CHARACTERISTICS OF THE SOLID STATE NUCLEAR TRACK DETECTOR CN-85 FOR NEUTRON RADIOGRAPHY

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ABSTRACT

The track etch method was employed in the Neutron Radiography (NR) Technique. A combination between the SSNTD CN-85 with a natural boron converter screen was used as image detector. Several radiographic tests concerning neutron exposures and etching time up to 5×10^{10} n/cm^2 and 25 minutes, respectively, were carried out. The best results were obtained for neutron exposures ranging from 10^9 n/cm^2 to 9×10^9 n/cm^2, with a track production rate tr/n = 10^{-2}, and for 7 minutes etching time. For such conditions, the track diameter is 1.4 μm, the maximum measured optical density was 1.6 and the resolution power of the method is about 20 μm.

The present results were compared with those reported by other authors for similar track detectors, and qualitatively evaluated accordingly the theory concerning the image formation process in SSNTD proposed by Ilic (4, 5, 6).

INTRODUCTION

The track etch is an important method used in the Neutron Radiography (NR) Technique. The ability of the Solid State Nuclear Track Detectors (SSNTD) to register local damages of individual radiation events, and its insensitivity to visible light, Beta (β) and Gamma (γ) radiations are some of the characteristics which makes these detectors attractive for NR applications (1, 2).

Basically in the NR Technique, a collimated and uniform neutron beam impinges a test object and is modulated in intensity accordingly its thickness and total macroscopic cross section. In the track etch method, a neutron-charged

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