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Thermal, structural and optical investigation of the effect of gamma irradiation in PM-355 nuclear track detector

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Samples from PM-355 sheets were irradiated with gamma doses at levels between 10 and 120 kGy. The modifications in the irradiated samples have been studied as a function of dose using different characterization techniques such as thermo gravimetric analysis, differential thermal analysis, and X-ray diffraction, Fourier Transform Infrared Spectroscopy and color difference studies. The gamma irradiation of PM-355 in the dose range 20-80 kGy resulted in an improvement in its thermal stability with an increase in the activation energy of thermal decomposition. The melting temperature of the PM-355 polymer, T_m , was found to be a probe of the crystalline domains of the polymer. At the dose range 20-80 kGy, defect generated destroys the crystalline structure so reducing the melting temperature. In addition, structural property studies using X-ray diffraction and Fourier transform infrared spectroscopy were performed on irradiated and non-irradiated PM-355 samples. The results indicate that both the degree of ordering and the absorbance of the PM-355 polymer are dependent on the gamma dose. Further, the transmission of these samples in the wavelength range 200-2500 nm, as well as any color changes, was studied. The color intensity E was greatly increased with increasing the gamma dose, accompanied by a significant increase in the whiteness and yellow color components.

Biography

Mymona Mohsen Abutalib received her Ph.D. degree in Radiation Physics and Material Science in 2005, from King Abdulaziz University in Jeddah, Saudi Arabia. She got promoted to be a Professor of Radiation Physics and Material Science in 2016, and now is working in King Abdulaziz University. She has worked in the Physics Laboratories in King Abdulaziz 2 University, King Khaled University and Cairo University for Radiation and Material Science and Nano Materials for about 10 years. She has about 45 published research papers in the same scientific fields. Abutalib has won scientific awards for uniqueness in scientific researches for several years.

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