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## Effect of Solar radiation induced and alpha particles on Nonlinear behavior of PM-355 film

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**Abstract:** In the current work of radiology, polymeric sheets of the PM-355 nuclear track detectors (SSNTDs) were exposed with  $\alpha$ -particles and solar radiation for several exposure times. The absorption spectrum of samples exposed to the sun showed that the edge of the absorption accidentally changed to longer wavelengths. An investigation of continue waveguide laser effects on the nonlinear absorption properties of nuclear track polymer has been done. Non-linear absorption increases with increasing levels of exposure to sunlight and is highly connected to revealed surface morphology and chemical structural modifications. In case of high solar radiation flux and  $\alpha$ -particles irradiation, the nuclear track detectors showed high nonlinearities, represented by the appearance of a number of diffraction rings.

Keywords: PM-355 polymer; Alpha particles; Absorption edge; Laser; Solar radiation

### Introduction:

The polymeric detector PM-355 has many applications in various subjects such as industry and medicines [1]. This detector responds to numerous types and effect of radiations, including  $\alpha$ -particles [2], Irradiation by neutrons [3], protons [4], slow and heavy charged particles [5], Gamma irradiation [6], UV [7], laser irradiation [8-11] and solar radiation [12]. The interaction of different types of radiation with PM-355 nuclear track detectors (SSNTDs) modifies chemical compositions, optical properties, chemical and mechanical properties and polymer structures [13]. The value of these modifications relies on the primary chemical composition of the polymer and methodology exposure conditions such as dose of gamma rays or alpha particles, induced solar radiation energy and wavelength of incident radiation of the laser beam.

