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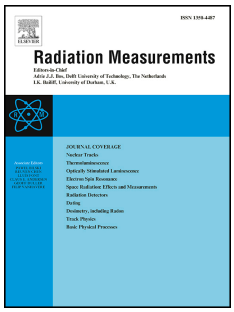

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High dose TL response of fly ash collected from coal fired thermal power plant

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Abstract

In this present work we have reported the Thermoluminescence properties of fly ash collected from Khaperkheda thermal power station, Nagpur, India. The behavior of the fly ash in powder form was investigated in a ^{60}Co gamma field, in order to verify if it can be used as a dosimeter. Fly ash was irradiated to different doses of γ- rays varying from 10 kGy to 60 kGy. The linear response was observed up to 40 kGy of irradiation. $T_m - T_{stop}$ method was used for the estimation of possible number of TL peaks present in glow curve of fly ash. The TL glow curve of fly ash was found to be consisting of four TL peaks at 141, 205, 285 and 347 ^oC respectively. Computerized glow curve deconvolution (CGCD) function was used for the deconvolution of TL glow curve to confirm the exact position of each peak present in the fly ash. Chen's peak shape method and initial rise method were used for the calculation of trapping parameters of observed glow peaks. The total lifetime of each glow peak was also calculated to show their stability at room temperature. The TL response of this fly ash may be considered to be satisfactory for applications in high-dose dosimetry.

Keywords: Fly ash, Thermoluminescence, High dose, Dosimetry.

1. Introduction

A variety of materials have been examined not only for low dose dosimetry, which finds its use in medical applications, but also for high-dose dosimetry, which is necessary in retrospective or industrial dosimetry. There are numerous areas in which very high doses are used, such as nuclear power plants, high-energy particle accelerators and high-dose irradiation facilities for food and flower preservation or the alteration of the properties of solid materials. The habit of high dose irradiation process comes in focus after the establishment of International Atomic Energy Agency (IAEA) in 1957 (Machi, 1995). The practice of irradiation by high doses delivers a number of advantages such as medical and pharmaceutical products sterilization, disinfection of foods and agricultural products, treatment of wire, cable jacket and different