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CAN ELECTRIC FIELD INFLUENCE THE SENSITIVITY OF CR-39 DETECTOR

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ABSTRACT

Preliminary studies concerning the effect of electric field on the etching characteristics of CR-39 were performed and reported elsewhere. Recently, further studies have been carried out and the effect of electric field on the sensitivity of CR-39 for neutrons from Am-Be source and alpha particles from an ^{241}Am source has been investigated. Here, samples of CR-39 were exposed to neutrons, alpha particles and fission fragments under different electric field values. The exposed sample were then chemically etched in series of steps in 6M NaOH at 70 $\pm$1 °C. Track densities and diameters were measured under an optical microscope. From track denqities and diameters, sensitivity and etching rates were determined. It was found that when detectors are irradiated in the presence of applied voltage, its V_B and V_T are increased but the sensitivity and critical angle of etching of the detector remain unchanged within experimental errors.

INTRODUCTION

Ever since the announcement of its excellent track-recording properties in 1978 [1], CR-39 still remains the most popular member of the SSNTD family and has found wide variety of applications in various fields of science and technology particularly in personnel neutron dosimetry and Radon monitoring [2-6]. Some groups have made attempts to develop new polymeric detectors of even better sensitivities. In this context, Fujii *et al.*, [7] developed and reported a new polymeric track detector, namely SR-86. However, due to severe ageing problems, SR-86 has so far failed to replace CR-39.

In spite of being suffering from persistent difficulties with varying sensitivity, high and variable background, environmental effects,etc., CR-39 based detectors are already in practical use as a personal neutron dosimeter and radon dosimeter. In the last several years, a great number of research groups have made remarkable efforts n improving the neutron detection characteristics with respect to neutron response, background and reproducibility of the dose reading. In order to study and compare the neutron response characteristics of CR-39, the Eurados-Cendos organized and sponsored