

Title: Thermoluminescence characterization of flooring tiles from Malaysia for potential use in retrospective dosimetry

Author Names: S.N. Mat Nawi , M.U. Khandaker , S.F. Abdul Sani , S.E. Lam , H. Osman N.A.I. Md Ishak , R. Saidur , D.A. Bradley

Abstract: In the event of natural disasters or technical malfunctions at nuclear sites, the surrounding media, including individuals, may be subject to unforeseen radiation exposure. Thus, it is not possible to determine the precise level of radiation exposure that each person has received in this scenario. To handle such a problem, the use of [retrospective dosimetry](#) can offer an accurate evaluation of the radiation dose acquired as a result of such incidents. This information enables the development of suitable remedial actions. Normally, in the region that has been impacted, several artifacts can serve as natural [dosimeters](#). The study involved the utilization of locally available seven different brands of flooring tiles in Malaysia for the possibility of being used in retrospective [dosimetry](#) through exposures to ^{60}Co gamma-rays within a range of 10–200 Gy. To understand the luminescence features of this material, a convenient [thermoluminescence](#) (TL) technique has been employed. The dosimetric features of the samples were investigated, including their effective atomic numbers (Z_{eff}), reproducibility, glow curve, dose response, sensitivity, linearity index, energy dependency and fading, which is representative of the usual TL method. Additionally, by analyzing the glow curves of the irradiated samples together with the peak shape method and the initial rise methods, several [kinetic parameters](#), including the [kinetic orders](#) (b), [activation energy](#) (E) or trap depth, frequency factor (s) or escape probability, and trap lifetime (τ) were calculated. Different kinds of tiles exhibit distinct scenarios in terms of kinetic characteristics. T1 sample exhibits the highest degree of sensitivity and a highly linear dose response among the tile samples that were evaluated. Also, T1, T3, and T5 samples show minimal loss of TL intensity ($\sim 38\text{--}39\%$) one year after irradiation, making them ideal for use as a retrospective dosimeter.

Keywords: Retrospective dosimetry Thermoluminescence (TL) Flooring tiles ^{60}Co gamma radiation Effective atomic number (Z_{eff})

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