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Modification of structural and optical properties of PVA/PEG thin film by laser irradiation

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The effect of IR laser irradiation on the structural and the optical properties of polyvinyl alcohol/polyethylene glycol (PVA/PEG) copolymer have been investigated. Thin films of PVA/PEG (nearly 50 μm thickness) were irradiated up to 15 J/cm^2 of Ga-As laser pulses of 904 nm, 5W power and 200-ns pulse duration. The resultant effect of laser irradiation on the structural properties of PVA/PEG has been investigated using X-ray diffraction and Fourier Transform Infrared Spectroscopy FTIR. Further, the refractive index and the color difference between the exposed samples and the pristine have been studied. FTIR spectroscopy showed that the PVA/PEG samples exhibited degradation under the effect of laser irradiation up to 9 J/cm^2 , where cross-linking started and continued until 15 J/cm^2 . The refractive index had a minimum value of 1.5020 at 9 J/cm^2 , accompanied by a high degree of ordering and maximum value of 1.5640 at 15 J/cm^2 , with an increase in disordering character due to the degradation and cross-linking formation inside the sample, respectively. Moreover, the color intensity ΔE was greatly increased with increasing the laser fluence, accompanied by a significant increase in the yellow color component.

Biography

Mymona Mohssen Abutalib is currently an Associate Professor of Nuclear Physics and interested in scientific research in nanomaterials and materials science.

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