

## **Influence of Laser Irradiation on the Optical and the Mechanical Properties of Makrofol-DE Polycarbonate**

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**ABSTRACT:** The effect of IR laser irradiation on the optical and the mechanical properties of Makrofol-DE 1-1 CC polycarbonate films were investigated. Three hundred microns-thick films of Makrofol-DE 1-1 CC polycarbonate were irradiated with 0.00–10.40 J/cm<sup>2</sup> of Ga-As laser pulses, 904 nm, 5 W, and 200-ns pulse duration. Fourier transform infrared spectroscopy measurements showed that (C=O) groups degrade under laser irradiation at the studied fluence range. The aliphatic and aromatic (CAH) groups exhibited the same behavior, which can be attributed to nature of laser interaction with matter. The Makrofol samples exhibited degradation under the effect of laser irradiation up to 0.94 J/cm<sup>2</sup>, where crosslinking mechanism started and continued until 7.07 J/cm<sup>2</sup>. The refractive index had a minimum value at 0.94 J/cm<sup>2</sup> and maximum value at 7.07 J/cm<sup>2</sup> due to the degradation and crosslinking formation inside the sample, respectively. The decrease in elastic modulus, E, of Makrofol irradiated with 0.47–0.94 and 7.07–10.40 J/cm<sup>2</sup> indicates that the sample becomes more flexible, which results from the decrease in interatomic force constants.

**Key words:** mechanical properties; FT-IR; refractive index; polycarbonates