

## عنوان مقاله:

Response of Cadmium Zinc Telluride Compound Semi-Conductor Detector against Gamma Photons by Efficiency Calculation: A Microdosimetry Simulation Study

## محل انتشار:

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## خلاصه مقاله:

Introduction: Cadmium zinc telluride has recently been used as a compound semiconductor detector in a wide range of fields. The current study is a comprehensive investigation of the performance of this detector against the photon beam. Moreover, a comparative study was carried out with other common detectors using the Mote Carlo code by the implementation of the same strategy. Material and Methods: During the simulation by FLUKA code, a number of photons were regarded as primary particles. It is attractive to trace each incident photon uniquely considering all possible collisions and produced secondary particles at the microdosimetry scale. In the current study, the coordinate of three-dimensional collisions location was realized at detector sensitive volume. Moreover, energy deposition was considered at each unique collision and through all interactions, totally. In addition, the physical concepts of photon interaction with detector volume were assessed, numerically. Furthermore, the effect of gold foils implemented as electrode at both sides of the detector was taken into account. Results: The obtained results indicated the context of photoelectric and Compton scattering in photon interactions with CZT, including the number of interactions, the deposited energy, and three-dimensional collision coordinate, while the latter case is proposed as a new achievement. Conclusion: As evidenced by the obtained results, the performance of this detector can be improved by changing material fraction and detector dimension to achieve optimum efficiency. In addition, the comparative results demonstrated that the efficiency of CZT covered by gold electrodes is superior to other common available semi-conductor detectors.

## کلمات کلیدی:

semiconductors, Radiation Dosimetry, Photons, Efficiency, Monte Carlo Code

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