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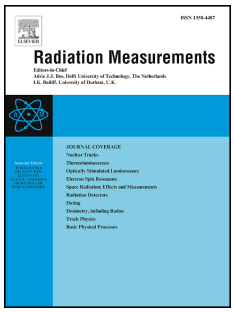

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Computational analysis of thermoluminescence glow curves from thin layer dosemeters

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Abstract

The Monitoring Service at the Materialprüfungsamt Nordrhein-Westfalen in Dortmund develops a new dosemeter system for large-scale individual dose monitoring. The dosemeters make use of thermoluminescence light from a thin layer of LiF:Mg,Ti. In the large-scale routine dosimetry service, a high number of dosemeters have to be evaluated on a monthly basis, which requires a fast readout. Therefore, thermoluminescence is stimulated by exponential heating of the dosemeters.

The main quantity of interest to obtain from a dosemeter is the irradiation dose. Since the data comes in the form of thermoluminescence glow curves, their analysis offers the possibility to extract more information from the data than the irradiation dose, e.g. the fading time. In addition, such an analysis can reduce the uncertainties of the reconstructed irradiation dose, especially for low irradiation doses.

Because it is not possible to measure the temperature of the dosemeter during the readout process, the recorded time-dependent glow curves have to be converted to temperature-dependent glow curves before the analysis.

Keywords: TL-DOS, thermoluminescence, LiF:Mg,Ti, glow curve analysis, irradiation dose, uncertainties

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