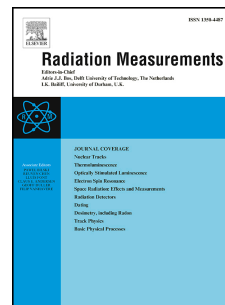


# Accepted Manuscript

Characterization of fluorescent nuclear track detectors as criticality dosimeters

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PII: S1350-4487(17)30166-X

DOI: [10.1016/j.radmeas.2017.03.036](https://doi.org/10.1016/j.radmeas.2017.03.036)

Reference: RM 5752

To appear in: *Radiation Measurements*

Received Date: 30 September 2016

Revised Date: 20 December 2016

Accepted Date: 14 March 2017

Please cite this article as: Harrison, J., Moreno, B., Van Hoey, O., Mihailescu, L.-C., Vanhavere, F., Million, M., Fomenko, V., Akselrod, M., Characterization of fluorescent nuclear track detectors as criticality dosimeters, *Radiation Measurements* (2017), doi: 10.1016/j.radmeas.2017.03.036.

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# Characterization of fluorescent nuclear track detectors as criticality dosimeters

J. Harrison<sup>a</sup>, B. Moreno<sup>b</sup>, O. Van Hoey<sup>c</sup>, L.-C. Mihailescu<sup>c</sup>, F. Vanhavere<sup>c</sup>, M. Million<sup>b</sup>, V. Fomenko<sup>a</sup>, and M. Akselrod<sup>a\*</sup>

<sup>a</sup> *Landauer, Crystal Growth Division, Stillwater, OK, USA*

<sup>b</sup> *Landauer-Europe, Vélizy-Villacoublay, France*

<sup>c</sup> *Belgian Nuclear Research Center SCK•CEN, Mol, Belgium*

## HIGHLIGHTS

- FNTD technology is suggested for criticality dosimetry
- FNTD signal depth profiles were obtained for four different neutron sources
- Monte Carlo simulations of energy deposition by recoil protons in aluminum oxide crystal fit well the experimental data
- The depth profile of the FNTD signal can be used for estimation of median neutron energy and neutron dose correction factor.

## ABSTRACT

Fluorescent nuclear track detectors (FNTDs) are suggested for criticality dosimetry of neutrons and photons. The depth profiles of the fluorescent signal from FNTDs after exposure to high doses of broad spectrum neutron fields from four different sources are analyzed using the power spectrum integral (PSI) measured at increasing depths within the  $\text{Al}_2\text{O}_3:\text{C},\text{Mg}$  crystals. The depth profiles are compared to Monte Carlo simulations of energy deposition of recoil protons as a function of depth in aluminum oxide for the same four neutron sources. An algorithm for estimating the median neutron energy and neutron dose correction factors was developed. The application of FNTDs for criticality excursion accidents is discussed.

**Keywords:**

متن کامل مقاله

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