

## **Physical Modification Study For CR39 Polymer Material Under Electronic Beam Effect Using Monte Carlo Method For Realising integrated Optical Elements**

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### **Abstract**

The presented work here is focused mainly on the study of physico-chemical changes of organic material by the electron -beam direct- writing technique. The organic polymer studied here is (diethylene glycol bis (allylcarbonate)) called CR39. The most important changes that we will focus on are the depth of penetration of the electronic beam as a function of the energy of electrons. This penetration will lead to an increase in the refractive index of this material, which can allow the formation of components and integrated optical circuits to be used in optical communications.

The first phase of this work will allow us to study the physico-chemical changes in organic material under effect of low energy of electronic beams which are the domain of our interest (from 5 keV to 25 keV), corresponding to the possibility of forming optical structures with very small dimensions and without the need to mask technology which is used by ion beams, and these structures can be used in optical communications.

Therefore, in the second phase of this study, we will make use of these changes and we will verify the possibility of acquiring guided electromagnetic propagation through a structure of identical dimensions to the employed electronic energy.

This structure can constitute the main element in formulating integrated optical circuits: such as Bragg grating, Optical filters.

**Keywords:** Polymer, electronic beams, EGS4 program, Optical Communications, Integrated Optical Circuits.

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For the Paper in Arabic see pages (51-64)

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