been enhanced, reflected in the increase in refractive index.