A study of the response of solid state nuclear track detectors LR115-I, LR115-П, CN85 and CR39 to alpha particles using track diameter measurement

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ABSTRACT

The accuracy of track diameter for (LR115-I, LR115-П, CN85 and CR39) are measured in the present work. Comparison for the response curve is studied regarding the relation between the growth of the diameter (Vd) and the energy of alpha particles for different detectors with the given processing parameters. As a conclusion: alpha particles with energy 4 MeV give the better results.CR39 track detector is more effected by the energy of alpha particles and the response to register the charge particles than the other detectors used.

Keywords: Alpha sources; Americium 241; Dielectric track detectors; Etching; Particles tracks.

1. Introduction

Latent tracks are damage zones created by energetic charge particles in insulating solids termed as solid state nuclear track detectors (SSNTD 's) . These damage trails show increased chemical reactivity. Chemical etching transforms these damaged trails into permanent structures called ion track.(SSNTD 's) have found applications in different branches of science [1] . One of the challenging tasks in the application of (SSNTD 's) is the accurate measurement of the depth and diameter of the tracks [2,3] .Indirect measurements of alpha-track depths are usually performed by optical methods. While measurements of track-opening diameters are relatively straightforward, some researchers might need or prefer direct measurements of track length. One approach involves the breaking of (SSNTD 's) to reveal the lateral images of the tracks for direct measurements [4] and another involves the use of confocal microscopy [5] . Due to the numerous applications in cosmic-ray studies and many other areas of applied science , a number of researchers have studied track information mechansim and other related processes , e.g. annealing and etching of nuclear tracks [6-11] . Recent years have witnessed an increasing use of (SSNTD 's) in a variety of fields such as cosmic rays experiments, nuclear reactions, space research and dosimetry applications. The wide spread use of (SSNTD 's) is due to their unique features, e.g. low cost, less weight, threshold nature, no electronics requirement and integrated response [6,7,12] . Improvement in the understanding of track formation mechanism and related processes will further widen the application spectrum of these detectors.